Report and recommendations of the Environmental Protection Authority

Perth - Darwin National Highway (Swan Valley Section)

Commissioner for Main Roads
Western Australia

Report 1569

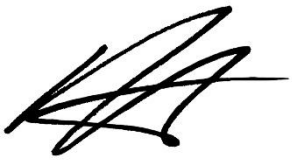
July 2016

Public Environmental Review
Environmental Impact Assessment Process Timelines

Date	Progress stages	Time (weeks)
6/1/2014	Level of assessment set	
31/3/2014	Final Environmental Scoping Document (ESD) approved	12
7/9/2015	Public Environmental Review (PER) document released for public review	75
6/10/2015	Public review period for PER document closed	4
29/2/2016	Final proponent Response to Submissions report received	21
21/4/2016	EPA meeting	7
29/6/16	EPA report provided to the Minister for Environment	10
4/7/16	Publication of EPA report (three working days after report provided to the Minister)	3 days
18/7/16	Close of appeals period	2

Timelines for an assessment may vary according to the complexity of the project and are usually agreed with the proponent soon after the level of assessment is determined.

In this case, the Environmental Protection Authority did not meet its timeline objective in the completion of the assessment and provision of a report to the Minister.



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Summary and recommendations

This report provides the Environmental Protection Authority's (EPA's) advice and recommendations to the Minister for Environment on the outcomes of its environmental impact assessment of the proposal by the Commissioner for Main Roads Western Australia (MRWA) to construct and operate a freeway-standard dual carriageway between the Reid Highway/Tonkin Highway junction and the Great Northern Highway at Muchea. The Minister has nominated the Commissioner for MRWA as the proponent responsible for the proposal.

Section 44 of the *Environmental Protection Act 1986* (EP Act) requires that the EPA prepare a report on the outcome of its assessment of a proposal and provide this assessment report to the Minister for Environment. The report must set out:

- what the EPA considers to be the key environmental factors identified in the course of the assessment; and
- the EPA's recommendations as to whether or not the proposal may be implemented and, if the EPA recommends that implementation be allowed, the conditions and procedures to which implementation should be subject.

The EPA may also include any other information, advice and recommendations in the assessment report as it thinks fit.

The aims of environmental impact assessment and the principles of environmental impact assessment considered by the EPA in its assessment of this proposal are set out in the *Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2012.*

Key environmental factors and principles

The EPA identified the following key environmental factors during the course of its assessment:

1. Flora and Vegetation;
2. Terrestrial Fauna;
3. Hydrological Processes;
4. Inland Waters Environmental Quality;
5. Amenity (Noise and Vibration); and
6. Offsets (Integrating Factor).

There were other environmental factors identified by the EPA during the course of its assessment of the proposal. The EPA's evaluation of whether an environmental factor is a key environmental factor is in Appendix 3.

The EPA also considered the principles and objectives set out in section 4A of the EP Act and has summarised these in Appendix 3.

Conclusion

Having assessed the proposal to construct and operate a freeway-standard dual carriageway between the Reid Highway/Tonkin Highway junction and the Great Northern Highway at Muchea, the EPA considers that the key environmental factors identified can be managed to meet the EPA's objectives. The EPA recommends that the proposal may be implemented, subject to the conditions and procedures set out in Appendix 5 and summarised in Section 4.

Conditions

Having considered the information provided in this report, the EPA has developed a set of conditions that the EPA recommends be imposed if the proposal by the MRWA to construct and operate a freeway-standard dual carriageway between the Reid Highway/Tonkin Highway junction and the Great Northern Highway at Muchea is approved for implementation. These conditions are set out in Appendix 5.

Matters addressed in the conditions include the following:

(a) managing construction and post-construction impacts from the proposal including weeds, dieback, changes in surface water regimes and dust to ensure the impacts to flora and vegetation are minimised as far as practicable;

(b) ensuring that clearing or laydown areas aren't constructed within designated buffer areas to protect a single location of *Caladenia huegelii* and populations of *Grevillea curviloba* subsp. *incurva* and *Darwinia foetida;*

(c) implementing measures to ensure that indirect impacts to *Caladenia huegelii* habitat and populations of *Grevillea curviloba* subsp. *incurva* and *Darwinia foetida* are minimised as far as practicable;

(d) implementing measures to ensure that the condition of the Threatened Ecological Community (TEC) SCP20a '*Banksia attenuata* woodlands over species rich dense shrublands' is maintained or improved;

(e) undertaking progressive rehabilitation for areas identified by the proponent as not being required for ongoing operations;

(f) minimising impacts as far as practicable to conservation significant fauna during construction through the use of fauna spotters, appropriate design of fauna underpasses and preventing the clearing of trees currently occupied by nesting black cockatoos;

(g) implementing measures, including restricting the storage of fuels and chemicals, to ensure that there is no decline in water quality in the Gnangara Underground Water Pollution Control Area and the Ellen Brook;

(h) preventing the construction of laydown areas, stockpiles or chemical storage within the well head protection zones and ensuring that

infiltration basins are not constructed within 100 metres of drinking water production wells;

(i) implementing measures to ensure that construction and operation of the proposal maintains predevelopment surface water flows and does not result in indirect impacts to *Darwinia foetida*, the TECs Claypans of the Swan Coastal Plain and Communities of Tumulus Springs (Organic Mound Springs, Swan Coastal Plain) and Conservation Category Wetlands;

(j) ensuring that impacts from noise emissions on Amenity during operation of the proposal are managed consistent with the requirements of State Planning Policy 5.4 *Road and Rail Transport Noise and Freight Consideration in Land Use Planning* and Environmental Assessment Guideline 13 *Consideration of environmental impacts from noise*; and

(k) requiring that the significant residual impacts identified in this report are appropriately offset through the acquisition and management of land and/or through the provision of funding for management.

Recommendations

That the Minister for Environment notes:

1. that the proposal assessed is for the construction and operation of the Perth-Darwin National Highway (Swan Valley Section);
2. the key environmental factors identified by the EPA in the course of its assessment set out in Section 3; and
3. the EPA has concluded that the proposal may be implemented to meet the EPA's objectives, provided the implementation of the proposal is carried out in accordance with the recommended conditions and procedures set out in Appendix 5 and summarised in Section 4.

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1. Introduction and background

This report provides the advice and recommendations of the Environmental Protection Authority (EPA) to the Minister for Environment on outcomes of the EPA's environmental impact assessment of the proposal by the Commissioner for Main Roads Western Australia (MRWA) to construct and operate a freeway-standard dual carriageway between the Reid Highway/Tonkin Highway junction and the Great Northern Highway at Muchea. The Commissioner for MRWA has been nominated as the proponent responsible for the proposal.

Section 44 of the *Environmental Protection Act 1986* (EP Act) requires that the EPA prepare a report on the outcome of its assessment of a proposal and provide this assessment report to the Minister for Environment. The report must set out:

- what the EPA considers to be the key environmental factors identified in the course of the assessment; and
- the EPA's recommendations as to whether or not the proposal may be implemented, and, if the EPA recommends that implementation be allowed, the conditions and procedures to which implementation should be subject.

The EPA may also include any other information, advice and recommendations in the assessment report as it thinks fit.

The aims of environmental impact assessment and the principles of environmental impact assessment considered by the EPA in its assessment of this proposal are set out in the *Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2012.*

The proponent, the Commissioner for MRWA, referred the proposal to the EPA on 29 October 2013. On 6 January 2014 the EPA set the level of assessment at Public Environmental Review (PER) with a four-week public review period. The Environmental Scoping Document (ESD) for the proposal was approved on 31 March 2014 and the PER was released for public review from 7 September 2015 to 6 October 2015.

The overall Perth-Darwin National Highway (PDNH) is a 4,000 kilometre (km) interstate road transport route linking Perth with northern Western Australia and the Northern Territory. This proposal (the Swan Valley Section) is to construct a new section of the PDNH between Malaga and Muchea to address traffic congestion, increased travel times and the reduced amenity that is experienced on the current alignment of the PDNH in the Swan Valley. The new section of highway will cater for the predicted increase in freight volumes, which are expected to double by 2050.

Previous projects and Schemes

The EPA has previously considered plans, a regional road proposal and scheme amendments, which relate to the PDNH.

In 1994, the EPA released Bulletin 753 *Route Alignment for Perth to Darwin National Highway and Fast Transit Route, excision of Land from State Forest No. 65 and Priority 1 Source protection Area for Urban Development* (EPA 1994). This assessment concerned the construction of a section of the PDNH, or other regional road, and excision of land for the proposed development of what is now the Ellenbrook residential estate. The road proposal was to commence from Reid Highway and follow an alignment close to Lord Street and proceed north around what is now the Ellenbrook residential area. Other route options were considered, however Bulletin 753 identified the alignment close to Lord Street as the preferred route for the PDNH or other regional road.

At the time of referral of the 1994 proposal, the proponent included information regarding different route options considered in determining the preferred route, which was referred, and the EPA provided advice on these in Bulletin 753. One of these route options was similar to the current PDNH proposal and traversed the same areas of the Gnangara Mound, Bush Forever sites, State Forest and Nature Reserves. The EPA advised in Bulletin 753 that this option may be environmentally unacceptable, as it "could be associated with a high level of risk for irreversible impacts to strategic groundwater resources and impacts to important conservation areas and habitat linkages". These issues in relation to the current PDNH proposal have now been assessed by the EPA and are discussed in Section 3.1. Flora and Vegetation and Section 3.3 Hydrological Processes and Inland Waters Environmental Quality of this report.

In October 2011 the EPA received a referral for Metropolitan Region Scheme (MRS) Amendment (1222/41) between Maralla Road in Bullsbrook and the northern boundary of the MRS under section 48A of the EP Act. The purpose of the amendment is to transfer portions of various lots to the primary regional roads reservation in the MRS for the PDNH. The EPA determined that the scheme should not be assessed and provided public advice on the environmental factors relevant to the scheme. The advice was primarily regarding the preparation of and consultation on the management plans for flora and vegetation, wetlands and acid sulfate soils. This amendment has now been completed and the lots which are the subject of the amendment have been gazetted as a primary regional road in the MRS.

While the EPA has previously provided advice on the environmental factors for this section of the road early in the planning stage, the proponent decided to include this section of the road as part of the referred proposal to the EPA in order to have the environmental issues further evaluated at the design stage. At this stage of the project further details of the construction and management of the road are available for assessment. The proponent indicated at the time that the benefits to this approach include providing for greater transparency to project stakeholders and, if the proposal receives environmental approval, one

set of conditions would apply to the overall project, including the southern sections of the proposal that were not part of the MRS amendment.

In 2002 the City of Swan referred a proposal to extend Hepburn Avenue from Marshall Road to Reid Highway which the EPA determined should be assessed at a PER level of assessment. The PER document was advertised in 2004 and was not progressed beyond this stage. The project was put on hold while transport planning for the area continued. The City of Swan agreed to terminate the environmental impact assessment of this proposal in 2014 in recognition that it forms part of the current PDNH proposal. Accordingly, the EPA determined to terminate the assessment of the proposal under section 40A(1)(a) of the EP Act in February 2014.

Commonwealth environmental assessment

The PDNH proposal was determined to be a controlled action under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 27 November 2013 as it may impact on the following Matters of National Environmental Significance:

- listed threatened species and communities (sections 18 and 18A);
- listed migratory species (sections 20 and 20A); and
- the proposal is located on Commonwealth Land (sections 26 and 27A).

In accordance with section 49(1) of the Commonwealth EPBC Act, a bilateral agreement does not have any effect in relation to an action in a Commonwealth area. The Commonwealth area for this proposal is an area of land between Raphael Road and Neaves Road in Bullsbrook which is owned by the Department of Defence. Therefore the proposal is unable to be assessed through the bilateral agreement under section 47 of the EPBC Act. However, the Commonwealth Department of the Environment (DotE) and the EPA have agreed to undertake a coordinated approach to this assessment.

The coordinated approach meant that the proponent prepared one environmental review document (for one public review period) to satisfy the requirements of both the State's Public Environmental Review and the Commonwealth's Public Environmental Report and thereby minimising duplication. The Commonwealth Minister for the Environment is still required to make a decision on the proposal under the EPBC Act.

Appendix 6 contains a summary of submissions from the public review period and the proponent's response to submissions (on CD at the back of this report and at www.epa.wa.gov.au). It is included for information only and does not form part of the EPA's report and recommendations. Relevant significant environmental issues identified from this process have been taken into account by the EPA during its assessment of the proposal.

This report provides the EPA advice and recommendations in accordance with section 44 of the EP Act.

2. The proposal

Proposal summary

MRWA, on behalf of the Commissioner for MRWA (the proponent), proposes to construct and operate a new section of the PDNH to the west of the Swan Valley, Western Australia (WA). The proposal is for a new dual carriageway approximately 38 km in length which connects the intersection of the Tonkin and Reid Highways in the south with the Great Northern and Brand Highways in the north (Figure 1). The proposal involves four traffic lanes in each direction between Tonkin/Reid Highways and Hepburn Avenue and two lanes in each direction in the northern section of the proposal.

The proposal is located within a 985 hectare (ha) development envelope, in which there is a 746 ha disturbance footprint. The road reserve is up to 100 metres (m) in width, with the reserve widening locally where seven grade-separated interchanges are required to access the highway at various locations.

The proposal design includes a reservation of 16 m in the central median between the Tonkin/Reid Highways and Gnangara Road to provide for future transport options. The construction and operation of these future transport options does not form part of this proposal.

The proposal design has also incorporated an interchange at Gnangara Road for a proposed future road heading north-west from Whiteman Park, known as the East Wanneroo North-South Route. The East Wanneroo North-South Route is currently in the early planning stages and also does not form part of this proposal.

The main characteristics of the proposal are summarised in Tables 1 and 2 below, consistent with Environmental Assessment Guideline (EAG) 1 *Defining the Key Characteristics of a Proposal* (EPA 2012). A detailed description of the proposal is provided in Section 4 of the PER document (MRWA 2015).

The potential environmental impacts of the proposal identified by the proponent and their proposed management are summarised in Table ES-2 (Executive Summary) in the PER document (MRWA 2015).

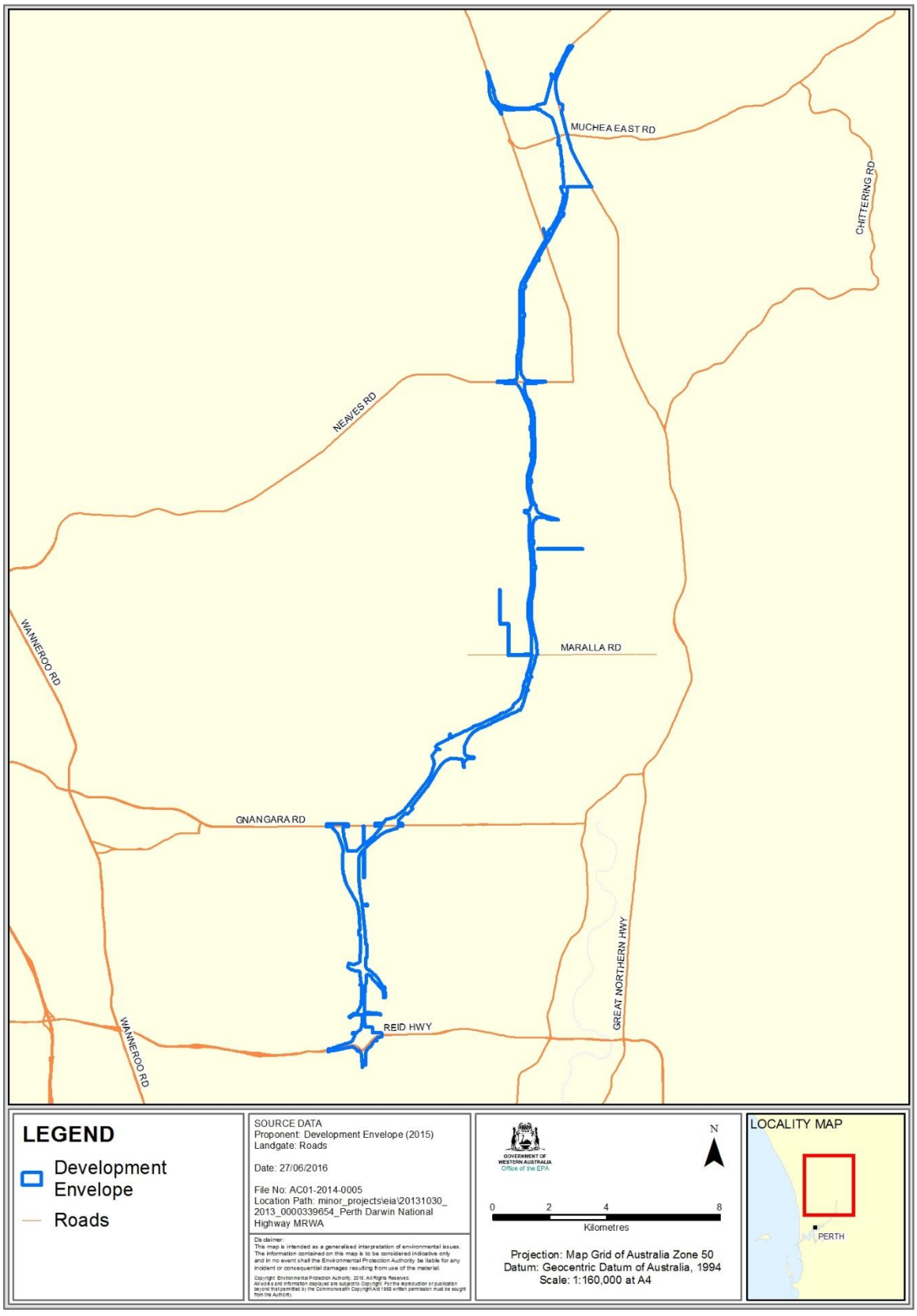

Figure 1: Proposal location

Table 1: Summary of key proposal characteristics

Proposal Title	Perth-Darwin National Highway (Swan Valley Section)
Short Description	The proposal is to construct and operate a new 38 km long section of the Perth-Darwin National Highway between Malaga and Muchea, WA. The proposal would consist of a dual carriageway highway and would connect the intersection of Tonkin Highway and Reid Highway in Malaga with the Great Northern Highway and Brand Highway in Muchea.

Table 2: Location and proposed extent of physical and operational elements

Column 1	Column 2	Column 3
Element	**Location**	**Authorised Extent**
Clearing and disturbance for road corridor, drainage, laydowns, bridges and culverts, fauna fencing, fauna underpasses, noise walls, road train assembly area and principal shared path.	Located within the development envelope as shown in Figure 1.	Clearing and disturbance of no more than 746 ha consisting of up to 206 ha of native vegetation. This includes up to: • 129.9 ha of Bush Forever areas; • 0.4 ha of Class A Nature Reserve 46920; • 0.2 ha of Class A Nature Reserve 46919; • 32.6 ha of Gnangara-Moore River State Forest No. 65; • 4 ha of Floristic Community Type SCP20a Threatened Ecological Community; • 31.9 ha of *Caladenia huegelii* critical habitat; • 2 ha of *Grevillea curviloba* subsp. *incurva* critical habitat*;* and • 16 ha of Conservation Category Wetlands, within a 985 ha development envelope.
Noise walls	Located within the development envelope as shown in Figure 1.	Height of noise walls to be no more than 5 m on residential boundaries between Reid Highway and south of Maralla Road.

Consultation

Six agency submissions and 11 public submissions were received during the public review period. The key issues raised relate to:

- the adequacy of proposed offsets;
- the potential impacts from noise on the amenity of residents;
- the potential impacts from the clearing of native vegetation and fauna habitat particularly on *Caladenia huegelii* and black cockatoos;
- the potential indirect impacts from the proposal including the spread of *Phytophthora cinnamomi* (dieback) and weeds; and
- the potential impacts that changes to hydrological regimes and water quality may have on wetlands and waterways in the area and on local residential and public drinking water source bores.

Issues raised were addressed by the proponent in the Response to Submissions document that was received by the EPA on 29 February 2016 (Appendix 6). A consolidated list of environmental outcomes and proposed management measures can be found in the proponent's Response to Submissions document (MRWA 2016).

In assessing this proposal and considering the submissions, the EPA notes that the proponent has sought to avoid, minimise and rehabilitate environmental impacts associated with the proposal by:

- designing the proposal road alignment to avoid direct impacts to:
    - the Claypans of the Swan Coastal Plain Threatened Ecological Community (TEC);
    - the Communities of Tumulus Springs (Organic Mound Springs, Swan Coastal Plain) TEC in the vicinity of Gaston Road;
    - an individual *Caladenia huegelii* in the Ellenbrook area; and
    - Bush Forever Site 13 which includes a Conservation Category Wetland (CCW),
- relocating the interchange that was planned for Warbrook Road to Stock Road to avoid indirect impacts to the habitat for the critically endangered western swamp tortoise at Twin Swamps Nature Reserve;
- designing the proposed road alignment to minimise impacts to vegetation of Very Good to Pristine condition;
- designing the proposed road alignment to minimise impacts to potential black cockatoo breeding trees by reducing the width of the disturbance footprint between J and Gnangara Road in an area identified by the proponent as containing a high concentration of potential black cockatoo breeding trees;
- designing the crossover at the Brand Highway to minimise impacts to the critical habitat and a known population of *Grevillea curviloba* subsp. *incurva*; and
- rehabilitating areas of disturbance not required for operations.

Since the release of the PER, the proponent has undertaken further targeted flora and vegetation surveys to confirm the impact of the proposal on conservation significant flora species and TECs. Targeted surveys were also undertaken to evaluate the extent and distribution of the flora and fauna values of the proposed offset site on Ioppolo Road. The proponent has also remodelled the proposal's potential noise impacts on noise sensitive premises in the vicinity of the proposal. The results from the targeted surveys and the noise modelling can be found in the Response to Submissions (Appendix 6).

Changes to the proposal

During the assessment process a number of minor changes to the development envelope and disturbance areas were also made, primarily to facilitate connections between the proposal and other roads or to remove redundant infrastructure. These changes were primarily small increases in the development envelope as a result of optimising the design. The changes equate to approximately 72 ha of additional land being included in the development envelope, increasing the overall development envelope from 913 ha to 985 ha.

Of the 72 ha increase, 58.3 ha is native vegetation of which approximately 38 ha is considered to include black cockatoo foraging habitat. Given the increase in the disturbance footprint is not significant and the extent of black cockatoo foraging habitat on the Swan Coastal Plain (as discussed in Section 3.2 Terrestrial Fauna), the EPA considers that these changes do not significantly increase the proposal's impact on the environment. Section 4 of the PER and Section 2 of the proponent's Response to Submission report contains additional details regarding these amendments. The EPA has consented to these changes to the proposal, made during the assessment, under s43A of the EP Act.

3. Key environmental factors

In undertaking its assessment of this proposal and preparing this report and recommendations, the EPA has had regard for the object and principles contained in s4A of the EP Act to the extent relevant to the particular matter being considered. Appendix 3 provides a summary of the principles and how the EPA applied the relevant principles in its assessment.

Having regard to:

- the proponent's PER document;
- public and agency comments on the PER document;
- the proponent's response to submissions;
- the EPA's own inquiries;
- Environmental Assessment Guideline (EAG) No 8 *Environmental Principles, Factors and Objectives* (EPA 2015a); and
- EAG No 9 *Application of a Significance Framework in the Environmental Impact Assessment Process* (EPA 2015b),

the EPA identified the following key environmental factors during the course of its assessment:

1. **Flora and Vegetation** – direct and indirect impacts from the clearing of flora and vegetation within the proposal development envelope resulting in impacts to Declare Rare Flora (DRF), TECs, Priority Ecological Communities (PECs), wetlands, Priority flora and Bush Forever Sites;
2. **Terrestrial Fauna** – impacts to fauna species (including conservation significant fauna) due to habitat loss from clearing, increased risk of vehicle strike and impacts from construction and operational activities;
3. **Hydrological Processes and Inland Waters Environmental Quality** – potential impacts to groundwater and surface water flows and impacts to groundwater and surface water quality from construction activities and operational road run-off;
4. **Amenity (noise and vibration)** – potential impacts of noise and vibration on residences that abut or are adjacent to the road; and
5. **Offsets (Integrating factor)** – to counterbalance the significant residual impacts to flora and vegetation, terrestrial fauna and wetlands.

Other environmental factors relevant to the proposal which the EPA determined not to be key environmental factors are discussed in the PER document (MRWA 2015).

Appendix 3 contains the environmental factors identified through the course of the assessment and the EPA's evaluation of whether an environmental factor is a key environmental factor for the proposal. This includes environmental factors that were identified as preliminary key environmental factors at Level of Assessment which were included in the Environmental Scoping Document and were addressed in the proponent's PER document.

The EPA's assessment of the proposal's impacts on the key environmental factors is provided in Sections 3.1 – 3.5. These sections outline the EPA's conclusions as to whether or not the proposal can be managed to meet the EPA's objective for a particular factor and if so, the recommended conditions and procedures that should apply if the proposal is implemented.

In assessing this proposal, the EPA has also considered relevant published EPA policies and guidelines. Appendix 4 lists the relevant policies and guidance documents relevant for each of the key environmental factors for this assessment and identifies the relevant matters discussed in, and principles derived from, each policy and guidance document. The EPA has discussed the application of the relevant policy and guidance for each factor in Section 3.

A number of policies referred to in ESD were withdrawn or revoked during the assessment process. These are:

- Position Statement (PS) 7 *Principles of Environmental Protection* (EPA 2004d);
- *Environmental Protection (Gnangara Mound Crown Land) Policy 1992;*
- *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992;*
- Guidance Statement (GS) 19 *Environmental Offsets* (EPA 2008b); and
- PS 9 *Environmental offsets* (EPA 2006d)

PS 7 *Principles of Environmental Protection* (EPA 2004d) was considered by the proponent within the PER. This policy was withdrawn in June 2015 and the relevant principles were incorporated into the revised EAG 8. The EPA considers that the proponent has adequately considered EAG 8 and has assessed the proposal having regard to its current policy and guidance.

The objective of the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992* was to protect the beneficial uses and values of certain lakes on the Swan Coastal Plain. This policy was considered in the PER however was revoked after the PER was released for public comment. Within the proposal area all lakes listed under this policy correspond with Swan Coastal Plain wetlands (Parks and Wildlife, 2013b). Notwithstanding the revocation of this policy, the EPA has considered and assessed the impacts to the wetlands of the Swan Coastal Plain, having regard to Parks and Wildlife (2013b).

The objective of the *Environmental Protection (Gnangara Mound Crown Land) Policy 1992* was to protect the level and quality of groundwater, native vegetation and wetlands within the policy area. This policy was considered in the PER however was revoked after the PER was released for public comment. Notwithstanding the revocation of this policy, the EPA has considered and assessed the impacts to the Gnangara Mound through the consideration of the DoW's Water Quality Protection Notes, State Planning Policy (SPP) 2.2 *Gnangara Groundwater Protection* and SPP 2.7 *Public Drinking Water Source Policy*.

The ESD referred to GS 19 *Environmental Offsets* (EPA 2008b) and PS 9 *Environmental offsets* (EPA 2006d), which were withdrawn in August 2014. This change in policy and guidance occurred prior to the release of the PER. Consequently when the proponent prepared the PER it utilised the current policy and guidance. The EPA has therefore assessed the proposal having regard to its current policy and guidance.

The EPA notes that the following policy and guidance relating to the key environmental factors replaced or amended policy and guidance since the ESD was released:

- EAG No 8 Environmental Principles, Factors and Objectives (EPA 2015a);
- EAG No 9 Application of a Significance Framework in the Environmental Impact Assessment Process (EPA 2015b);

- EAG No 13 EPA consideration of environmental impacts from noise (EPA 2014a);
- Environmental Protection Bulletin (EPB) 1 Environmental Offsets (2008 version); and
- WA Environmental Offsets Guidelines (Government of WA 2014).

The proponent considered the above current policy and guidance in its PER.

The EPA considered the above current policy and guidance (policy and guidance amended since the ESD was released) in its assessment (see sections 3.1, 3.4 and 3.5 for further detail).

The EPA notes that other published policies and guidelines were also considered.

3.1 Flora and Vegetation

The EPA's environmental objective for this factor is *to maintain representation, diversity, viability and ecological function at the species, population and community level*.

Relevant EPA policy and guidance

The EPA policy and guidance applicable to Flora and Vegetation for this assessment and relevant matters discussed in each policy and guidance document are outlined in Appendix 4. The EPA considers that the following policy and guidance is relevant to its assessment of the proposal in relation to this factor:

- PS 2 *Environmental Protection of Native Vegetation in WA* (EPA 2000).
- PS 3 *Terrestrial biological surveys as an Element of Biodiversity Protection* (EPA 2002).
- EPB 20 *Protection of Naturally Vegetated Areas Through Planning and Development* (EPA 2013).
- GS 6 *Rehabilitation of Terrestrial Ecosystems (EPA 2006a).*
- GS 10 *Level of Assessment for Proposals Affecting Natural Areas Within the System 6 Region and Swan Coastal Plain Portion of the System 1 Region* (EPA 2006c).
- GS 51 *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in WA* (EPA 2004a).
- *Technical Guide Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2015d).

EPA Assessment

The assessment of impacts for Flora and Vegetation has been placed in the context of the Swan Coastal Plain Region of the Interim Biogeographic Regionalisation of Australia (IBRA). Where further information is available, the EPA has considered these impacts at a subregional level, and has used the administrative boundaries of the Perth-Peel Region (PPR). This is consistent with the position in PS 3 and GS 51 (EPA 2002; EPA 2004a).

The proposal would directly impact on flora and vegetation through the clearing of up to 206 ha of native vegetation. The proposal also has the potential to indirectly impact flora and vegetation through the introduction and/or spread of weeds and dieback and impacts resulting from changes to surface and groundwater flows during construction and operation.

The proponent has undertaken Level 2 flora and vegetation surveys, as required by the ESD (EPA 2014c). The EPA considers that the relevant matters of PS 3 and GS 51 (season, duration and analysis) were met for this proposal. The EPA's *Technical Guide for flora and vegetation surveys* was released in December 2015, and was only available for and utilised by the proponent for targeted flora and vegetation surveys conducted for the Response to Submissions. The EPA considers this approach appropriate.

In designing this proposal, the proponent has considered alternatives and applied the mitigation hierarchy to avoid impacts where possible. In taking reasonable steps to avoid disturbing native vegetation, the proponent has designed the proposal so that approximately 78 per cent of the proposal is located over vegetation classified as being in a Degraded or worse condition. The proponent has reduced the requirement for clearing for fire protection by locating the road adjacent to the Ellenbrook development. The proponent has also considered both direct and indirect impacts. The EPA notes that this approach is generally consistent with the relevant matters in PS 2 and EPB 20.

The potential impacts of the proposal on Flora and Vegetation has been set out below with respect to:

- Vegetation complexes;
- Floristic community types;
- Flora; and
- Bush Forever and other conservation areas.

Vegetation complexes

The majority of the proposal area where clearing of intact native vegetation takes places falls within the Swan Coastal Plain portion of the Perth Metropolitan Region (Bush Forever Study Area). Within this area, surveys identified that five vegetation complexes occur within the development envelope (refer Figure 2). Table 3 lists the extent of each complex to be impacted by the proposal and the percentage loss and pre-European extent remaining as a result of the implementation of the proposal.

A relevant matter outlined in PS 2, with further guidance in GS 10, is the retention at least 10 per cent of each vegetation complex of its pre-European extent on the Swan Coastal Plain portion of the Perth Metropolitan Region (EPA 2000; EPA 2006c).

Table 3: Vegetation complexes impacted by the proposal within the Swan Coastal Plain portion of the Perth Metropolitan Region

Vegetation Complex	Extent of intact native vegetation[1] to be removed by proposal (ha)	Pre-European extent remaining after proposal (%) & (% loss)	Extent in secure conservation tenure (%)
Bassendean Complex Central and South	62.1	21.2 (0.1 %)	1.4
Southern River Complex	44.8	14.2 (0.1 %)	0.7
Yanga Complex	12.5	13.2 (0.2 %)	4.3
Bassendean Complex North –Transition Vegetation Complex	19.2	64.7 (0.6 %)	23.9
Bassendean Complex North	73.4	50.9 (0.3 %)	3.0

[1] The proponent's loss calculations are based on vegetation considered in a 'Degraded' condition or better. The term native vegetation is consistent with the EP Act.

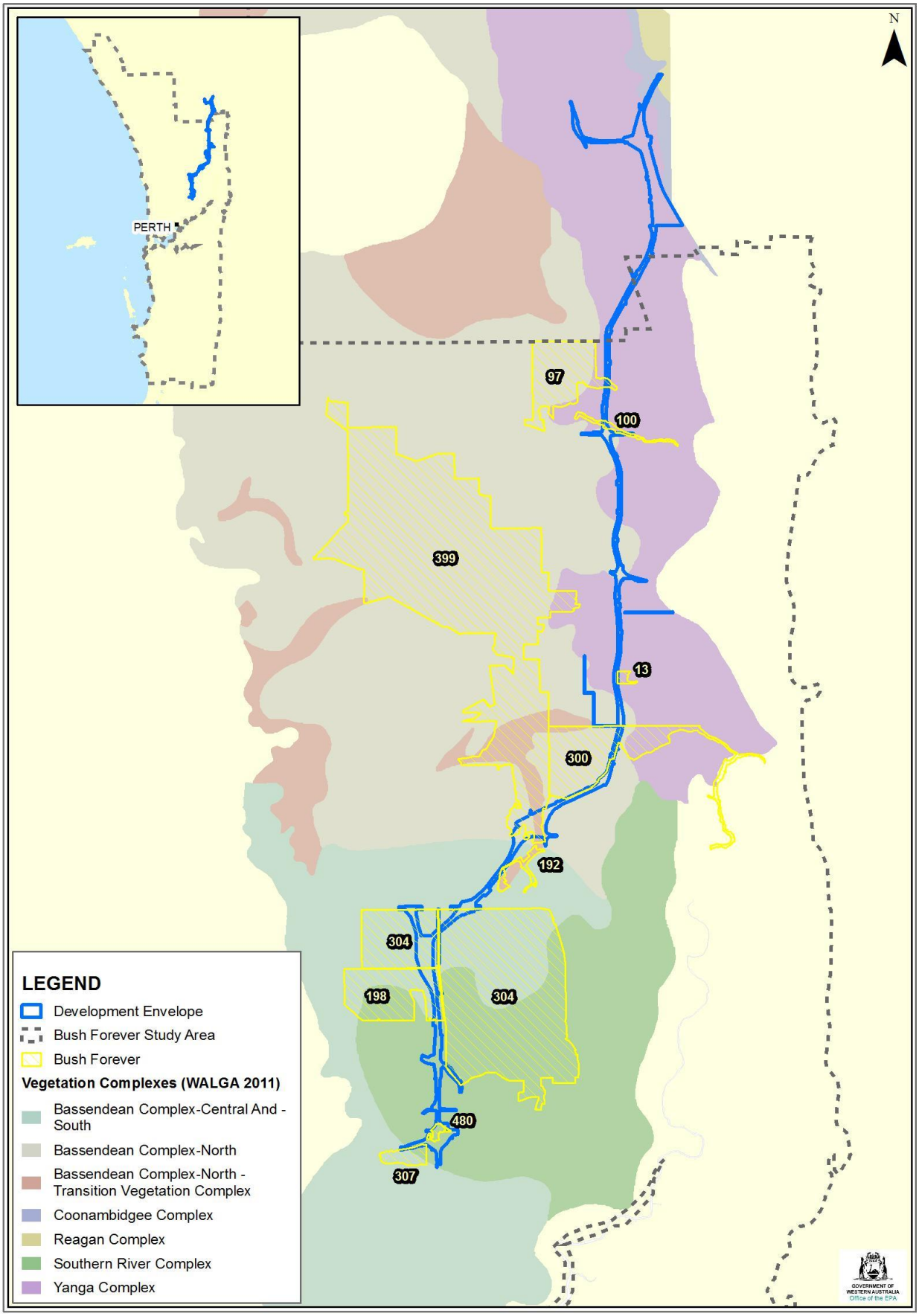

Figure 2: Vegetation Complexes within Bush Forever areas

One vegetation complex impacted by the proposal within the Bush Forever Study Area, the Yanga Complex, is close to the 10 per cent target with 13.2 per cent remaining. This proposal would result in the clearing of 12.5 ha or 0.2 per cent of the remaining Swan Coastal Plain extent.

To ensure direct impacts are not greater than predicted the proponent has proposed a number of management measures including clearly demarcating the clearing boundary and identifying the vegetation to be retained. To manage and mitigate the potential indirect impacts on vegetation during construction, the proponent has indicated it will prepare an environmental management plan (EMP) to limit the risk of fire, spread and/or introduction of weeds and dieback, littering and unauthorised access. To ensure that impacts to vegetation as a result of construction are minimised the EPA has recommended condition 9 be imposed.

The EPA notes these further losses to vegetation complexes and the proponent's proposed management and mitigation measures, however also notes that this proposal would not result in any vegetation complex having less than 10 per cent of its pre-European extent remaining. This proposal is therefore consistent with GS 10 (EPA 2006c).

The proposal also extends outside the Bush Forever Study Area (refer Figure 2) where the EPA's policy position is that 30 per cent of the pre-European extent of each vegetation complex should be retained (EPA 2000; EPA 2006c). This portion of the proposal contains the Yanga Complex, of which there is approximately 16.5 per cent remaining on the Swan Coastal Plain, and this proposal would result in a further loss of 5.5 ha. This equates to a 0.4 per cent reduction in the remaining extent of the Yanga Complex.

The EPA acknowledges the further loss of the Yanga Complex, when it is already below 30 per cent of its Pre-European extent, is inconsistent with PS 2 and GS 10. However, the EPA notes the vegetation proposed to be cleared is in a degraded condition, it covers a small geographic area and constitutes a small incremental loss. In this case, the EPA is satisfied that this small incremental loss is an acceptable impact.

However, taking into consideration the cumulative loss of the Yanga Complex on the Swan Coastal Plain, the EPA considers that the further loss of Yanga Complex outside the Bush Forever Study Area constitutes a significant residual impact. The EPA therefore considers that an offset is required to counterbalance the loss of 5.5 ha Yanga Complex outside the Swan Coastal Plain portion of the Perth Metropolitan Area. This position is in accordance with its current policies and with the WA Environmental Offsets Guideline (Government of WA 2014) and is discussed further in Section 3.5 Offsets.

In considering the objective for this factor at the vegetation complex level, the EPA considers that the proposal is likely to maintain representation, diversity, viability and ecological function at this level.

Floristic community types (FCT)

The vegetation surveys determined that 20 FCTs exist within the flora study area, eight of which are conservation significant. Table 4 shows the conservation significant FCTs which would be impacted by the proposal.

Table 4: FCTs potentially impacted by the proposal

Floristic Community Type (Conservation rating)	Extent within flora study area (ha)	Extent within proposal footprint (ha)	# occurrences # mapped % of known extent impacted by proposal
Claypans of the Swan Coastal Plain (Critically Endangered – Commonwealth and Priority 1 PEC – State)	9.8	0	N/A
Organic Mound Springs, Swan Coastal Plain (Endangered – Commonwealth and Critically Endangered TEC – State)	1.5	0	N/A
SCP20a *Banksia attenuata* woodlands over species rich dense shrublands (Endangered TEC)	12.3	4.0	70 occurrences 69 mapped 0.7 %
SCP21c (Priority 3 PEC)	178.0	64.0	> 65 occurrences 22 mapped 13.1 %
SCP22 (Priority 2 PEC)	3.4	0.1	45 occurrences 0 mapped 3%
SCP23b (Priority 3 PEC)	57.5	11.6	79 occurrences 1 mapped 20.2 %
SCP24 (Priority 3 PEC)	8.1	7.8	33 occurrences 16 mapped 0.76 %
Banksia dominated woodlands on the Swan Coastal Plain (Priority 3 PEC)	488.1	62.2	1 occurrence 1 mapped 12.7 %

The EPA's policy position for FCTs is outlined in PS 2 with further guidance in GS 10 (EPA 2000; EPA 2006c).

The proponent has avoided direct impacts through proposal design to two of the TECs found in close proximity to the proposal, being the Organic Mound Springs, Swan Coastal Plain at Gaston Road and Claypans of the Swan Coastal Plain at Muchea. However, the proponent notes that indirect impacts to these TECs as a result of changes in groundwater and hydrology have the potential to occur (MRWA 2015). These impacts and the management and mitigation measures proposed are discussed in Section 3.3 Hydrological Processes and Inland Waters Environmental Quality.

The proposal would directly impact 4 ha of SCP20a '*Banksia attenuata* woodlands over species rich dense shrublands' (SCP20a), which is listed by the State as an Endangered TEC. The EPA notes that the proponent has avoided an occurrence east of the proposal and further refined the construction footprint through the assessment process to reduce the impact on the remaining two occurrences by a further 0.3 ha.

Despite these avoidance measures the proposal would bisect two occurrences of SCP20a, leaving three smaller remnants (refer Figure 3).The proponent considers that these resulting remnants are likely to remain viable despite their small perimeter to area ratio given their co-location with Bush Forever site 198 (MRWA 2016). However, while the EPA notes that one of these remnants remains contiguous to a larger area of vegetation in Excellent condition, the other two remnants are within a narrow corridor between the proposed development footprint and Beechboro Road North. Most of this corridor contains a power line easement where the vegetation is in a degraded condition, leaving a narrow strip of vegetation (which includes the two SCP20a remnants) in a Very Good to Excellent condition.

Advice from the Department of Parks and Wildlife (Parks and Wildlife) indicates that the remnants of SCP20a are expected to retain some of their conservation values in the short to medium term due to the proximity of adjacent *Banksia* woodlands. However, Parks and Wildlife has advised that these remnants would be unlikely to remain viable in the long term without ongoing management of indirect impacts.

In its Response to Submissions, the proponent recognises that ongoing indirect impacts have the potential to occur and have committed to implementing a Flora and Vegetation Management and Monitoring Plan (FVMMP) to minimise these impacts and ensure the viability of the SCP20a remnants. This plan includes establishing baseline condition, undertaking monitoring, and implementing remedial actions should changes to vegetation health and condition be detected (MRWA 2016).

The EPA therefore considers that, given the condition of the remaining SCP20a remnants are Very Good to Excellent, and the proponent's commitments to manage the threatening processes, these remnants of SCP20a are likely to be

viable in the long term. The EPA has recommended condition 10 to ensure the condition of these remnants of SCP20a are maintained or improved.

Since the release of the proponent's PER document, further information on the distribution of individual occurrences SCP20a in the PPR has become available through the *Perth and Peel Green Growth Plan for 3.5 million – Draft State Strategic Impact Assessment Report* (GGP DSIAR) (Government of WA 2015b). The EPA has utilised this mapping to complement the information in the proponent's PER to support its assessment about whether the proposal is likely to significantly impact the regional representation of SCP20a.

Parks and Wildlife have advised that approximately 560 ha of SCP20a remains on the Swan Coastal Plain, of which the GGP DSIAR estimates that 441 ha of this is within the PPR. Within the PPR, there are approximately 56 occurrences of this community (Government of WA 2015b). The loss of 4 ha of this community as a result of this proposal would therefore reduce the total extent by 0.9 per cent in the PPR and 0.7 per cent on the Swan Coastal Plain.

Taking into account the small incremental loss to SCP20a, the extent remaining in the PPR, and the proponent's measures to manage impacts to the remnants created as a result of this proposal, the EPA considers, in accordance with PS 2, that the further loss of 4 ha is unlikely to increase the conservation category of this TEC or cause this community to cease to exist. Furthermore, the loss is unlikely to impact the regional representation of SCP20a on the Swan Coastal Plain. Therefore in this case, the EPA is satisfied that this small incremental loss is an acceptable impact.

However, taking into consideration the cumulative loss of the SCP20a on the Swan Coastal Plain, the EPA considers that the further loss constitutes a significant residual impact. The EPA therefore considers that an offset is required to counterbalance the loss of 4 ha of SCP20a. This position is in accordance with the WA Environmental Offsets Guideline (Government of WA 2014) and is discussed further in Section 3.5 Offsets.

The proposal would directly impact on five FCTs which are listed as Priority 3 PECs (refer Table 4). The EPA considers that losses of 0.1 ha of SCP22, and 7.8 ha of SCP24, which equates to three per cent and 0.76 per cent respectively of the known extents, represents small incremental losses which are unlikely to result in a significant impact to these communities.

The proposal would also result in the loss of 64 ha of SCP21c, 11.6 ha of SCP23b, and 62.2 ha of *Banksia* dominated woodlands on the Swan Coastal Plain. The EPA notes that the total percentage loss of 15.7 per cent of SCP21c, 20.2 per cent of SCP23b and 12.7 per cent *Banksia* dominated woodlands could be considered high. However, the proponent considers that these percentage losses are likely to be an overestimate given the lack of mapping for most of the known occurrences of theses PECs.

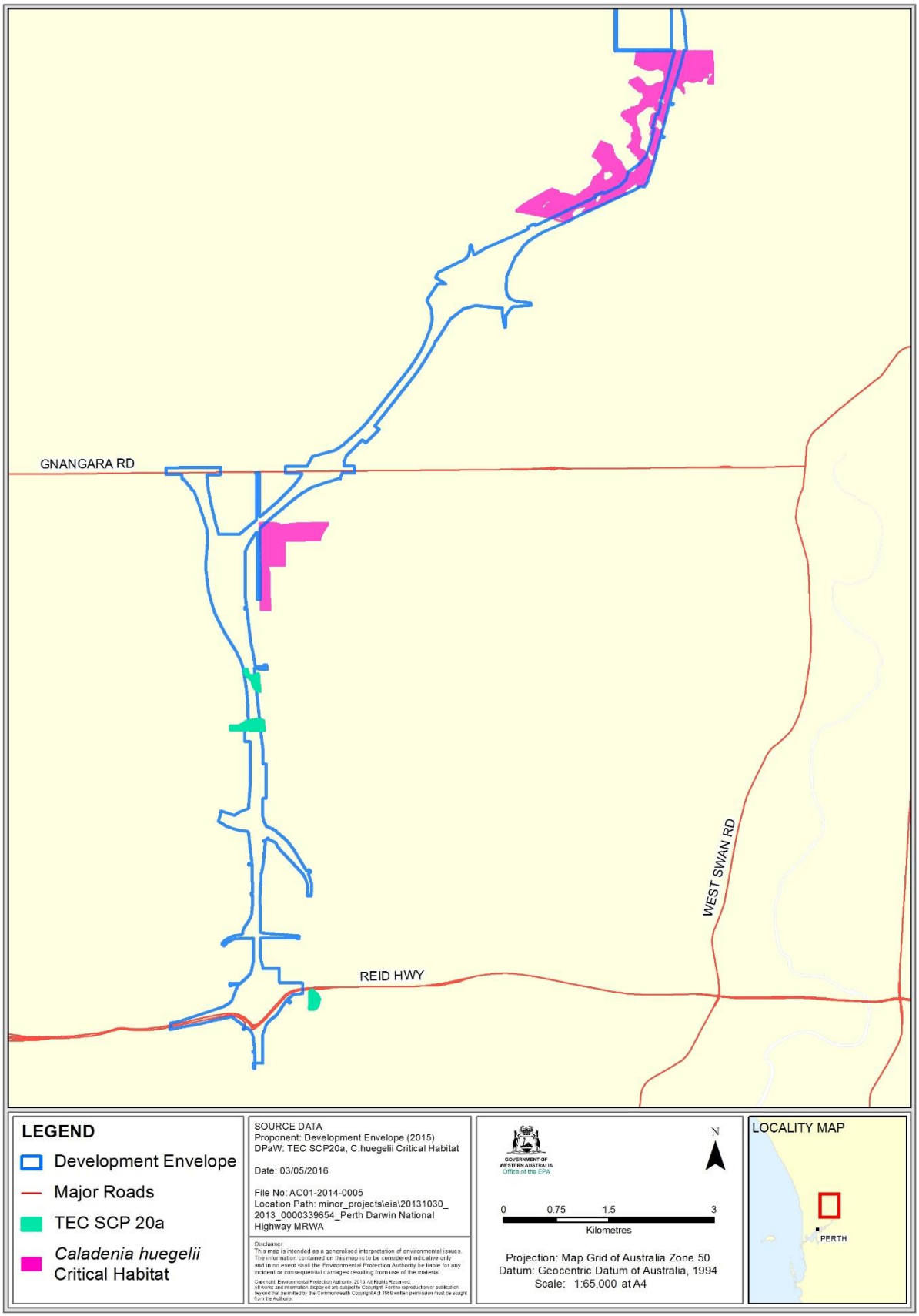

Figure 3: Extent of SCP20a and *Caladenia huegelii* critical habitat within the development envelope

SCP21c ranges from near Muchea to south of Bunbury and the proponent believes that, given the regional distribution, the impact to this vegetation community is not considered significant (MRWA 2015).

For SCP23b, 23 of the known occurrences occur within 15 km of the development envelope and the majority of these occurrences are in Bush Forever sites and/or within state forest (Keighery *et. al* 2012). The proponent considers that the total extent of SCP23b in the vicinity of the proposal would be considerably larger than that mapped within the study area and therefore the proposal is unlikely to have a significant impact on this PEC (MRWA 2015).

The PEC '*Banksia* dominated woodlands on the Swan Coastal Plain' is determined by the presence of the two dominant Banksia species, *Banksia attenuata* and *B. menziesii*. Parks and Wildlife has listed this community as a PEC and the DotE is currently conducting a scientific assessment on its nomination for a listing as an EPBC Act listed TEC. This community is represented by ten different Swan Coastal Plain FCTs. While one occurrence is mapped at this stage, given the broad description of this PEC, other occurrences are likely to be mapped in future. The proponent therefore considers that the impact to this PEC is an overestimate and therefore the impact is not likely to be significant (MRWA 2015).

The EPA recognises that detailed mapping is not available for all PECs on the Swan Coastal Plain and that, in some cases, the predicted impact on these FCTs may be an overestimation. The EPA notes that the proponent is proposing a construction EMP to manage and mitigate indirect impacts (MRWA 2016). To ensure that impacts to vegetation as a result of construction are minimised the EPA has recommended condition 9 be imposed.

In considering the proponent's management and mitigation measures and the likely extent remaining of these PECs, the EPA considers that the impact represents a small incremental loss and is unlikely to impact the representation of these PECs on the Swan Coastal Plain. Furthermore, the EPA considers, in accordance with PS 2, that the conservation rating of these PECs would not increase and the proposal is unlikely to cause these communities to cease to exist. In considering the objective for this factor at the FCT level, the EPA considers that the proposal is likely to maintain representation, diversity, viability and ecological function at the community level.

Flora

The vegetation surveys found the following DRF species within the study area:

- 1 individual *Caladenia huegelii* (Grand Spider Orchid), Critically Endangered DRF;
- 137 individual *Grevillea curviloba* subsp. *incurva*, Endangered DRF; and
- 41 individual *Darwinia foetida* (Muchea Bell), Critically Endangered DRF.

C. huegelii, which is also listed as Endangered under the EPBC Act, is a tall growing orchid species which dies back to an underground tuber during summer and only has an active growing period from May to mid-November. This species is only identifiable during the brief flowering period from September to October and doesn't flower every year. These characteristics therefore can make the species difficult to find, and it is considered highly likely that additional unknown populations exist (Government of WA 2015a).

Since the release of the proponent's PER document, further information on the size and distribution of populations of *C. huegelii* in the PPR has become available through the *Perth and Peel Green Growth Plan for 3.5 million – Draft EPBC Act Strategic Impact Assessment Report* (GGP DCIAR) (Government of WA 2015a). The EPA has utilised this mapping to complement the information in the proponent's PER to support its assessment about whether the proposal is likely to significantly impact the regional representation of *C. huegelii*.

C. huegelii is also the subject of an Interim Recovery Plan, which aims to maintain or improve the conservation status of this species by ensuring the continued survival of known populations, abating identified threats to populations, and supporting future increases in area of occupancy and numbers of mature plants through translocations once successful techniques are established (Department of Environment and Conservation 2008b).

Across the species' range it is known from a total of 50 populations and comprises an estimated total of 1,340 mature individuals (Government of WA 2015a). The majority of populations are small (less than 10 individuals) and occur in small disjunct remnants of natural vegetation. Within the PPR there are 43 populations, eight of which occur in land managed by Parks and Wildlife with a further 15 populations occurring in Bush Forever Sites or Crown Reserves that have a conservation purpose. A number of the populations within the PPR occur on land that is not within secure conservation tenure or have been identified for conservation (Government of WA 2015a).

The proponent has avoided impacting the individual *C. huegelii* within the development envelope through locating the construction footprint approximately 60 m away. The proponent has also indicated it will apply a minimum buffer of 50 m from the proposal footprint to ensure the ecological processes necessary for the plant are maintained. The individual however is located approximately 20 m west of the Ellenbrook development and is likely experiencing a range of indirect impacts that are expected to be ongoing. While the proponent notes that the individual is persisting in this location despite these indirect impacts, they have proposed an EMP to manage and mitigate indirect impacts as well as a FVMMP to monitor *C. huegelii* health and condition (MRWA 2016). To manage both construction and operational indirect impacts, the EPA has recommended conditions 9 and 10 be imposed.

While not impacting any individual, the proposal would impact critical habitat of *C. huegelii* (refer Figure 3). The proponent has defined critical habitat as the current known occupancy of a population and areas of similar habitat surrounding the known populations. The proponent undertook additional

surveys as part of its Response to Submissions to confirm the area of critical habitat that would be impacted by the proposal. The surveys found 185.1 ha of critical habitat within the study area, of which 31.9 ha is within the proposal development envelope. During the surveys no additional individuals of *C. huegelii* were found (MRWA 2016).

The proposal would directly impact on 30 ha of critical habitat and a further 1.9 ha of critical habitat would be indirectly impacted as a result of fragmentation (MRWA 2016). To manage and mitigate the potential indirect impacts to the critical habitat the proponent has indicated it will prepare an EMP to address threats including weeds, dieback, altered fire regimes and illegal dumping (MRWA 2016). The Interim Recovery Plan recognises that weeds, altered fire regimes and loss of habitat are key threats to this species (Department of Environment and Conservation 2008b).

Mapping undertaken to inform the GGP DCIAR across the species' range identified 476 ha of known and supporting habitat, with supporting habitat defined as remnant vegetation within 200 m of a known population (Government of WA 2015a). The loss of 31.9 ha of this habitat as a result of this proposal would therefore reduce the total extent by 6.7 per cent on the Swan Coastal Plain. The EPA notes that the proponent has defined supporting habitat differently to the GGP DCIAR, and therefore the regional impact is likely to be an overestimation.

To ensure that impacts to flora and vegetation as a result of construction and operation are minimised the EPA has recommended conditions 9 and 10 be imposed which would ensure that construction and post-construction impacts to *C. huegelii* and its habitat are minimised as far as practicable. Condition 9-8 also requires the proponent to ensure that no clearing or construction of laydown areas takes places within 50 m of the individual.

Taking into account that the impact represents a small incremental loss of *C. huegelii* critical habitat, the extent remaining of critical habitat and the proponent's measures to manage impacts to the individual and critical habitat, the EPA considers that, in accordance with PS 2, the further loss of 31.9 ha of critical habitat is unlikely to cause this species to become extinct and is unlikely to impact the regional representation of *C. huegelii* on the Swan Coastal Plain. In this case, the EPA is satisfied that this small incremental loss is an acceptable impact.

However, the EPA considers that the proposal would result in a significant residual impact to 31.9 ha of critical habitat for *C. huegelii* and would require an offset. This position is in accordance with the WA Environmental Offsets Guideline (Government of WA 2014) and is discussed further in Section 3.5 Offsets.

As mentioned above, *C. huegelii* is also the subject of an Interim Recovery Plan (Department of Environment and Conservation 2008b). The EPA does not consider that this proposal would impact the ability of the Interim Recovery Plan to achieve its objective.

G. curviloba subsp. *incurva*, which is also listed under the EPBC Act, is a shrub that occurs predominately outside the PPR across a 30 km area from Bambun to Bullsbrook, with most populations occurring in the Muchea area. The subspecies tends to be associated with two listed TECs, however this population is located in a 20 m wide strip of degraded and weedy vegetation between the Brand Highway and the Midland-Geraldton railway line (MRWA 2016; Government of WA 2015a).

Since the release of the proponent's PER document, further information on the size and distribution of populations of *G. curviloba* subsp. *incurva* in the PPR has become available through the GGP DCIAR (Government of WA 2015a). The EPA has utilised this mapping to complement the information in the proponent's PER to support its assessment about whether the proposal is likely to significantly impact the regional representation of *G. curviloba* subsp. *incurva*.

This subspecies is known from a total of nine populations comprising approximately 875 mature individuals. *G. curviloba* subsp. *incurva* is also the subject of an Interim Recovery plan which aims to abate identified threats and maintain and/or enhance in situ populations to ensure the long-term preservation of the taxon in the wild (Phillimore and English 2000).

The proponent has avoided impacting any individuals by designing the proposal to include a bridge over the railway line and ensuring the proposal is constructed no closer than the existing Brand Highway. However individuals are located within 10 m of the proposal and therefore indirect impacts are likely. Given the population's existing location in the road/rail reserve, the population is experiencing a range of indirect impacts, including weed invasion, which are expected to be ongoing. While the proponent notes that the population is persisting in this location, they have proposed an EMP to manage and mitigate indirect impacts as well as a FVMMP to monitor the health and condition of the population (MRWA 2016). The EPA has recommended conditions 9 and 10 to manage construction impacts to flora and vegetation, to ensure that no construction takes places within 10 m of any individual and to ensure that post-construction impacts to *G. curviloba* subsp. *incurva* are minimised as far as practicable.

While not impacting any individuals, the proposal would impact 2 ha of *G. curviloba* subsp. *incurva* critical habitat. The degraded vegetation along the Brand Highway verge is considered to be critical habitat for this subspecies due to the known area of occupancy and the link the verge provides to other known populations (Phillimore and English 2000). The proponent considers that this impact to critical habitat is minor and that the bridge would maintain connectivity between sub-populations in a north-south direction.

Taking into account that no *G. curviloba* subsp. *incurva* individuals would be impacted and the proponent's measures to manage impacts to the individuals and critical habitat, the EPA considers that, in accordance with PS 2, the proposal is unlikely to cause this subspecies to become extinct. Furthermore,

the EPA considers that the impact to critical habitat represents a small incremental loss and is unlikely to impact the regional representation of *G. curviloba* subsp. *incurva* on the Swan Coastal Plain. Therefore an offset is not considered necessary.

As mentioned above, *G. curviloba* subsp. *incurva* is also the subject of an Interim Recovery Plan (Phillimore and English 2000). The EPA does not consider that this proposal would impact the ability of the Interim Recovery Plan to achieve its objective.

D. foetida, which is also listed under the EPBC Act, is a shrub that occurs in the Muchea, Bullsbrook and Chittering areas. This species is known to occur in swampy and seasonally wet habitats and changes to hydrology are identified as a potential threat to the species (DoTE 2016).

Since the release of the proponent's PER document, further information on the size and distribution of populations of *D. foetida* in the PPR has become available through the GGP DCIAR (Government of WA 2015a). The EPA has utilised this mapping to complement the information in the proponent's PER to support its assessment about whether the proposal is likely to significantly impact the regional representation of *D. foetida*.

This species is known from four existing populations and approximately 1,875 mature individuals. While no *D. foetida* were recorded during the surveys, this species was identified as being likely to occur in the proposal area. Recent flora surveys commissioned by the proponent for a separate proposal found two new populations of *D. foetida,* one of which is located within the development envelope. This population contains 17 individuals located in vegetation 2 m from the edge of a roadside rest area on the western side of Great Northern Highway. The proponent has indicated it will avoid direct impacts to the *D. foetida* population within the development envelope through location of the construction footprint.

No formal critical habitat has been described for *D. foetida* (DotE 2016) however, the proponent has assumed the critical habitat for *D. foetida* to include areas of similar habitat surrounding the population. This includes wetland habitats and therefore maintaining water flows within this area would be considered critical.

Given the proximity of the *D. foetida* population to the activities of the proposal there is the potential for indirect impacts to the population to occur. These include habitat degradation from dust, altered hydrology and an increased spread of weeds and dieback. Due to the location of the *D. foetida* population it is already exposed to many of these threats as well as illegal rubbish dumping and altered fire regimes.

The proponent has indicated it will maintain existing vegetation within 10 m of the population, which would include the roadside drainage structure that provides a sumpland habitat for the species. The proponent is also proposing

an EMP to manage and mitigate indirect impacts as well as a FVMMP to monitor population health and condition (MRWA 2016).

The EPA has recommended conditions 9, 10 and 14 to manage construction impacts to flora and vegetation, to ensure that no clearing of vegetation or construction of laydown areas or stockpiles takes places within 10 m of any individual and to ensure that post-construction impacts to the *D. foetida* population are minimised as far as practicable. This includes maintenance of predevelopment surface water flows to the area occupied by the *D. foetida* population.

Taking into account that no *D. foetida* individuals would be impacted and the proponent's measures to manage impacts to the population and critical habitat as far as practicable, the EPA considers that, in accordance with PS 2, the proposal is unlikely to cause this species to become extinct. Furthermore, the EPA considers that the implementation of the proposal is unlikely to impact the regional representation of *D. foetida* on the Swan Coastal Plain. Therefore, an offset is not considered necessary.

The vegetation surveys also found five species of Priority Flora present in the proposal footprint. For three of these species the proposal would impact less than 0.2 per cent of known individuals and as a result the proponent considers the potential impact to be minor.

For the other two species of priority flora, the initial flora studies conducted by the proponent predicted that the proposal would impact 18.8 per cent of the known extent of Priority 2 species *Millotia tenuifolia* var. *laevis* and 50 per cent of the known extent of Priority 3 species *Meeboldina decipiens* subsp. *decipiens ms*. To confirm the significance of this impact, the proponent undertook additional spring surveys as part of its Response to Submissions. These surveys concluded that:

- *Millotia tenuifolia* var. *laevis* is widely distributed outside the development envelope as an additional 5,222 individuals in eight populations were found. The impact to this species is now not considered significant at a local or regional scale; and
- *Meeboldina decipiens* subsp. *decipiens ms* was misidentified in the original surveys and is not found in the development envelope.

Given the small extent of impacts to Priority Flora, the EPA considers that the impacts represent small incremental losses and are unlikely to impact the representation of any of these species on the Swan Coastal Plain. The EPA has recommended conditions 9 and 10 to manage construction impacts to flora and vegetation and to ensure that post-construction impacts to flora and vegetation are minimised as far as practicable. In considering the objective for this factor at the species level, the EPA considers that the proposal is likely to maintain representation, diversity, viability and ecological function at the species level.

Impacts to Bush Forever Sites and other conservation areas

The proposal would result in the direct loss and fragmentation of regionally significant vegetation as it traverses the following Bush Forever Sites and other conservation areas as presented in Table 5 and Figures 4a and 4b. The proposal would impact a total of 188.7 ha of Bush Forever Sites, of which 129.9 ha is intact native vegetation. The EPA notes that Bush Forever Sites 97 and 100 were the subject of a previous referral (MRS 1222/41 discussed in Section 1). Notwithstanding this, the EPA has considered the values of the sites being impacted.

Table 5: Impacts to Bush Forever Sites and other conservation areas

Bush Forever Sites and conservation areas	Extent of intact native vegetation[1] impacted by proposal (ha)	Total loss of area (ha)[2]	Extent remaining (%)
BF Site 198: Beechboro Road Bushland, Cullacabardee/Ballajura	30.7	31.3	93.7
BF Site 304: Whiteman Park, Whiteman West Swan	29.9	75.1	98.9
BF Site 399: Melaleuca Park and Adjacent Bushland, Bullsbrook/Lexia	30.8	37.9	99.3
BF Site 300: Maralla Road Bushland, Ellenbrook/Upper Swan	16.9	16.9	97.4
BF Site 192: Wetherell Road Bushland, Lexia/Ellenbrook	1.3	1.3	97.0
BF Site 307: Lightning Swamp and Adjacent Bushland, Noranda	1.0	1.1	98.7
BF Site 97: Kirby Road Bushland, Bullsbrook	3.3	3.3	99.3
BF Site 100: Neaves Road Creek, Bullsbrook	0.2	3.5	99.4
BF Site 480: Victoria Road Bushland, Malaga/Beechboro	15.9	18.2	15.9
Class A Reserve 46919	0.2	0.25	99.8
Class A Reserve 46920[3]	0.4	7.4	63.9
Gnangara-Moore River State Forest No. 65[3]	32.6	91.2	99.9

Note: values may not sum to totals due to rounding

[1] The proponent's loss calculations are based on vegetation considered in a Degraded condition or better. The definition of native vegetation is consistent with the EP Act.

[2] Some Bush Forever Sites contain infrastructure or areas considered in a Degraded to Completely Degraded condition.

[3] These reserves include areas of pine plantation and have not been considered as intact native vegetation. These areas are proposed to be cleared by the Forest Products Commission.

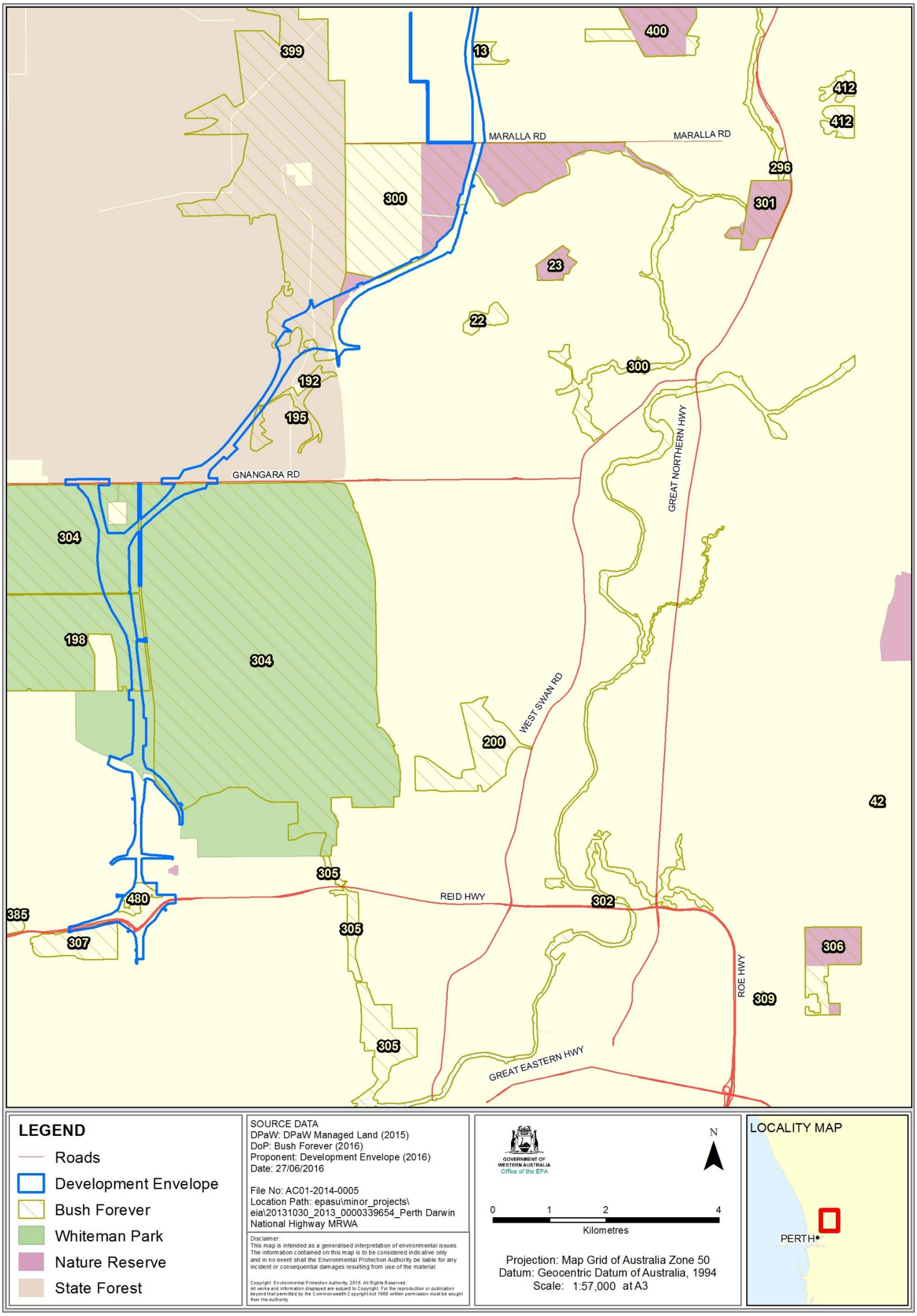

Figure 4a: Bush Forever Sites and other conservation areas within the southern section of the development envelope

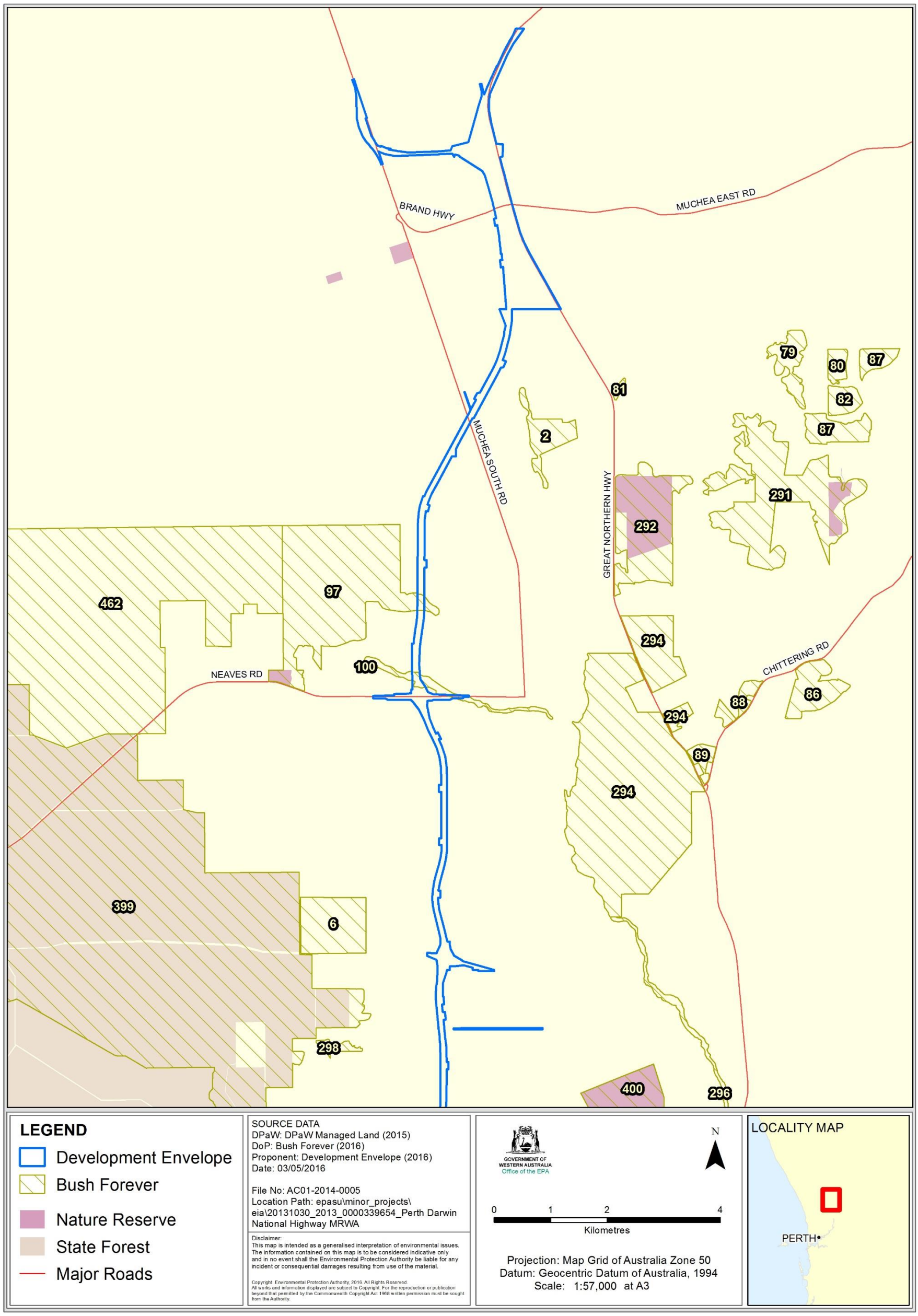

Figure 4b: Bush Forever Sites and other conservation areas within the northern section of the development envelope

The EPA's policy position for regionally significant vegetation is outlined in EPB 20 and GS 10 (EPA 2013; EPA 2006c). The regional significance of vegetation is determined by six criteria, described in GS 10, which identifies the values of a particular area based on factors including size and shape, vegetation condition and the presence of wetlands and TECs.

The EPA also notes that SPP 2.8 *Bushland Policy for the Perth Metropolitan Region* (WAPC 2010) provides guidance and criteria for decision making relating to regionally significant bushland identified in *Bush Forever,* a key government initiative which the EPA has endorsed. The EPA further notes that EPB 20 specifically identifies that it complements SPP 2.8 and many of the design and conservation considerations referred to in SPP 2.8 are consistent with existing EPA's policy considerations. The EPA's consideration of impacts on TECs, PECs, priority significant flora and conservation category wetlands have been discussed in specific detail above.

Whiteman Park, which includes Bush Forever Sites 198 and 304, is currently bisected by Beechboro Road North (refer Figure 4a). Due to design constraints, this proposal is located adjacent to but not contiguous with this road and as a result the proposal would create three additional areas of remnant vegetation. Most of the 30.7 ha of vegetation to be lost within Site 198 is in a Very Good to Excellent condition, while most of Site 304 is in a Degraded condition. The proponent considers that, while fragmented by roads, these areas would persist as they are either adjacent to the larger Bush Forever Site 304 to the east and north (remnants from Site 198) or have a large area-to-perimeter ratio (remnants from Site 304).

The EPA notes that, as part of this proposal, the proponent is proposing to decommission part of Beechboro Road North (from Jules Steiner Memorial Drive north) and therefore would be undertaking rehabilitation works. This would reconnect two areas of Bush Forever Site 304 into a larger consolidated area that would otherwise be further fragmented by the proposal. The EPA considers this would improve the resilience of these two areas of Bush Forever Site 304. The EPA considers that the relevant matters of GS 6 have been adequately considered by the proponent for the rehabilitation and decommissioning proposed for the proposal. The EPA has recommended that condition 11 be imposed requiring the proponent to undertake rehabilitation of this area within six months of decommissioning.

Bush Forever Site 399 overlaps the Gnangara-Moore River State Forest and, as a result of the proposal, would create three additional areas of remnant vegetation (refer Figure 4a). Vegetation condition across the area impacted by the proposal ranges from Completely Degraded to Excellent. The proponent considers that two of these remnants would remain viable as they have a large area-to-perimeter ratio. One of these remnants is located within the State Forest, while the other would be within the development envelope but not required for the construction footprint. This second area would remain in the road reserve. The proponent predicts that one small remnant of Site 399 is unlikely to retain its values as a Bush Forever Site as the remnant is 0.3 ha.

Bush Forever Site 300 overlaps a Parks and Recreation Reserve owned by the Western Australian Planning Commission (WAPC), two A Class Nature Reserves and a Road Reserve (refer Figure 4a). The 16.9 ha of vegetation to be lost is predominately in a Very Good, to Pristine to Excellent condition. In the original Bush Forever Implementation Guide, it was recommended that this site be reserved for protection (Government of WA 2000). However, subsequent amendments to the MRS have resulted in most of the area impacted by the proposal being reserved as a Primary Regional Road.

The development envelope is located along the edge of Bush Forever Sites 192 and 307 (refer Figure 4a). Site 192 is within the State Forest and the proposal would remove 1.3 ha of rehabilitated vegetation that is considered Completely Degraded. The proposal would also fragment Site 192 by removing a narrow strip that connects the two areas of the site. The proponent considers that both fragmented areas would retain their values given the large size of the smallest remnant area (13.9 ha) and high area-to-perimeter ratio. Bush Forever Site 307 is reserved as Parks and Recreation in the MRS and the proposal would remove 1.0 ha of roadside vegetation in a Very Good condition. While noting that both of these sites were identified as areas for protection within Bush Forever, given the small area to be cleared and that a large area of consolidated vegetation will remain for each site, the EPA considers that the loss of these areas would not significantly impact the values of Bush Forever sites 192 or 307.

The proposal would bisect the two northern Bush Forever sites 97 and 100, both of which contain wetland areas and are surrounded by open paddocks (refer Figure 4b). The impact to Site 97 is 3.3 ha or 0.7 per cent and the development envelope would separate a small section (4.3 ha) from the remaining site. The area to be lost is in a Very Good to Good condition. To maintain hydrological connectivity to the wetlands and allow fauna movements the proponent has indicated it will install culverts and fauna underpasses in this location. This would also minimise impacts to the adjacent Organic Mound Springs, Swan Coastal Plain TEC. These issues are discussed further in Sections 3.2 and 3.3.

Within Site 100, the 0.2 ha of vegetation within the 3.5 ha Bush Forever Site which would be lost is in a Completely Degraded condition and the site would be fragmented into three smaller remnants (refer Figure 4b). One of these remnants is not expected to retain its values due to its small size. To ensure the hydrological connectivity and ecological linkage between the fragmented Bush Forever Site 100 are maintained, the proponent would be installing culverts and fauna underpasses. This is discussed further in Sections 3.2 and 3.3. The proponent is also proposing to use road side vegetation to form an ecological linkage between Bush Forever sites 97 and 100.

The proposal would result in a significant impact to Bush Forever Site 480, with 15.9 per cent of the site remaining at the intersection of the Tonkin and Reid highways following direct impacts to 15.9 ha of the 18.2 ha site (refer Figure 4a). The proponent considers this area constrained as residential areas abut the road reserve, leaving few opportunities for avoiding the clearance of

vegetation. The Bush Forever Implementation Guide recognised that this area may be required for a future road (Government of WA 2000) and the site is reserved as a Primary Regional Road under the MRS. The proponent considers that the resulting remaining fragment of Site 480 is likely to retain its values as it occurs in association with a larger area of CCW and contains vegetation in a Very Good to Excellent condition. The proponent is proposing to manage this area to ensure the remnant retains its values as a Bush Forever Site.

The proposal is located between two adjacent Nature Reserves and fragments the Gnangara-Moore River State Forest (refer Figure 4a). Direct impact to Nature Reserve 46919 at Maralla Road is considered to be very minor as the proposal would remove 0.2 ha from the edge of the reserve. However the proposal would remove native vegetation in the road reserve that connects Nature Reserves 46919 and 46875. Both reserves are large and the proponent proposes fauna underpasses in this location to minimise the impacts to ecological linkages. Impacts to fauna are discussed further in Section 3.2 Terrestrial Fauna.

Reserve 46920 is predominately pine plantation and, while the proposal would require 7.4 ha to be excised from the conservation reserve system, the area of intact native vegetation that would be lost in this area as a result of the proposal is small (0.4 ha). The Gnangara-Moore River State Forest also contains large areas of pine plantation, however the EPA notes that 32.6 ha of native vegetation would be lost. While the proposal would fragment the State Forest, both remaining areas are large.

To manage and mitigate the potential indirect impacts on vegetation, the proponent has indicated it will implement an EMP to limit the risk of fire, spread and/or introduction of weeds and dieback, littering, and unauthorised access. In addition, the proponent is also proposing a FVMMP, which would include establishing baseline condition, undertaking monitoring, and implementing remedial actions should changes to vegetation health and condition be detected (MRWA 2016). The FVMMP would apply to the TECs and PECs, which align with the areas of vegetation in Good or better condition in Bush Forever sites 198, 304, 399, 300 and 97.

The EPA has recommended conditions 9 and 10 to manage construction impacts to flora and vegetation, which include impacts from weeds and dieback and to ensure that post-construction impacts to flora and vegetation are minimised as far as practicable. The EPA has also recommended condition 11 be imposed which requires the proponent to progressively rehabilitate areas not required for ongoing operations. This includes the areas of Beechboro Road North to be decommissioned. As part of this condition, the proponent would be required to establish appropriate completion criteria to determine the success of rehabilitation measures.

In considering the EPA's policy position in EPB 20 (which complements SPP 2.8) and GS 10 the EPA notes that:

- approximately 78 per cent of the proposal is located over vegetation classified as being in a Degraded or worse condition;
- the proponent has avoided naturally vegetated areas as far as practicable given the design constraints of the road;
- from Lord St adjacent to Ellenbrook to north of Neaves Road the proposal is located within a MRS Regional Road Reserve previously assessed by the EPA (EPA 1994);
- the requirement for clearing for fire protection has been reduced by locating the road adjacent to the Ellenbrook development; and
- connectivity would be maintained through the installation of fauna underpasses and therefore fragmentation would be minimised.

However, the proposal would result in the fragmentation and further loss of Bush Forever and conservation areas. In considering these impacts, the EPA notes that these losses would not result in the remaining extent of any of the impacted Bush Forever Sites being reduced below 93 per cent, with the exception of Bush Forever Site 480 and Reserve 46920. As discussed above, Site 480 is currently zoned as a Primary Regional Road and has limited opportunities to minimise impacts further and Reserve 46920 is pine plantation.

The EPA acknowledges that the proposal would result in some fragmentation of consolidated areas and is therefore not consistent with some of the relevant matters outlined in EPB 20. The EPA also notes that SPP 2.8 has a general presumption against clearing regionally significant bushland, except where the proposal is consistent with the intent of the reserve or has existing environmental or planning commitments or approvals. SPP 2.8 acknowledges that some proposals may result in an unavoidable adverse impact on bushland and considers that all reasonable steps should be taken to avoid and minimise any impacts to bushland.

The EPA recognises that the proposal does not fully comply with the expectations of EPB 20 or the presumption referred to SPP 2.8, but notes the following on a case by case analysis:

- the majority of areas that remain in a consolidated block have a low perimeter-to-area ratio;
- where fragmentation has resulted in the creation of smaller remnant areas, impacts would be minimised by the use of culverts and underpasses to aid connectivity; and
- the proposal is located over vegetation in a Degraded condition where possible to minimise the impacts of fragmentation.

Taking these factors into consideration, the EPA considers that the potential impacts from fragmentation are acceptable as the remaining conservation areas will remain viable. In reviewing the objective for this factor, the EPA considers that the proposal is likely to maintain the viability and ecological function at the community level. The EPA however considers that there will be significant residual impact on specific areas of consolidated regionally significant vegetation, particularly Bush Forever areas. The EPA therefore

considers that an offset is required to counter balance the loss of 7.65 ha of A Class Nature Reserves and 129.9 ha of Bush Forever areas. This position is in accordance with the WA Environmental Offsets Guideline (Government of WA 2014) and is discussed further in Section 3.5 Offsets.

Summary

Having regard to the:

- relevant policy and guidance pertaining to Flora and Vegetation;
- public submissions;
- avoidance and minimisation measures proposed by the proponent;
- potential impacts of the proposal on vegetation complexes, flora, threatened and priority vegetation communities, Bush Forever sites and other conservation areas;
- degree of vegetation loss at the vegetation complex scale within the Perth Metropolitan Region is consistent with the EPA's policy position in GS 10;
- small incremental loss of the Yanga Complex, which is in a predominately degraded condition;
- small incremental loss of the TEC SCP20a, which is unlikely to impact the regional representation of SCP20a on the Swan Coastal Plain;
- prediction that the proposal would not cause the extinction or change in conservation status of the TEC, PECs, C. huegelii or other species of Priority Flora or DRF and meets the relevant matters of PS 2;
- monitoring, management and mitigation measures to reduce the impact to consolidated areas of regionally significant vegetation, in accordance with EPB 20;
- loss and fragmentation of regionally significant vegetation in conservation areas, which is unlikely to affect the viability of the remaining areas; and
- fact that no flora species or vegetation communities would be impacted to the extent that it would significantly affect its diversity, viability or ecological function,

the EPA considers that the proposal can be managed to meet the EPA's objective for Flora and Vegetation provided that conditions 9, 10, 11, 14 and 16 are imposed requiring the proponent to:

- manage construction and post construction impacts to flora and vegetation, which includes preventing construction activities from taking place within buffer areas for DRF;
- ensure that indirect impacts to *Grevillia curviloba* subsp. *incurva*, *Darwinia foetida, Caladenia huegelii,* Claypans of the Swan Coastal Plain and Organic Mound Springs, Swan Coastal Plain are minimised as far as practicable;
- maintain or improve the condition of the remaining extent of SCP20a;
- undertake progressive rehabilitation for areas of the development envelope not required for ongoing operations; and
- offset the significant residual impact to SCP20a, *Caladenia huegelii* critical habitat and Bush Forever sites and other conservation areas.

3.2 Terrestrial Fauna

The EPA's environmental objective for this factor is *to maintain representation, diversity, viability and ecological function at the species, population and assemblage level.*

Relevant EPA policy and guidance

The EPA policy and guidance applicable to Terrestrial Fauna for this assessment and relevant matters discussed in each policy and guidance document are outlined in Appendix 4. The EPA considers that the following policy and guidance is relevant to its assessment of the proposal in relation to this factor:

- PS 3 *Terrestrial biological surveys as an Element of Biodiversity Protection* (EPA 2002).
- EPB 20 *Protection of Naturally Vegetated Areas Through Planning and Development* (EPA 2013).
- GS 33 *Environmental guidance for planning and development* (EPA 2008a).
- GS 56 *Terrestrial Fauna Surveys for Environmental Impact Assessment in WA* (EPA 2004b).
- *Technical Guide Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment* (EPA 2010).

EPA Assessment

The assessment of impacts for Terrestrial Fauna has been placed in the context of the Swan Coastal Plain Region of the Interim Biogeographic Regionalisation of Australia (IBRA). Where further information is available, the EPA has considered these impacts at a subregional level, and has used the administrative boundaries of the Perth-Peel Region (PPR). This is consistent with the position in PS 3 and GS 56 (EPA 2002; EPA 2004b).

The proposal has the potential to directly impact on terrestrial fauna through the clearing of fauna habitat and increased risk of vehicle strikes. In addition, the proposal has the potential to indirectly impact terrestrial fauna from increased light emissions; noise and vibrations; increased feral predation; habitat fragmentation; and habitat degradation through increased rubbish, weeds, dieback, altered fire regimes and changes to surface and groundwater hydrology.

In designing this proposal, the proponent has considered alternatives and applied the mitigation hierarchy to avoid impacts to fauna where possible. In taking reasonable steps to avoid disturbing fauna habitat, the proponent has designed the proposal so that approximately 78 per cent of the proposal is located over vegetation classified as being in a Degraded or worse condition. The proponent has also considered both direct and indirect impacts to fauna and their habitat and the resultant loss of ecological linkages from this proposal. In this regard, the EPA notes that the proponent has considered a number of the relevant matters from EPB 20.

Fauna surveys

As required by the ESD the proponent conducted targeted Level 2 fauna surveys in areas potentially containing significant fauna or their habitat that had the potential to be directly or indirectly impacted by the proposal (EPA 2014c). In accordance with GS 56, significant fauna is defined as fauna that are protected by international agreement or treaty, the *Wildlife Conservation Act 1950* (WC Act) or Priority Fauna. It also includes species that have declining populations or distributions, species at the extent of their range, or isolated outlying populations or species which may be undescribed (EPA 2004b).

The single season Level 2 and targeted surveys were conducted to supplement existing and regional survey data. Survey sites were located in all major fauna habitats and conducted at an appropriate time of year for most fauna. Although the spring targeted survey was not conducted during the period of 'maximum activity' (as per the Technical Guide) for Carnaby's cockatoos and forest red-tailed black cockatoos (hereafter collectively referred to as black cockatoos), evidence of foraging was positively recorded in the study area.

During the assessment of the proposal the proponent made some minor changes to the development envelope and disturbance areas (as discussed in Section 2 The proposal). The proponent conducted a Level 1 survey, including a black cockatoo habitat assessment for the additional areas equating to approximately 41 ha that had not previously been mapped for fauna values. Subsequently all areas to be disturbed have been surveyed for their fauna values with the findings outlined below.

The EPA notes that targeted surveys for invertebrate short range endemic species were not undertaken, as the proponent did not identify any preferred habitat for potential short range endemic species during the desktop study. Therefore, the consideration of GS 20 *Sampling of Short Range Endemic Invertebrate Fauna for Environmental Impact Assessment in WA* (EPA 2009) was not required.

The EPA considers that the surveys conducted met the principles in PS 3 (EPA 2002), were undertaken in accordance with GS 56 (EPA 2004b) and adequately met the relevant matters of the Technical Guide (EPA & DEC 2010).

The survey identified four natural areas of fauna habitat within the proposal development envelope; Banksia Woodland, Eucalypt/Corymbia Woodland, Dampland and Wetland. An additional three highly degraded fauna habitats were also recorde, which include Modified Vegetation, Paddock and Pine Plantation. To avoid and minimise impacts to natural fauna habitat the proponent has designed the proposal to predominately follow existing infrastructure and cleared or degraded areas (MRWA 2015).

No new fauna species were recorded during the survey and those species recorded were typical of the habitats present. In total, evidence of 97 species were recorded during the survey, comprising one fish, six amphibians, nine mammals, 19 reptiles and 62 birds (MRWA 2015). Of these, four fauna species

are protected under the EPBC Act, the WC Act or listed by Parks and Wildlife Threatened Species Consultative Committee and include:

- Carnaby's cockatoo (*Calyptorhynchus latirostris*) listed as Endangered (EPBC Act) and Schedule 1 (WC Act);
- forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*) listed as Vulnerable (EPBC Act) and Schedule 1 (WC Act);
- Australian bustard (*Ardeotis australis*) listed as Priority 4 (Parks and Wildlife Priority list); and
- southern brown bandicoot (*Isoodon obesulus fusciventer*) listed as Priority 4 (Parks and Wildlife Priority list).

A further seven other Priority and migratory species have the potential to occur in the study area but were not recorded during the survey. The survey also recorded 22 fauna species considered to be locally or regionally significant within the development envelope (MRWA 2015).

Black cockatoos

The Carnaby's cockatoo species exists as two distinct populations present over a large area of the south-west of the State (Government of WA 2015a). The two populations comprise the:

- western population, which migrates between the northern wheatbelt and the west coast, north to the mouth of the Murchison River; and
- eastern population, which moves between the southern wheatbelt and the south coastal region.

The current total population size is estimated to be about 40,000 birds and the western population is considered to be the larger of the two populations (Government of WA 2015a). The PPR supports part of the western population referred to as the Perth-Peel subpopulation. The EPA notes that this subpopulation is estimated at approximately 8,000 birds.

Both species of black cockatoo are the subject of separate Recovery Plans, which outline the key threatening processes. These include habitat loss or degradation; competition for available nest hollows; and the loss of individuals through illegal shooting, collisions with motor vehicles and disease (DEC 2008a, Parks and Wildlife 2013a). The EPA has assessed the potential impacts to the black cockatoos by evaluating impacts to the loss of foraging, roosting and breeding habitats and the potential risk of mortality from the operation of the road.

Since the release of the proponent's PER document, further information on Carnaby's cockatoo and the forest red-tailed black cockatoo in the PPR has become available through the GGP DCIAR (Government of WA 2015a). As part of the development of the GGP DCIAR, habitat mapping has been undertaken to spatially present the current known extent and occurrence of potential Carnaby's cockatoo resources across the PPR for three habitat elements:

- feeding habitat (foraging), mapped separately for the Swan Coastal Plain and Jarrah Forest IBRA regions as well as for pine plantations;

- roosting habitat; and
- breeding habitat.

The EPA has utilised this habitat mapping information to complement the information in the proponent's PER to support its assessment about whether the proposal is likely to significantly impact the viability of the Carnaby's cockatoo at a species or population level.

Foraging habitat

Implementation of the proposal would result in the clearing and loss of 207.2 ha of Carnaby's cockatoo and 120.5 ha of forest red-tailed black cockatoo foraging habitat. Within the development envelope, approximately 51 ha of pine plantation occurs. The harvesting of pine trees from these areas is required to be undertaken by the Forest Products Commission regardless of the implementation of the proposal and as a result the proponent has not included this loss in its calculations of impacts from this proposal (MRWA 2015). The EPA considers this approach about accounting for the loss of pine plantation appropriate.

To put the potential residual impacts to black cockatoos in context, the EPA notes that there is approximately 106,000 ha of Carnaby's cockatoo and approximately 75,000 ha of forest red-tailed black cockatoo foraging habitat mapped within the PPR of the Swan Coastal Plain (Government of WA 2015a). The predicted loss of 207.2 ha of Carnaby's cockatoo habitat therefore represents a loss of 0.2 per cent of the remaining extent of Swan Coastal Plain foraging habitat. Similarly, the predicted loss of 120.5 ha of red-tailed black cockatoo habitat represents a 0.16 per cent loss of the Swan Coastal Plain foraging habitat. There is also further foraging habitat outside the PPR of the Swan Coastal Plain. At the regional scale, the EPA considers that the amount and extent of this loss is unlikely to have a significant impact on food availability for either species of black cockatoos.

Roosting habitat

The EPA notes that while the proponent, in the PER document, has assumed impacts to 56.5 ha of potential roosting habitat based on suitable habitat and suitably sized trees being present, no confirmed roosting sites for black cockatoos were recorded during the fauna surveys. Further to this, recent information about the distribution of roosting sites on the PPR confirms no roosting sites or associated buffers for Carnaby's cockatoo would be intersected by the proposal. In addition, no breeding site data for the forest-red tailed black cockatoo is available in the GGP DCIAR (Government of WA 2015a).

Based on the information from the proponent's PER and the more recent information about the distribution of roosting sites on the PPR (Government of WA (2015a), the EPA considers that the proposal is unlikely to have an impact on the roosting habitat of either species.

Breeding habitat

The proponent has identified a number of areas south of Gnangara Road in Whiteman Park which have large mature trees with characteristics such as hollows that could support breeding activity (MRWA 2015). However, there was no evidence of current or historic use of these trees for breeding activities found during the survey. The proponent has conservatively assumed impacts to 120.5 ha of potential breeding habitat and 763 potential breeding trees in the Response to Submissions document. This is conservatively based on trees that have a diameter at breast height of over 500 millimetres (MRWA 2016). However, the EPA notes that, relative to the Wheatbelt region, the PPR is not a notable breeding area for Carnaby's cockatoo, although it is noted that the species has been observed displaying nesting behaviours and there are a number of confirmed breeding sites in the area (Government of WA 2015a).

The additional information made available for the PPR in the GGP DCIAR further indicates that the proposal does not intersect any of the mapped 'confirmed' or 'possible' breeding sites. No breeding site data for the forest-red tailed black cockatoo is available in the GGP DCIAR, however surveys undertaken by the proponent found no evidence of breeding sites for forest red-tailed black cockatoos in the proposal development envelope.

Based on the information in the proponent's PER and the more recent information about the distribution of breeding sites in the PPR (Government of WA 2015a), the EPA considers that proposal is unlikely to have a significant impact on breeding habitat of either species.

Vehicle strikes

To reduce the risk of vehicle strikes to black cockatoos during the ongoing operation of the proposal, the proponent has indicated it will not plant black cockatoo foraging resources within 10 m of the road during rehabilitation activities. The EPA notes that this is consistent with the Carnaby's Cockatoo Recovery Plan (Parks and Wildlife 2013a). Accordingly, the EPA has recommended condition 11-6 be imposed which would ensure that black cockatoo foraging resources are not planted within 10 m of the constructed road.

To minimise impacts during construction the proponent has proposed, where possible, to clear vegetation outside of the spring season to minimise impacts to the breeding cycles of nesting birds. The EPA notes there is no evidence of black cockatoo nesting activities within the proposal development envelope. However, to ensure impacts to black cockatoos are minimised as far as practicable, the EPA has recommended condition 12 be imposed which requires the proponent to inspect potential nesting trees prior to clearing. In the event evidence that black cockatoo nesting is observed, clearing in the area must be postponed until a time determined suitable by Parks and Wildlife.

The EPA's GS 33 and the Carnaby's and forest red-tailed black cockatoos recovery plans aim to stop further decline in the distribution and abundance of

black cockatoos by protecting habitat critical for their survival (EPA 2008a, Parks and Wildlife 2013a, Department of Environment and Conservation 2008a). While the proposal doesn't fully meet the expectations of these guidance documents the EPA notes:

- that the proponent has avoided impacts to natural habitat areas as much as practicable;
- that the loss of 207.2 ha of Carnaby's and the loss of 120.5 ha red-tailed black cockatoo foraging habitat in the PPR of the Swan Coastal Plain is unlikely to significantly impact black cockatoos at a species or population;
- these losses of foraging habitat represents a small portion of the existing foraging habitat within the PPR of the Swan Coastal Plain; and
- that impacts to black cockatoos would not result in the extinction or an increase in the conservation status of either black cockatoo species.

Taking into account the above, that the proposal would not impact the regional distribution of either species and the mitigation measures proposed by the proponent, in this case the EPA is satisfied that this small incremental loss of foraging habitat is an acceptable impact.

However as the proposal will still have some impact on habitat for a protected species, in accordance with the WA Environmental Offsets Guidelines (Government of WA 2014), this constitutes a significant residual impact. The EPA therefore considers that an offset is required to counterbalance the loss of black cockatoo foraging habitat. This is discussed further in Section 3.5 Offsets.

Other significant fauna

In addition to black cockatoos, nine other significant fauna species were found or have the potential to occur in the proposal development envelope. Of these, the proponent predicted local scale impacts to a number of species resulting from the clearing of habitat, vehicle strikes, fragmentation and loss of ecological linkages. These species are the jewelled sandplain ctenotus (P3), black-striped snake (P3), Australian bustard (P4), western brush wallaby (P4) and the southern brown bandicoot (P5). The western carpet python (Schedule 4 WC Act) and three migratory bird species – great egret, cattle egret and rainbow bee-eater – were not recorded during the survey, but the proponent considered they were likely to occur in the proposal development envelope.

The EPA considers that impacts to migratory birds are not likely to be significant given their widespread distribution and non-reliance on habitats specific to the proposal. The Australian bustard was recorded south of Neaves Road in a road reserve adjacent to the proposal development envelope. Impacts to the Australian bustard are also not considered to be significant due to their nomadic behaviours.

As mentioned above, the proponent has aligned the proposal with areas of existing infrastructure, cleared areas or secondary habitats to minimise impacts to terrestrial fauna. The proponent has indicated it will undertake a trapping and

translocation program prior to clearing native vegetation and in accordance with a licence issued by the Parks and Wildlife. Fauna spotters would be present during clearing activities to assist in translocating and releasing fauna to suitable habitat adjacent to the proposal development envelope to minimise mortalities (MRWA 2015).

The proponent has also proposed to avoid clearing where possible during spring to minimise impacts to the breeding cycles of resident fauna such as nesting birds. In the event clearing during spring is required, fauna spotters would be present to assist in translocating any fauna to suitable adjacent habitat to minimise mortalities (MRWA 2015).

To avoid and minimise impacts to ground dwelling fauna from vehicle strikes, fencing would be installed on both sides of the road from north of Hepburn Avenue to a minimum of 100 m north of Maralla Road to restrict fauna access to the road. The proponent has also proposed fauna underpasses and bridges to facilitate fauna movement under the road alignment. The EPA has recommended that condition 12-3 be imposed which requires the proponent to include the design, shape, size, furniture and sky lights for fauna underpasses in a management plan for approval prior to implementation.

Taking into consideration PS 3 (EPA 2002) the EPA recognises that the proponent has designed and located the proposal to avoid impacts to terrestrial fauna habitat. As stated above, the EPA's expectation is that regionally significant and large areas of consolidated native vegetation should be protected, isolation and fragmentation should be avoided, and that infrastructure should not be located within these areas (EPB 20). Furthermore, EPB 20 identifies that ecological linkages should be planned in the regional context and connect large naturally vegetated areas (EPA 2013).

While the proposal doesn't fully comply with the expectations of EPB 20, the EPA notes that the proponent has avoided as much as practicable areas of consolidated vegetation through locating the proposal along the boundaries of these areas (EPA 2013). Where fragmentation is unavoidable, the proponent has proposed mitigation measures which are discussed in detail below. The EPA further notes that the proponent is proposing to offset the significant residual impact to flora and vegetation, which would seek to protect and create additional areas of fauna habitat.

In considering GS 33, maintaining biodiversity is of the highest priority and requires the protection of natural areas to ensure biodiversity (EPA 2008a). While the proposal doesn't fully meet the expectations of this guidance, the EPA considers that the proponent has avoided impacts to natural habitat areas as much as practicable. The EPA considers that the impacts of the proposal represents a minor loss of fauna habitat and, while this may result in impacts to significant fauna at the local scale, the EPA notes that given the proposals linear nature similar surrounding habitat would remain. Furthermore, the proposal is unlikely to result in the extinction or an increase in the conservation status of any of the fauna species.

Fragmentation of fauna habitat

Due to the linear nature of the proposal and the proximity of regionally significant bushland, habitat fragmentation and the loss of ecological connectivity has the potential to impact fauna values. While the majority of the proposal occupies highly impacted areas or abuts existing infrastructure, Maralla Road Bushland, Whiteman Park/Cullacabardee Bushland and the areas surrounding Micro Gardens Park are at risk of losing ecological connectivity.

A section of the proposal is located within an existing road reserve which is located between two Nature Reserves on Maralla Road (refer figure 4a). This section provides an ecological linkage between the two Nature Reserves to the east and west of the development envelope.

The alignment of the proposal in the south runs alongside Beechboro Road between Hepburn Avenue and Gnangara Road and passes through the Cullacabardee Bushland and Whiteman Park. The Cullacabardee Bushland forms part of an ecological linkage with the greater Whiteman Park Bushland, although it should be noted that the existing Beechboro Road North, which is fenced on either side, currently fragments these bushlands. While the fence and road do not create an impenetrable barrier for fauna movement they do limit access between the areas.

The proposal would also remove a large portion of Bush Forever Site 480 known as Victoria Road Bushland or Micro Gardens Park. This area is located at the Tonkin Highway/Reid Highway intersection and forms an ecological corridor with Lightening Swamp Bushland. Evidence of southern brown bandicoot diggings were recorded in the road reserve near the Reid Highway/Altone Road intersection, which suggests that the roadside vegetation provides some level of ecological linkage.

To assess the potential impact to habitat connectivity from the fragmentation of regionally significant areas of vegetation, the proponent conducted a fauna movement study. This was undertaken on vehicle tracks adjacent to the Maralla Road Bushland and Whiteman Park/Cullacabardee Bushland to identify areas of high fauna traffic. Sites were surveyed for their potential to provide ecological linkage between areas of remnant bushland and for their ability to encourage safe fauna movement. Across the two sites, a total of 354 fauna crossings spread across a variety of faunal groupings were recorded and crossing “hot spots” were identified (MRWA 2015).

A number of Priority listed ground dwelling fauna have been previously recorded in the Cullacabardee Bushland and Maralla Road Bushland, including the jewelled sandplain ctenotus, southern brown bandicoot and western brush wallaby (MRWA 2015). The proponent expects impacts to some local populations of southern brown bandicoots due to their limited dispersal characteristics, in particular the population recorded at Micro Gardens Park as there is limited dispersal opportunity and the majority of the vegetation in this area is proposed to be cleared. However the proponent notes that southern

brown bandicoots have been recorded moving along vegetation in road verges (MRWA 2015).

To facilitate fauna movement the proponent has proposed a total of 21 fauna underpasses and two bridges. The underpasses range in lengths from 12 m to 85 m, with a large number of the underpasses being constructed with lengths of between 70 to 85 m. Multiple underpasses are proposed at each site to facilitate fauna movement. A recent study conducted by Chambers and Bencini (2013) found that the southern brown bandicoot did not use long underpasses very often. The study suggested shorter underpasses were being used frequently as part of home ranges, whilst longer tunnels may be used infrequently during dispersal events. Openings or sky lights to allow natural light through and encourage usage would be incorporated into the design of the underpasses where possible. The proponent has proposed to undertake pre-construction monitoring to determine the size and population of fauna species most likely to use the underpasses. The proponent has also proposed to undertake post-construction monitoring to determine the effectiveness of the underpasses. In the event underpasses are not effective, greater rehabilitation and installation of underpass furniture would be considered as management options (MRWA 2015). The proponent's monitoring of underpasses would also serve to provide information to inform the design of other underpasses in similar habitats.

The EPA considers the inclusion of fauna underpasses and bridges into the design of the proposal are appropriate mitigation measures to reduce the impacts to terrestrial fauna during the operation phase. The proposed locations of the underpasses are appropriately placed to retain connectivity between areas of high fauna movement.

The EPA has recommended that condition 12-3 be imposed which requires the proponent to include the design, shape, size, furniture and sky lights for fauna underpasses in a management plan for approval prior to implementation.

In considering the proponent's management and mitigation measures the EPA does not consider that there would be a significant residual impact to ecological linkages.

Indirect impacts to fauna

The proposal has the potential to indirectly impact fauna due to habitat degradation, increased light emissions, noise and vibrations and increased feral predation. To mitigate and manage the indirect impacts of the proposal the proponent proposes to undertake a number of measures including:

- constructing a total of 21 fauna underpasses and two bridges in key "hot spots" identified for fauna movement, ensuring these have appropriate furniture and that revegetation occurs close to the underpasses to encourage use and limit predation;
- directing lighting towards construction activities and using low level lighting where possible to limit light spill on the surrounding habitats; and

- preparing an EMP (including an emergency response procedure) to limit the risk of fire, spread of weeds and dieback, rubbish and vehicle tracks during construction.

The EPA has recommended conditions 9 and 10 which requires the proponent to prepare a construction management plan to manage the construction and post-construction indirect impacts to flora and vegetation, which include impacts from weeds, dieback, and dust.

In considering the proponent's management and mitigation measures the EPA does not consider that there would be a significant residual impact to terrestrial fauna as a result of indirect impacts.

Summary

Having regard to the:

- relevant policy and guidance pertaining to Terrestrial Fauna;
- public submissions;
- avoidance and minimisation measures proposed by the proponent;
- potential impacts of the proposal on high conservation fauna habitat values, particularly on the foraging habitat of the Endangered Carnaby's cockatoo and the Vulnerable forest red-tailed black cockatoo and fragmentation of fauna habitats;
- small geographic footprint of the black cockatoos foraging habitat to be impacted, relative to the existing habitats in the PPR of the Swan Coastal Plain and which represents a minor incremental loss of foraging habitat and is therefore unlikely to significantly impact the black cockatoos at the species and population levels;
- large areas of contiguous bushland habitat adjacent to the proposal that provides for fauna species and assemblages; and
- potential direct and indirect impacts to terrestrial fauna in and adjacent to, the proposal development envelope which are unlikely to result in the extinction or increase in conservation status of any of the fauna species,

the EPA considers that the proposal can be managed to meet the EPA's objectives for Terrestrial Fauna provided that conditions 6, 9, 10, 11, 12 and 16 are imposed requiring the proponent to:

- not plant black cockatoo foraging habitat within 10 m of the road;
- prepare and implement an EMP to manage indirect impacts to fauna habitat;
- trap and translocate ground dwelling fauna prior to clearing;
- undertake a survey of potential black cockatoo nesting trees prior to clearing and, if evidence of nesting activities is found, clearing in the area must be postponed until a time determined suitable by Parks and Wildlife;
- provide the location and dimensions of fauna underpasses and fauna fencing;
- providing the design of fauna underpasses; and

- offset the residual impacts to black cockatoo habitat.

3.3 Hydrological Processes and Inland Waters Environmental Quality

These two factors have been combined due to the inter-related effects of the proposal on natural values, which are maintained by hydrological processes and environmental quality, such as for wetlands. The EPA's environmental objectives for these factors are:

- *to maintain the hydrological regimes of groundwater and surface water so that existing and potential uses, including ecosystem maintenance, are protected*; and
- *to maintain the quality of groundwater and surface water, sediment and biota so that the environmental values, both ecological and social, are protected*.

Relevant EPA policy and guidance

The EPA policy and guidance applicable to Hydrological Processes and Inland Waters Environmental Quality for this assessment and relevant matters discussed in each policy and guidance document are outlined in Appendix 4. The EPA considers that the following policy and guidance is relevant to its assessment of the proposal in relation to this factor:

- PS 4 *Environmental Protection of Wetlands* (EPA 2004c).
- GS 33 *Environmental guidance for planning and development* (EPA 2008a).

The ESD referred to PS 7 *Principles of Environmental Protection* (EPA 2004d) and this policy was considered by the proponent within the PER. This policy was withdrawn in June 2015 and the relevant principles were incorporated into the revised EAG 8. The EPA considers that the proponent has adequately considered EAG 8 and has assessed the proposal having regard to its current policy and guidance.

The EPA also notes that the following policies were referred to in the ESD and considered in the PER:

- *Environmental Protection (Gnangara Mound Crown Land) Policy 1992*; and
- *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992*.

The objective of the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992* was to protect the beneficial uses and values of certain lakes on the Swan Coastal Plain. This policy was considered in the PER however was revoked after the PER was released for public comment. Within the proposal area all lakes listed under this policy correspond with Swan Coastal Plain wetlands (Parks and Wildlife, 2013b). Notwithstanding the revocation of this policy, the EPA has considered and assessed the impacts to the wetlands of the Swan Coastal Plain, having regard to Parks and Wildlife (2013b). This assessment is outlined below.

The objective of the *Environmental Protection (Gnangara Mound Crown Land) Policy 1992* was to protect the level and quality of groundwater, native vegetation and wetlands within the policy area. This policy was considered in the PER however was revoked after the PER was released for public comment. Notwithstanding the revocation of this policy, the EPA has considered and assessed the impacts to the Gnangara Mound through the consideration of the DoW's Water Quality Protection Notes, State Planning Policy (SPP) 2.2 *Gnangara Groundwater Protection* and SPP 2.7 *Public Drinking Water Source Policy*. This assessment is outlined below.

EPA Assessment

The proposal has the potential to impact on hydrological processes and inland waters environmental quality directly through the clearing of wetlands and indirectly through the alteration of surface water and groundwater hydrological regimes and water quality during both construction and operation.

In designing the proposal, the proponent has considered alternatives and applied the mitigation hierarchy to avoid impacts where possible in order to protect the environmental values and functions of wetlands, a relevant matter of PS 4 (EPA 2004c).

The potential impacts of the proposal on Hydrological Processes and Inland Waters Environmental Quality has been set out below with respect to:

- wetlands;
- surface water;
- groundwater; and
- public drinking water source areas.

Wetlands

The assessment of wetlands has been placed in the context of the Swan Coastal Plain, and within the PPR where regional information is available. Since the release of the proponent's PER document, further information on the distribution and extent of wetlands in the PPR has become available through the GGP DSIAR (Government of WA 2015b). The EPA has utilised this mapping to complement the information in the proponent's PER to support its assessment about whether the proposal is likely to significantly impact the regional representation of wetlands.

On the Swan Coastal Plain, wetlands are recognised though their listing in the *Geomorphic Wetlands Swan Coastal Plain dataset,* which is managed by Parks and Wildlife. This dataset contains the most comprehensive wetland mapping, classification and evaluation work on the Swan Coastal Plain. The EPA considers wetlands in terms of the three broad management categories contained within this dataset; conservation, resource enhancement and multiple use. Categories are assigned to wetlands based on their environmental values and condition and each category has an overall objective. CCWs support a high level of wetland attributes and functions and are the highest

priority wetlands. The objective for CCWs is to preserve and protect their existing conservation values (Government of WA 2015b; Parks and Wildlife 2013b).

The proposal development envelope intersects three lakes described within the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992* (EPP Lakes). The EPA notes that this policy was revoked in November 2015. Two of these wetlands formerly classified as EPP Lakes are CCWs and one is highly degraded and is a Multiple Use Wetland (MUW). The EPA has considered the proposal's impact to these wetlands in terms of their conservation category and the values they support.

Twenty-five wetlands occur within the development envelope, with another 26 occurring within 100 m of the development envelope. Of these, 20 are classified as CCWs (refer Figures 5a and 5b), 10 as Resource Enhancement Wetlands (REW) and 21 as MUWs. There are no Nationally Important Wetlands or Wetlands of International Importance within the proposal development envelope.

The EPA notes that during the design of the proposal the proponent has avoided two CCWs (Unique feature identifier (UFI) 8926 & 8914) and three REWs (UFI 8916, 8915 & 8541). Within the development envelope, the proponent has indicated it will avoid a further 2.8 ha of CCWs and 4.5 ha REWs.

The proposal would directly impact four REWs with a total area of impact of 14 ha and seven CCWs with a total area of impact of 14.8 ha. A further 1.2 ha of CCWs would be indirectly impacted through predicted changes to surface water flows across the landscape and/or hydrological connectivity between the wetlands being fragmented by the proposal (MRWA 2015). All 16 ha of CCWs impacted by the proposal are considered to be in Good or better condition.

Wetlands found across the Swan Coastal Plain vary in size, shape, hydrology, stratigraphy and vegetation. However when similarities, such as geomorphic setting, origin and hydrology, occur between wetlands they are considered related or 'consanguineous'. On the Swan Coastal Plain, there are currently 62 recognised consanguineous suites (Parks and Wildlife 2013b). The wetlands within the development envelope that would be impacted are within the Bennett Brook, Ellen Brook and Jandakot consanguineous suites.

The proponent has assessed the significance of the impacts using the Parks and Wildlife (2013b) regional significance criteria. This criteria deems the impact of regional significance if the:

- proportion of CCWs remaining within a consanguineous suite is reduced below 10 per cent; or
- impact is to a CCW within a consanguineous suite where less than 10 per cent remains.

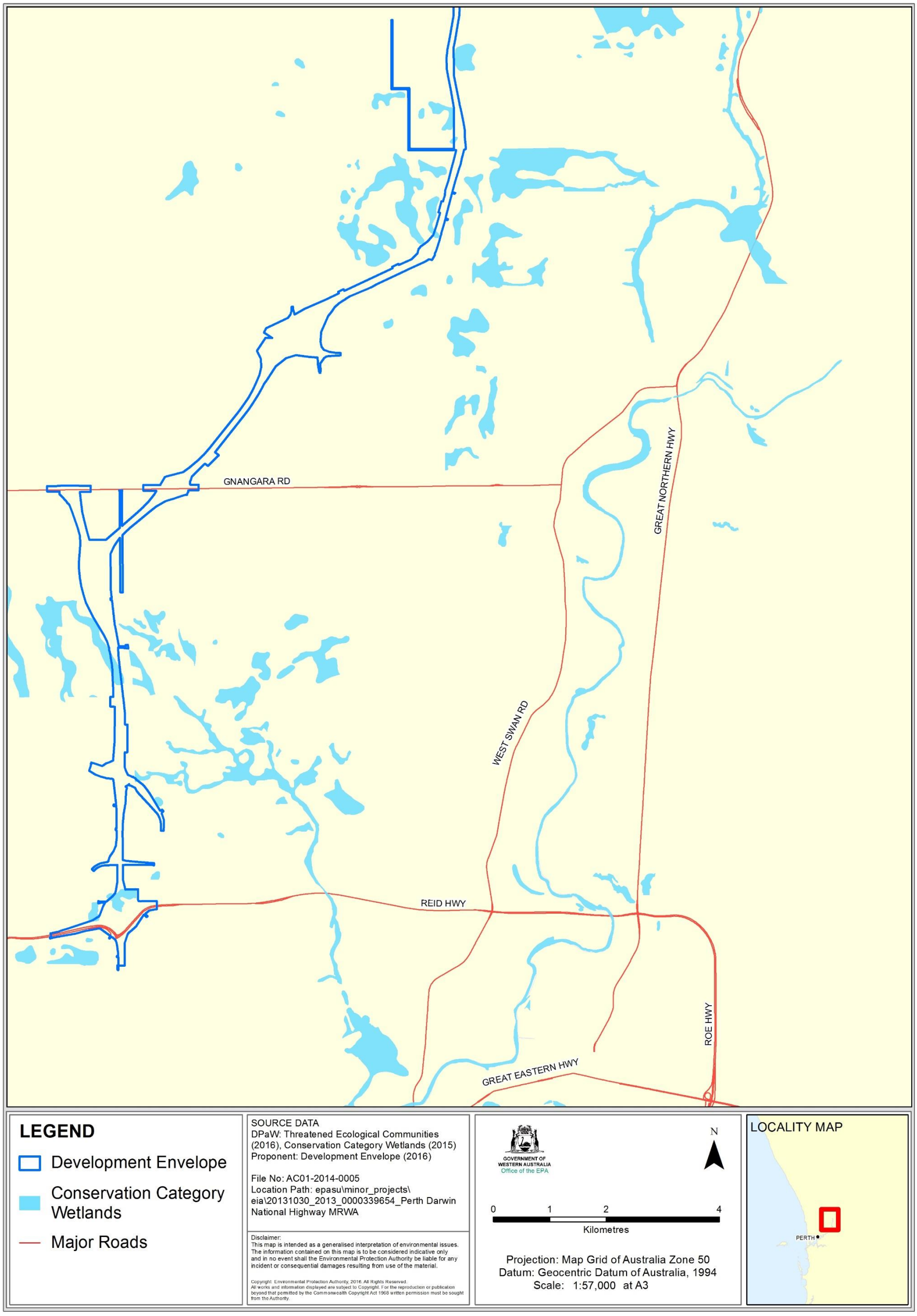

Figure 5a: CCWs within the southern section of the development envelope

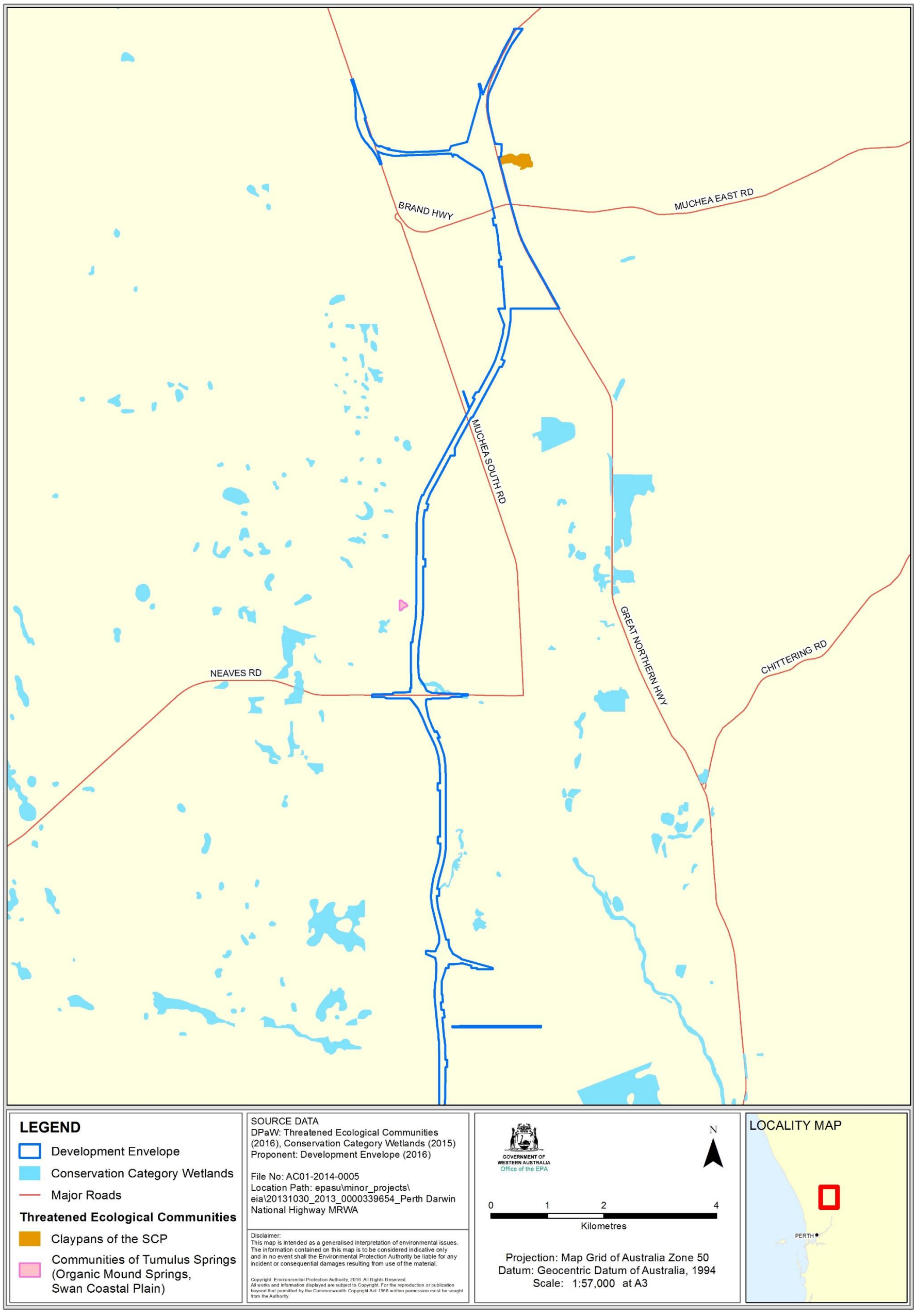

Figure 5b: CCWs within the northern section of the development envelope

The loss of CCWs within the three relevant consanguineous suites is between 0 and 0.1 per cent. However for the Bennett Brook and Ellen Brook suites there is less than 10 per cent of CCWs in these suites remaining (7.7 and 3.1 per cent respectively). The proponent therefore considers these losses of regional significance (MRWA 2015).

PS 4 identifies two specific hydrological values of wetlands that should be protected, hydrological balance and water quality, and this proposal has the potential to impact both these values (EPA 2004c). Hydrological balance impacts include altering surface water runoff volumes, changes in groundwater levels and altering surface and groundwater flows. The proposal also has the potential to impact wetland water quality through liberating sediments during ground disturbing activities, disturbance of potential Acid Sulfate Soils (ASS), contaminated road runoff and accidental spills. These matters are discussed further below in relation to surface and ground water.

To manage and mitigate the potential impacts to wetlands the proponent proposes to:

- locate construction laydown areas and stockpiles at least 50 m from all CCWs;
- schedule dewatering activities during summer where practicable to avoid drawdown impacts to wetlands;
- design and construct culverts in accordance with the drainage strategy to maintain hydraulic connectivity of wetlands; and
- locate water abstraction bores so that drawdown impacts to wetlands are within seasonal variations of groundwater levels.

While GS 33 states that CCWs and appropriate buffers should be protected, the EPA recognises that the proponent has avoided and minimised the impacts to wetlands and their buffers from the proposal as far as practicable given the linear nature of the proposal. The EPA has recommended condition 14-9 be imposed prohibiting the construction of laydown areas and stockpiles within 50 m of a CCW.

The EPA notes that data from the GGP DSIAR estimates that there are 1,891 CCWs with a total area of 44,987 ha (Government of WA 2015b). At a regional scale, the direct and indirect impacts of this proposal on CCWs (up to 16 ha) equates to a 0.04 per cent loss of CCW area within the PPR.

Taking into account the small incremental loss of CCW's at the regional scale, the extent remaining in the PPR, and the proponent's measures to manage and mitigate impacts to wetlands, the EPA considers that this proposal would not impact the representation of wetlands on the Swan Coastal Plain. Furthermore, the EPA has recommended condition 14 to ensure that the hydrological regimes and water quality of wetlands in, and near, the development envelope are maintained.

However considering the position stated in PS 4 and GS 33 regarding the protection of CCWs, the EPA considers the direct and indirect impacts to CCWs

constitute a significant residual impact. The EPA therefore considers that an offset is required to counterbalance the loss of 16 ha CCWs. This is consistent with the WA Environmental Offsets Guidelines and this is discussed further in Section 3.5 Offsets.

Surface water

The proposal development envelope intersects two major surface water features and their catchments; Ellen Brook and Bennett Brook. Two minor catchments, Henley Brook and St Leonards Creek, are also intercepted by the development envelope. These are all tributaries to the Swan River.

As linear infrastructure this proposal has the potential to impact surface water hydrology and overland flows. Impacts to surface water are primarily from proposal operation, where it has the potential to change surface water quality and quantity. Changes to surface flows and water quality have the potential to affect adjacent vegetation, wetlands and groundwater through:

- ponding of water upstream of the road embankment and/or a reduction in water availability downstream of the road embankment;
- increased volume of stormwater run-off due to the increased hardstand areas;
- ponding of water downstream of the road as a result of poor infiltration from road run-off; and
- contamination of surface water through the liberation of sediments, disturbance of ASS and accidental spills of pollutants.

To manage and mitigate the potential changes to surface water the proponent has prepared a Drainage Strategy, the aim of which would be to maintain drainage across the site as close as practicable to the pre-development condition (MRWA 2015). This approach is consistent with PS 4 and GS 33, where the aspirational goal is to not lose wetland or waterway functions (EPA 2004c, EPA 2008a). Key elements of this strategy include bridges and culverts to maintain surface flows and hydrological connectivity, bioretention swales for pollutant trapping, and infiltration basins for surface flows.

The EPA notes that this Drainage Strategy has been prepared in consultation with the Department of Water (DoW) and in accordance with their policy *Stormwater Management Manual for WA* (Department of Environment 2004a). The proponent has indicated it will construct the bridges over Ellen Brook during periods of low flow and above the current water level at the time of construction to minimise impacts to surface water flow (MRWA 2016). The EPA has recommended condition 13 be imposed to ensure the proposal will not result in a decline in water quality of Ellen Brook.

The proponent has also indicated it will prepare a detailed Infrastructure Plan prior to construction and for each stage of the development to ensure the proposal is designed and constructed in accordance with the Drainage Strategy. The proponent predicts that as a result of these measures, impacts to surface water would be localised and negligible (MRWA 2015).

As part of this proposal, the proponent also proposes to construct a road train assembly and traveller's rest area in the vicinity of Brand Highway and the Great Northern Highway in Muchea. This area is will consist of an asphalt area approximately 5 ha in size. To ensure that drainage is appropriately managed in this area and there is no decline in surface water quality, the EPA has recommended conditions 6 and 13 be imposed. Condition 6 will require the proponent to provide the dimensions and locations of drainage basins, swales and culverts to ensure that they are consistent with the drainage strategy and that impacts to surface water flow are minimised. Condition 13 will require the proponent to ensure that there is no decline in surface water quality in Ellen Brook.

The proponent has undertaken a preliminary ASS investigation, which confirms that ASS are present in a number of areas within the proposal footprint. Prior to construction, the proponent has indicated it will undertake a detailed ASS investigation to inform the measures to minimise disturbance to ASS during construction. The proponent has identified a number of measures to minimise impacts including using spread footings, reducing dewatering, use of well-point spears for dewatering required in ASS areas, and constructing the road surface above the maximum groundwater level. These measures are consistent with the relevant Department of Environment Regulation (DER) guidance. The EPA considers this approach appropriate and is therefore unlikely to have a significant impact on surface water quality.

Given the management and mitigation proposed, which is in accordance with relevant DoW and DER guidance, the EPA considers that the proposal is unlikely to result in a significant impact to surface water. The EPA has recommended conditions 6 and 13 be imposed to ensure that there is no decline in surface water in Ellen Brook and the GUWPCA, which is discussed below. To ensure surface water impacts to the TEC, DRF and CCWs are minimised, the EPA has also recommended condition 14 which requires the proponent to maintain predevelopment surface water flows. This is also discussed below.

Groundwater

The Gnangara Groundwater Mound is located to the northwest of the proposal and groundwater flows from the mound in an easterly to southerly direction. However in the northern section of the alignment groundwater generally flows from the Darling Scarp in a southwest direction. The hydrogeological conditions along the proposal development area consists of Bassendean Sand deposits in the southern portion of the alignment where the aquifer is unconfined. The northern section of the alignment consists of the Guildford Formation where the clay layer may act as an aquitard (MRWA 2015).

The proposal has the potential to impact groundwater hydrology and quality as a result of construction and operation. Impacts from construction include potential dewatering for bridge footings, groundwater abstraction for construction purposes and the compaction of soils and changes to sub-surface flows from the construction of the road embankment. The ongoing operation of

the proposal has the potential to impact groundwater quality from the infiltration of contaminated surface water.

The potential impacts to groundwater regimes and quality have been set out below in relation to:

- dewatering;
- abstraction; and
- compaction.

Dewatering

For the construction of bridge footings, the proponent's assessment of drawdown on groundwater levels found that no dewatering would be required if the construction works were undertaken during drier months when groundwater levels are at a minimum. However, if footings are constructed during wetter months, then dewatering may be required at eight locations. If dewatering is required, dewatering methods such as well-point spears that minimise the radius of influence in confirmed areas of ASS and on sensitive receptors including wetlands and groundwater dependant ecosystems would be utilised. he drawdown would range from 0.1 to 0.9 m with a drawdown radius of influence of 160 to 490 m centred on the dewatering point (MRWA 2015).

The proponent has concluded that should dewatering be required, impacts on groundwater levels are anticipated to be minor and short-term, and within usual seasonal variation. However, the proponent has indicated, where practical, construction of bridge footings will be scheduled during summer to avoid dewatering requirements (MRWA 2015). The EPA also notes that dewatering would require a licence to take water under the *Rights in Water and Irrigation Act 1914*.

Abstraction

During construction of the proposal, water would be required for earthworks and dust control purposes at various locations along the alignment. Various pumping rates and durations were modelled by the proponent to predict drawdown for groundwater abstraction. It was predicted that for the portion of the alignment south of Neaves Road, after 12 months of pumping drawdown ranged between 1.1 and 6.7 m at the well and between 0.07 m and 0.41 m at 1 km from the well, for pumping rates of between 5 litres per second (L/s) and 30 L/s respectively. The maximum radius of influence, irrespective of the pumping rate was about 1.5 km.

For the portion of the alignment north of Neaves Road after 12 months of pumping, drawdown ranged between 1.16 and 8.2 m at the well and between 0.38 m and 1.51 m at 1 km from the well, for pumping rates of between 1 L/s and 5 L/s respectively. Pumping rates are significantly lower in this area due to the lower hydraulic conductivity and the confined nature of the aquifer. The maximum radius of influence, irrespective of the pumping rate, was about 7.8 km. It should be noted that the clayey Guildford Formation in this section of the alignment separates wetlands from the sand aquifer below that would be

pumped. Therefore the estimated drawdown is from the aquifer and does not represent the drawdown in the groundwater table (MRWA 2015).

The proponent considers that operational requirements for bores is likely to be less than that assumed for the modelling. For example it is unlikely a bore would be pumped continuously for 12 months due to the progressive nature of the construction work and abstraction from a bore would be limited to a stage of development (MRWA 2015).

Water requirements and final bore locations have yet to be determined as this would be influenced by final engineering specifications. Where possible, the proponent is proposing to source water from existing bores in accordance with existing licences to take water (MRWA 2015). Any abstraction activities for construction purposes would require a licence to take water under the *Rights in Water and Irrigation Act 1914*.

However, to minimise the impacts of drawdown on environmentally sensitive receptors, the proponent has indicated it will locate and operate the construction water abstraction bores such that drawdown impacts are within the usual seasonal variations of groundwater levels for those receptors. Monitoring bores may be used to monitor groundwater levels and verify hydrogeological modelling. Given the results of the modelling, the proponent has concluded that impacts from groundwater drawdown are likely to be short-term and localised (MRWA 2015).

Compaction

The construction of the road embankment has the potential to compact soils affecting soil permeability and in turn the movement of groundwater. This could result in groundwater levels rising or ponding upstream and decreasing downstream of the proposal. To assess the potential impacts of soil compaction on groundwater flow, the proponent undertook numerical modelling which was based on the areas north of Neaves Road where the presence of a shallow clay layer beneath a thin surface layer of sand exists. This modelling predicted that where the overlaying sand layer was thin, the clay layer was within 0.5 m of the surface and the depth to groundwater was small, groundwater level rise could range from approximately 0.12 m to 0.23 m and may reach the surface up to 40 m upstream. However, as this sand layer thickness increases, the surface expression of groundwater decreases. This modelling predicts that groundwater changes downstream are up to 0.1 m in all scenarios (MRWA 2015).

While noting that these changes to groundwater levels are within seasonal variations, the proponent further predicts that changes to groundwater flow and levels are likely to be negligible where appropriate drainage structures are in place. Similar approaches were used on the Perth to Bunbury Highway, which was also constructed on sand and palusplain wetland systems. Post-construction monitoring of that project found that hydraulic conductivity was maintained across the road, with little to no effect on groundwater levels observed either side of the road (MRWA 2015).

In considering the potential impacts to groundwater, the EPA notes that all impacts to sensitive environmental receptors are predicted to be within seasonal variation. Given this, the EPA considers that the proposal will maintain the quality and hydrological regimes of groundwater.

Priority 1 Public Drinking Water Source Area (PDWSA)

The proposal development envelope traverses the Gnangara Priority 1 (P1) and Priority 3 (P3) Water Source Protection Areas of the Gnangara Underground Water Pollution Control Area (GUWPCA) (refer Figure 6). The aim of the P1 classification is to ensure that no degradation of the drinking water source occurs, while P3 aims to manage the risk of pollution to the water source from catchment activities. Within the P1 area, the proposal intercepts ten Well Head Protection Zones (WHPZs), which provide a 500 m radius buffer around production bores to protect water sources from contamination (MRWA 2015).

During the assessment of this proposal, the Minister for Environment revoked the *Environmental Protection (Gnangara Mound Crown Land) Policy 1992* (Gnangara EPP). The EPA has considered the potential impacts to the Gnangara Mound in the context of the GS 33 and relevant WAPC and DoW policies as discussed below.

Development of the proposal within the P1 area of the GUWPCA has the potential to increase the risk of contamination and decrease water quality during both construction and operation. During construction water quality may be affected by the disturbance of ASS, and an accidental spill and/or the release of hydrocarbons and other chemicals which could infiltrate the groundwater. During operation water quality may be affected by polluted road runoff that could include gross litter and particulates, nutrients, heavy metals and hydrocarbons which could infiltrate groundwater systems.

The DoW's (formerly the Department of Environment) Water Quality Protection Note *Land use compatibility in Public Drinking Water Source Areas* (2004b) and the WAPC *Statement of Planning Policy 2.2 Gnangara Groundwater Protection* (2005) (SPP 2.2) provide guidance on the compatibility of land uses within PDWSAs depending on their priority classification. These policies and guidelines define major transport infrastructure including roads in P3 areas as acceptable, but incompatible in P1 areas. However, these policies and guidelines recognise that there are circumstances which may occasionally result in an incompatible land use receiving approval. SPP 2.2 states that essential transport infrastructure in the policy area may be acceptable provided best management practices are implemented in the design, construction and management of the road (WAPC 2005).

The proponent considers that with best practice management measures, water pollution from road runoff can be managed (MRWA 2015). The *Gnangara Underground Water Pollution Control Area Drinking Water Source Protection Review* (Water Corporation 2007) notes that there is currently an extensive network of roads operating in the GUWPCA as well as other potentially polluting land uses. The review concludes that there has been no increase in the overall

risk to water quality of the GUWPCA observed since initial assessments were conducted in the late 1990s.

In accordance with SPP 2.7 *Public Drinking Water Source Policy* (WAPC 2003) the DoW has provided advice to the proponent on the mitigation and management measures to minimise impacts to the GUWPCA.

The proponent proposes to manage and mitigate impacts to this PDWSA by:

- not undertaking dewatering within the PDWSA;
- locating construction laydown areas and stockpiles outside WHPZs;
- locating retention basins at least 100 m away from production bores;
- constructing swales to direct overflow away from production bores;
- requiring double lined bunded areas capable of storing 125 per cent of the capacity of the largest tank in construction laydown areas, which would be located outside of the WHPZ;
- implementing specific measures to address impacts regarding generation, storage and release of pollutants, including an emergency spill response procedure; and
- monitoring groundwater to ensure impacts to the Gnangara Mound are being appropriately managed.

The EPA notes that the proponent has designed the proposal to avoid impacts to the groundwater quality and quantity of the P1 and P3 PDWSA and WHPZs, and that the DoW has advised that with appropriate management, impacts within these areas can be managed to meet the EPA's objectives. The EPA therefore considers that it is unlikely that the proposal would have a significant impact on the PDWSA. The EPA has recommended condition 6 which requires the proponent to provide the dimensions and locations of the infiltration basins within the GUWPCA to ensure impacts to groundwater quality are minimised. The EPA has also recommended condition 13 be imposed to ensure impacts to groundwater quality in the P1 and P3 PDWSA do not occur.

TECs

As noted in Section 3.1 of this report, the proponent has avoided direct impacts to two TECs found in close proximity to the proposal, being the Organic Mound Springs, Swan Coastal Plain at Gaston Road and Claypans of the Swan Coastal Plain at Muchea (refer to Figure 5b). However, the proponent notes that indirect impacts as a result of changes in groundwater quality and hydrology have the potential to occur.

The Organic Mound Springs, Swan Coastal Plain is listed as an Endangered TEC under the EPBC Act and as a Critically Endangered TEC by the State government. This community is characterised by continuous discharge of groundwater in raised areas of peat which provide a stable, permanently moist series of microhabitats for flora and invertebrate fauna. In total it is known from eight occurrences on the Swan Coastal Plain. The proponent conducted a hydrological review to assess the risk of indirect impacts of the proposal on this TEC, identifying that changes in groundwater level and associated spring flow and/or changes in water quality are possible (MRWA 2015).

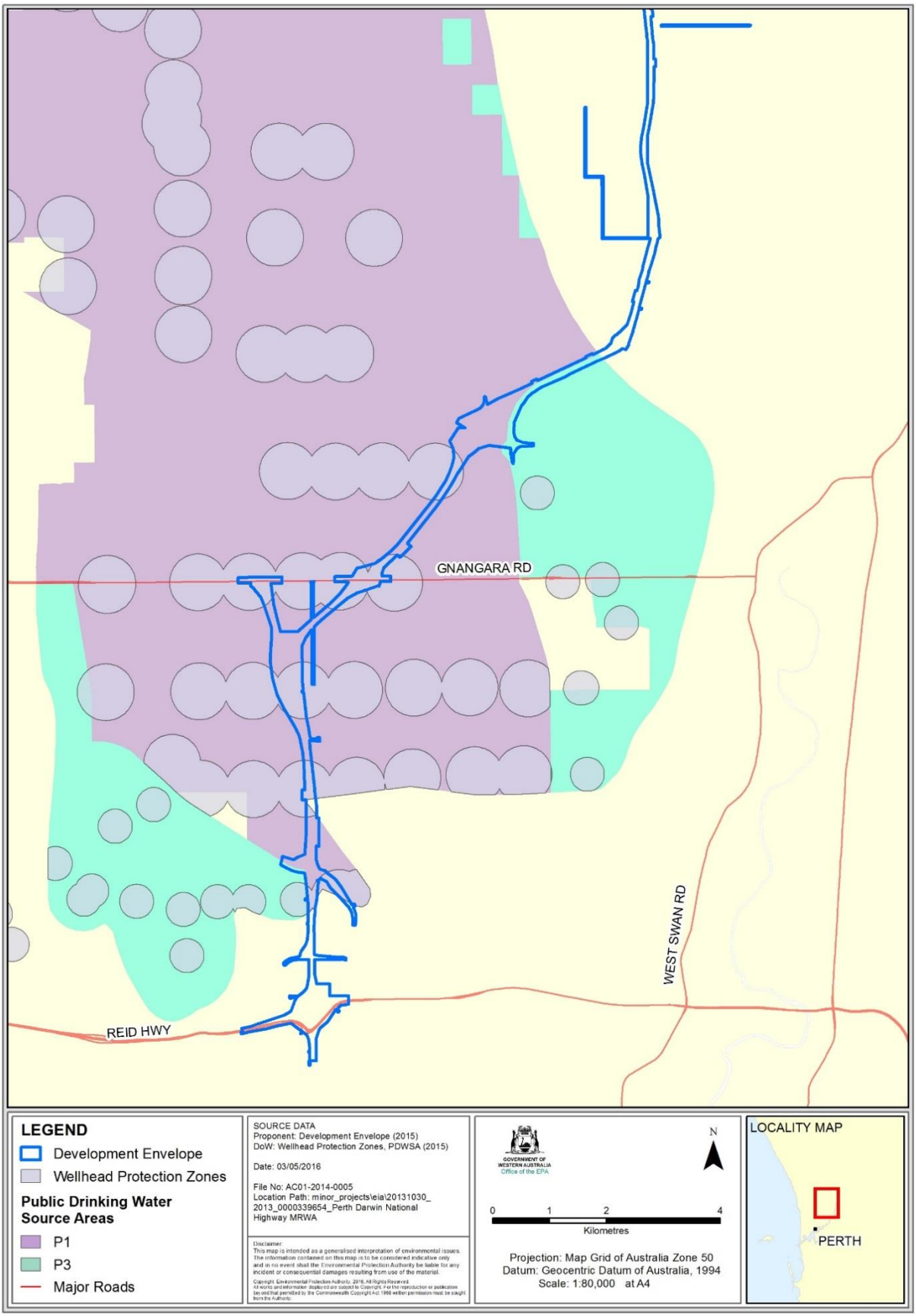

Figure 6: P1 and P3 areas within the development envelope

Groundwater in the unconfined superficial aquifer flows east-south-east from the Gnangara Mound, with shallow groundwater discharging into the spring. This means that, should the unconfined groundwater become contaminated, it could flow into the spring from up-gradient sources. To reduce this risk, the proponent aligned the proposal to ensure that the proposed road would be located down-gradient of the Organic Mound Springs, Swan Coastal Plain TEC at Gaston Road to minimise any potential changes to groundwater quality and hydrology.

Impacts to groundwater levels at the Organic Mound Springs, Swan Coastal Plain TEC at Gaston Road from potential dewatering during construction are unlikely as the closest dewatering site is located 6 km to the south at the Stock Road interchange. The compaction of the road is also unlikely to result in any changes to groundwater levels in the location of the Organic Mound Springs, Swan Coastal Plain TEC at Gaston Road, as this area consists of Bassendean Sands overlying the sandy Guildford Formation and therefore no clay layer is present near the surface. To ensure no indirect impacts on the TEC, the proponent has indicated it will locate abstraction bores for construction purposes so that impacts are avoided or minimised to within seasonal variation (MRWA 2015). The EPA has therefore recommended condition 14 which requires the proponent to ensure that construction and operation of the proposal, including from dewatering and abstraction, does not result in indirect impacts to this TEC.

The proponent acknowledges that, if any impediment to surface water movement away from the TEC should occur, indirect impacts are possible. The proponent has therefore indicated it will design and install culverts to ensure that surface water is able to move unimpeded across the development envelope to ensure that indirect impacts would not occur (MRWA 2015). The EPA has therefore recommended condition 14 which also requires the proponent to maintain predevelopment surface water flows to the TEC.

To minimise any impact from contaminated road runoff, the proponent has proposed retention and infiltration basins to capture road runoff and reduce transmission of pollutants. Condition 14 requires the proponent to locate construction laydown and stockpile areas at least 50 m from the Organic Mound Springs, Swan Coastal Plain TEC.

The Claypans of the Swan Coastal Plain TEC is listed as Critically Endangered under the EPBC Act and 123 occurrences occur on the Swan Coastal Plain. This TEC is found either in basins or flats associated with clay soils which form an impermeable layer close to the surface. Wetlands associated with Claypans of the Swan Coastal Plain rely solely on rainfall and dry to impervious pans in summer (Threatened Species Scientific Committee 2012).

The Claypans have a high species richness and the vegetation within the Claypans of the Swan Coastal Plain is dependent on the wetland filling and drying at appropriate times of the year. Any change to the hydrological functioning of the community may alter it to the point where it is unlikely to

remain part of the community (Threatened Species Scientific Committee 2012). This TEC is located adjacent to the proposal development envelope in Muchea. Therefore the ponding of surface water or a rise in groundwater levels has the potential to significantly impact this TEC.

The potential impacts from ponding of surface water and a rise in groundwater levels are most likely to occur as a result of compaction of the road surface adjacent to the proposal. As discussed above, the proponent undertook modelling to determine the geological conditions where impacts to the Claypans are possible. The proponent considers that these geological conditions, such as the presence of clay close to the surface, are likely to be present in the vicinity of the Claypans TEC. However, they also consider that either the installation of drainage structures or increasing the thickness of the sand layer would reduce any impacts of compaction (MRWA 2015). The EPA has therefore recommended condition 14 which requires the proponent to maintain predevelopment surface water flows to the TEC.

Impacts from dewatering or groundwater abstraction are likely to be minimal as wetlands associated with Claypans are generally separated from the aquifer by the clay of the Guildford Formation. Where practicable, the proponent has indicated it will schedule bridge footing construction to occur during summer to avoid dewatering requirements. However, should dewatering be required, the Claypans TEC is located over 500 m from the proposed bridge. To ensure no indirect impacts on the TEC, the proponent has indicated it will site abstraction bores for construction purposes so that impacts are avoided or minimised to within seasonal variation (MRWA 2015).

The EPA has recommended condition 14 which requires the proponent to ensure that construction and operation of the proposal, including from dewatering and abstraction, does not result in indirect impacts to this TEC. Condition 14 also requires the proponent to locate construction laydown and stockpile areas at least 50 m from the Claypans of the Swan Coastal Plain TEC.

The Organic Mound Springs, Swan Coastal Plain is also the subject of an Interim Recovery Plan (Department of Conservation and Land Management 2006). The EPA does not consider that this proposal would impact the ability of the Interim Recovery Plan to achieve its objective.

As outlined in Section 3.1 Flora and Vegetation, the proponent has indicated it will implement a FVMMP to limit indirect impacts to both the TECs. This plan includes establishing baseline condition, undertaking monitoring and implementing remedial actions should changes to vegetation health be detected (MRWA 2015). The EPA has recommended condition 10 to minimise indirect impacts to both these TECs.

In considering impacts to these TECs, the EPA notes that no direct impacts are predicted and the proponent has proposed a range of management and mitigation measures to minimise indirect impacts. However the EPA has recommended condition 14 be imposed to ensure indirect impacts to hydrological regimes and water quality in the TECs does not occur.

Summary

Having regard to the:

- relevant policy and guidance pertaining to Hydrological Processes and Inland Waters Environmental Quality;
- public submissions;
- avoidance and minimisations measures proposed by the proponent;
- CCWs and TECs that are dependent on hydrological processes and environmental quality;
- partial or complete loss of seven CCWs totalling up to 16 ha representing a small incremental loss of CCW's and is unlikely to significantly impact on the representation of CCWs on the Swan Coastal Plain;
- absence of nationally important wetlands or Wetlands of International Importance occurring within the proposal development envelope;
- priority drinking water source area;
- predictions that the proposal would not impact the TEC Organic Mound Springs, Swan Coastal Plain or the TEC Claypans of the Swan Coastal Plain;
- drainage strategy which would aim to ensure that hydrological connectivity between wetland areas would be maintained as close to practicable to a pre-development state;
- monitoring, management and mitigation measures proposed to reduce the construction impacts; and
- advice from DoW that the proposal is unlikely to significantly impact groundwater quality in the Gnangara Mound and that activities proposed within the GUWPCA and associated WHPZs are manageable,

the EPA considers that the proposal can be managed to meet the EPA's objectives for Hydrological Processes and Inland Waters Environmental Quality provided that conditions 6, 13 14 and 16 are imposed requiring the proponent to:

- ensure that construction activities and operation of the proposal do not affect the quality and quantity of groundwater and surface water within the GUWPCA and WHPZs;
- ensure that construction and operation of the proposal does not result in indirect impacts to TEC Organic Mound Springs, Swan Coastal Plain, the TEC Claypans of the Swan Coastal Plain and CCWs;
- ensure that pre-development surface water flows are maintained for the TEC Organic Mound Springs, Swan Coastal Plain, the TEC Claypans of the Swan Coastal Plain and CCWs; and
- offset the significant residual impact to CCWs.

3.4 Amenity (Noise and Vibration)

The EPA's environmental objective for this factor is *to ensure that impacts to amenity are reduced as low as reasonably practicable*.

Relevant EPA policy and guidance

The EPA policy and guidance applicable to Amenity (Noise and Vibration) for this assessment and relevant matters discussed in each policy and guidance document are outlined in Appendix 4. The EPA considers that the following policy and guidance is relevant to its assessment of the proposal in relation to this factor:

- EAG 13 *Consideration of environmental impacts from noise* (EPA 2014a).

EPA Assessment

The proposal has the potential to impact nearby noise-sensitive premises and land uses during both construction and operation through traffic and construction generated noise and vibration. Noise-sensitive premises are those occupied for residential or accommodation purposes and are defined in the Environmental Protection (Noise) Regulations 1997 (Noise Regulations). Noise-sensitive land uses also includes premises used for other purposes such as hospitals and education facilities.

Construction impacts

Noise from construction sites and its impact on noise-sensitive premises is managed under Regulation 13 of the Noise Regulations. Any construction noise made between 7.00 a.m. and 7.00 p.m. Monday to Saturday (excluding public holidays) is exempt from assigned noise limits, provided the works are being carried out in accordance with the Australian Standard 2436:2010 *Guide to noise and vibration control on construction, demolition and maintenance sites*.

The proponent considers that noise and vibration impacts would be localised and temporary during the construction phase. However, to manage and mitigate the potential impacts, the proponent has indicated it will comply with Regulation 13, and would prepare a noise management plan should work be planned outside of the permissible hours as required by the Noise Regulations. The proponent considers that, with appropriate management and mitigation measures, noise and vibration impacts are expected to be manageable and within the requirements of the Noise Regulations. This is consistent with EAG 13.

Operational impacts

To determine the potential noise impacts during operation, the proponent conducted background noise monitoring from September to December 2014 at nine locations from just south of Reid Highway to Muchea. Monitoring was undertaken in accordance with the Australian Standard 2702:1984 *Acoustics – Methods for the Measurement of Road Traffic Noise*. This background data was used as an input into a noise model in order to predict future noise levels for affected noise-sensitive land uses in the vicinity of the proposal.

During the public review period the DER raised a number of issues regarding the modelling undertaken. As a result, the proponent re-ran the model to better predict the noise levels on noise-sensitive land uses. This revised assessment is provided in the proponents Response to Submissions (MRWA 2016). The DER has advised that revised modelling has addressed the matters raised.

The Noise Regulations do not apply to traffic noise, rather that is managed under State Planning Policy 5.4 (SPP 5.4) *Road and Rail Transport Noise and Freight Consideration in Land Use Planning* (WAPC 2009). This policy applies to proposed new major road projects as well as major redevelopments of existing roads in the vicinity of existing or future noise-sensitive land uses. It also defines the traffic noise criteria relevant to the operation of the proposal.

In accordance with EAG 13, the EPA expects proponents use best practice noise management to minimise impacts on amenity, comply with SPP 5.4 and other accepted standards where applicable and address their contribution to cumulative noise emissions.

For this proposal, noise-sensitive land uses from the Tonkin/Reid Highway intersection to Maralla Road efforts should be made to achieve the “limit”, consistent with SPP 5.4. For properties north of Maralla Road where there is no existing traffic noise there is an expectation that the "target" should be achieved where reasonable and practical. Table 6 outlines the noise criteria from SPP 5.4.

Table 6: SPP 5.4 noise criteria

Period	Target	Limit
Day (6am to 10pm)	55 dB $L_{Aeq\ (Day)}$	60 dB $L_{Aeq\ (Day)}$
Night (10pm to 6am)	50 dB $L_{Aeq\ (Night)}$	55 dB $L_{Aeq\ (Night)}$

SPP 5.4 states that where the "target" can be met, no further mitigation measures under SPP 5.4 are required. However, where it is not possible to achieve the "limit", best practicable noise mitigation measures should be implemented.

Modelling undertaken by the proponent predicted that, together with the appropriate management and mitigation measures, the SPP 5.4 noise:

- target of 55 dB $L_{Aeq\ (Day)}$ would be met at most noise-sensitive land uses in the vicinity of Ellenbrook;
- limit of 60 dB $L_{Aeq\ (Day)}$ would be met at noise-sensitive land uses at the Tonkin Highway/Reid Highway interchange and the section of highway between the Reid Highway and Hepburn Avenue; and
- limit of 60 dB $L_{Aeq\ (Day)}$ would be exceeded at 16 rural premises north of Ellenbrook.

To manage and mitigate the potential impacts to noise-sensitive land uses south of Maralla Road, the proponent has located the proposal as far from noise-sensitive land uses as possible within the development envelope, is proposing to use the quietest practical road surface, and is constructing noise walls to a maximum height of 5 m. Once constructed, the proponent also proposes to undertake noise monitoring to confirm that the noise limit specified in SPP 5.4 is achieved.

For those properties north of Maralla Road where the noise limit would be exceeded the proponent has proposed to undertake additional measures, consistent with the implementation guidelines in SPP 5.4, in order to reduce indoor noise levels to acceptable levels. These measures including screening walls to a maximum of 2.4 m and other noise mitigation measures as discussed and agreed with affected property owners. Noise mitigation measures may include façade protection packages such as thick window glazing.

Where the proposal cannot meet the noise limits outlined in SPP 5.4, the proponent is expected to follow the procedures provided in SPP 5.4 to implement “reasonable and practicable measures” to reduce noise impacts. This includes consulting with the community to identify the best overall solutions for noise management. The EPA considers the proponent’s proposed approach to manage noise impacts is consistent with EAG 13.

In considering the proposal’s potential impacts on noise-sensitive land uses, the EPA notes that noise and vibrations associated with construction can be managed under the Noise Regulations. The EPA also notes that the impacts from construction noise would meet the requirements and recommendations of EAG 13 and SPP 5.4.

To manage and mitigate potential impacts on noise sensitive premises, the EPA recommends that condition 15 be imposed requiring the proponent to prepare a management plan which would ensure impacts to existing noise-sensitive land uses as a result of the ongoing operation of the proposal are minimised as low as reasonably practicable and/or are consistent with EAG 13 and SPP 5.4.

Summary

Having regard to the:

- relevant policy and guidance pertaining to Amenity (noise and vibration);
- public submissions;
- monitoring, management and mitigation measures proposed to ensure that noise levels at noise-sensitive land uses are within the limits specified in EAG 13 and SPP 5.4 for properties south of Maralla Road; and
- additional measures proposed to reduce indoor noise levels at noise-sensitive land uses to acceptable limits for properties north of Maralla Road, as discussed and agreed with affected property owners, which is consistent with the approach in EAG 13 and SPP 5.4,

the EPA considers that the proposal can be managed to meet the EPA's objectives for Amenity (noise and vibration) provided that condition 15 is imposed requiring the proponent to propose actions to manage and mitigate impacts on noise-sensitive land uses.

3.5 Offsets (Integrating Factor)

The EPA's environmental objective for this factor is *to counterbalance any significant residual environmental impacts or uncertainty through the application of offsets.*

Relevant EPA policy and guidance

The EPA and State Government policy and guidance applicable to Offsets (Integrating Factor) for this assessment and relevant matters discussed in each policy and guidance document are outlined in Appendix 4. The EPA considers that the following policy and guidance is relevant to its assessment of the proposal in relation to this factor:

- WA Environmental Offsets Policy (Government of WA 2011).
- WA Environmental Offsets Guidelines (Government of WA 2014).
- EPB 1 Environmental Offsets (EPA 2014b).

The ESD referred to GS 19 *Environmental Offsets* (EPA 2008b) and PS 9 *Environmental offsets* (EPA 2006d). The ESD also referred to the 2008 version of EPB 1. All three of these policies referred to critical, high and low to medium values assets and contained a presumption against recommending approval where a proposal had a potential significant residual impact on critical assets. The EPA notes that the significant residual impacts discussed below would have been to 'critical assets' as defined in PS 9. However these policies were either withdrawn or updated when the Government of WA released the WA Environmental Offsets Guidelines in August 2014. This change in policy and guidance occurred prior to the release of the PER.

The concept of critical assets has been incorporated into the Residual Impact Significance Model in the WA Environmental Offsets Guidelines (refer Figure 3). This model identifies where offsets cannot be applied, where an offset will be required and where an offset may be required, based on the significance of the residual impact. In accordance with this guide, in general significant residual impacts include those that affect DRF, TECs, rare and endangered fauna or habitat for fauna, areas within the formal conservation reserve, Bush Forever areas, CCWs, and areas that are being critically impacts in a cumulative context.

The EPA notes the timing of this policy and guidance change and that the proponent prepared the PER utilising the current policy and guidance. Within this context, the EPA has assessed the significant residual impacts of the proposal having regard to the Residual Impact Significance Model and its current policy and guidance pertaining to environmental offsets.

EPA Assessment

Consistent with principle 1 of the WA Environmental Offset Policy, the proponent has applied the mitigation hierarchy to avoid, minimise and mitigate the proposal's potential impacts on the environment, as discussed in Sections 3.1 – 3.3. However, following the implementation of all mitigation measures the EPA considers that a number of significant residual impacts remain. These are:

- loss of 4 ha of TEC SCP20a '*Banksia attenuata* woodlands over species rich dense shrublands';
- loss of 5.5 ha of Yanga Complex outside the Swan Coastal Plain portion of the Perth Metropolitan Region;
- loss of 7.65 ha of A Class Nature Reserves;
- loss of 129.9 ha of native vegetation within Bush Forever areas;
- loss of 207.2 ha of foraging habitat for Carnaby's cockatoo (*Calyptorhynchus latirostris*);
- loss of 120.5 ha of foraging habitat for forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*);
- loss and impact to 16 ha of CCWs; and
- loss of 31.9 ha of critical habitat for *Caladenia huegelii*.

While noting these significant residual impacts, the EPA does not consider that the proposal will significantly affect the regional representation of any of these environmental values, as has been discussed in Sections 3.1 – 3.3. Therefore, the EPA is of the view that residual impacts are not unacceptable and offsets are appropriate for this proposal to counterbalance these significant residual impacts. This position is consistent with principal 2 of the WA Environmental Offsets Policy and the Residual Impact Significance Model in the WA Environmental Offsets Guidelines.

The proponent has proposed four offsets to address the residual impacts, which comprise:

- Ioppolo Road Site – land acquisition and funding for ongoing management to address the residual impacts to black cockatoos;

- Land acquisition and rehabilitation – land acquisition and funding for ongoing management in combination with rehabilitation work to address impacts to black cockatoos, CCWs and under-represented vegetation complexes.
- SCP20a – land acquisition and funding for ongoing management in combination with rehabilitation work if required; and
- *Caladenia huegelii* – provision of funding for on-ground management within existing Crown land.

Ioppolo Road Site Land Acquisition and Management Plan

The proponent has acquired a large 983 ha block at Lot M2091 Ioppolo Road, Chittering (Ioppolo Road Site) and is proposing to cede 673.5 ha of this site to the Conservation and Parks Commission for vesting as a conservation reserve. The EPA notes that the remainder of the Ioppolo Road Site may be used to offset a separate proposal and therefore the EPA's consideration of this offset is limited to the 673.5 ha proposed as an offset for this proposal.

This lot is currently zoned Agricultural Resource and is surrounded by private land, with the exception of existing A and C Class Nature Reserves managed by Parks and Wildlife to the west. A vegetation and fauna assessment undertaken on the Ioppolo Road Site identified 673.5 ha of Carnaby's cockatoo and 279 ha of forest red-tailed black cockatoo potential foraging habitat.

Vegetation on the Ioppolo Road Site is considered in Excellent condition and is in a better condition than the majority of the vegetation proposed to be cleared. The proponent has identified that the Ioppolo Road Site contains large mature trees with characteristics such as hollows that could support breeding activity for both species of black cockatoo. The Ioppolo Road Site also has a number of additional values including one inferred TEC (SCP20b), one known TEC (SCP20c), two inferred PECs (Banksia on yellow-orange sands and SCP23b) and is known to support the western brush wallaby. It also supports the DRF *Chamelaucium* sp. Gingin and four species of Priority flora.

The proponent is proposing to fund the ongoing management of the Ioppolo Road Site for a period of up to 10 years and has identified potential management activities including rubbish removal, prevention of third party access, and weed and dieback management.

The EPA notes that the proponent has used the Commonwealth's Offset Assessment Guide to consider the Ioppolo Road Site as an offset for black cockatoo species. This is consistent with the approach used for other assessments and is provided for in the WA Environmental Offsets Guideline. Based on this guide, the Ioppolo Road Site doesn't fulfil the full offset requirement for either species of black cockatoo. It does, however, fulfil 97.5 per cent of the required offset for Carnaby's cockatoo and 82.23 per cent of the required offset for forest red-tailed black cockatoo (refer to Section 6 of the Proponent's Response to Submissions). However, the EPA notes that the remaining residual impacts to black cockatoo foraging habitat would be part of a separate land acquisition and rehabilitation plan that is discussed below.

In considering the acceptability of the proposed offset, the EPA recognises the Ioppolo Road Site doesn't involve habitat creation or restoration, only protection of existing foraging habitat. While the EPA doesn't consider this a sustainable long term strategy for any species, it does recognise the high environmental values of this Site. Principles 3 and 4 of the WA Environmental Offsets Policy, as discussed in the WA Environmental Offset Guidelines, allows for land acquisition which involves the protection of environmental values through improved security of tenure. The recommended offset will also provide for the long term maintenance of values through a contribution to ongoing management. The acquisition of 673.5 ha at the Ioppolo Road Site is therefore considered to be a suitable partial offset for both black cockatoo species, when considered as part of the entire offset package.

The EPA also considers that the proposed vesting of 673.5 ha of the Ioppolo Road Site as a conservation reserve would adequately address the significant residual impacts from the loss of 7.65 ha of A Class Nature Reserves 46919 and 46920.

The EPA has recommended conditions 16-2 to 16-7 which require the proponent to prepare the Ioppolo Road Site Land Acquisition and Management Plan to address the significant residual impacts to black cockatoos and nature reserves. This plan would identify the area to be ceded to the Conservation and Parks Commission, activities to be undertaken, including improvement activities for areas requiring rehabilitation, timeframes for the plan's implementation, funding arrangements for ongoing management, monitoring and reporting requirements, and completion criteria.

Condition 16-4 requires the proponent to continue implementing the plan until the completion criteria have been achieved, while condition 16-6 also requires the proponent to review and revise the plan as and when directed by the Chief Executive Officer of the Office of the Environmental Protection Authority. This provides for adaptive management of the offset and will ensure that the objective will be achieved, consistent with principle 5 of the WA Environmental Offsets Policy and as discussed in the WA Environmental Offsets Guidelines.

Land Acquisition and Rehabilitation Offset Strategy

In order to counterbalance the significant residual impacts to CCWs, remaining black cockatoo foraging habitat and impacts to vegetation complexes, the proponent proposed a land acquisition and rehabilitation plan as part of its Response to Submissions (refer Appendix 6). As part of this plan, the proponent proposed offsetting the loss of vegetation complexes that had under 30 per cent of its Pre-European extent remaining. These complexes are Bassendean Complex Central and South, Southern River Complex and Yanga Complex.

However, as discussed in Section 3.1, the EPA considers the only vegetation complex for which a significant residual impact remains is the 5.5 ha of the Yanga Complex outside the Swan Coastal Plain portion of the Perth Metropolitan Region. The EPA has therefore determined, consistent with the

Residual Impact Significance Model in the WA Environmental Offsets Guidelines, that full offset identified in the Response to Submissions is not required.

As also discussed in Section 3.1, the EPA considers that there will be a significant residual impact on specific areas of consolidated regionally significant vegetation, mainly Bush Forever areas. The EPA therefore considers that an offset is required to counter balance the loss 129.9 ha of vegetation within Bush Forever areas. The EPA notes that the proponent did not propose an offset for this loss.

The EPA has recommended a Land Acquisition and Rehabilitation Offset Strategy to address the offsets required for the:

- remaining loss of 5.2 ha of foraging habitat for Carnaby's cockatoo (*Calyptorhynchus latirostris*);
- remaining loss of 21.4 ha of foraging habitat for forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*);
- loss and impact to 16 ha of CCWs;
- loss of 129.9 ha of vegetation within Bush Forever areas; and
- loss of 5.5 ha of Yanga Complex outside the Swan Coastal Plain portion of the Perth Metropolitan Region.

This plan would aim to protect and/or restore values to a commensurate or greater value than those being impacted and locate the sites as close to the proposal as possible. The proponent is proposing that restoration would form a significant part of this plan and may therefore acquire land that is in a worse condition than the area being impacted, with the aim of restoring values to those commensurate with the impacted areas. The proponent identified in its Response to Submissions that it has found a number of potential properties that may form part of this offset. However as the full offset requirement hasn't been identified, details regarding these properties was not included within the Response to Submissions.

The EPA supports rehabilitation and restoration based offsets as it can contribute to a net environmental benefit. This is particularly for black cockatoos as discussed above. Consistent with principle 3 of the WA Environmental Offsets Policy and as discussed in the WA Environmental Offset Guidelines, on-ground management that includes rehabilitation as the objective can be used as an offset as it can provide a tangible improvement to the environmental values in the offset area. The EPA also notes that the restoration of wetland areas is in accordance with PS 4, which has an overarching goal to restore the biological diversity of wetland habitats (EPA 2004c).

The EPA notes, as identified in principle 5 of the WA Environmental Offsets Policy and discussed in the WA Environmental Offsets Guideline, that the significant residual impact should be properly quantified. This includes considering the extent of the impact, vegetation condition, conservation significance of the affected area, and land tenure. In determining an appropriate offset quantum, the EPA has considered these elements (which have been described in Sections 3.1 – 3.3), in addition to previous EPA assessments, the

Commonwealth's Offset Assessment Guide and SPP 2.8 for Bush Forever areas.

Appendix 4 of SPP 2.8 provides guidance on offset criteria based on the conservation significance of the Bush Forever site being impacted. In determining the quantum of native vegetation the proponent is required to acquire, the EPA has considered the environmental attributes of the impacted Bush Forever sites, such as vegetation complex, presence of flora and fauna and vegetation condition, as well as the ratios provided in this Appendix.

The EPA therefore considers that the proponent should acquire:

- 5.5 ha of Yanga Complex given the condition of the impacted vegetation is predominately in a degraded condition;
- 181 ha of native vegetation with vegetation communities and/or complexes and condition commensurate with the Bush Forever sites being impacted;
- an area containing Carnaby's cockatoo and forest red-tailed black cockatoo foraging habitat that is to be determined using the Commonwealth's Offset Assessment Guide once the condition of the proposed site and extent of any rehabilitation works is known; and
- at least 48 ha of wetlands which are of the same quality as CCW at the time of acquisition or after rehabilitation. The EPA notes that it is likely to be a combination of CCWs and rehabilitation of lower value wetlands to CCW condition. The EPA has previously recommended a 3:1 offset ratio for impacts to CCWs where wetland restoration has been proposed. It is considered that a higher offset ratio is necessary to account for the risk of failure in restoring wetland values.

The EPA recommends conditions 16-8 to 16-11 which will require the proponent to prepare an Offset Strategy to address the significant residual impacts identified above. In accordance with principle 5 of the WA Environmental Offsets Policy and as discussed in the WA Environmental Offsets Guidelines, condition 16-9 will require that the condition of the land to be acquired must be commensurate with, either at acquisition or after rehabilitation works, the values being impacted. Also in accordance with principle 5, the Offset Strategy requires the proponent to identify whether the acquired land is managed under a conservation covenant or ceded to the Crown.

As a requirement of this condition, the proponent would need to identify activities to be undertaken, timeframes, funding arrangements, monitoring and reporting requirements and completion criteria for rehabilitation activities. To ensure that offset will be successful, the EPA has recommended that funding for ongoing management of any land acquired be provided for a minimum of seven years. The EPA has further recommend a condition requiring the quantum of funding for both the upfront establishment and on-going management actions be determined based on whether the aims, objectives and completion criteria for the acquired land are met.

Condition 16-10 also requires the proponent to continue implementing the plan until the completion criteria have been achieved, while 16-11 requires the proponent to review and revise the plan as and when directed by the Chief Executive Officer of the Office of the Environmental Protection Authority. This provides for adaptive management of the offset and will ensure that the objective will be achieved, consistent with principle 5 of the WA Environmental Offsets Policy and as discussed in the WA Environmental Offsets Guidelines.

Caladenia huegelii Habitat Management Plan

As discussed in Section 3.1 Flora and Vegetation, the Grand Spider Orchid (*C. huegelii*) has a cryptic lifecycle. This species has been found to have a low rate of pollination success, thought to be a result of the limited presence of the specific pollinating wasp species. As a consequence, habitat critical for a population to remain viable requires the thynnid wasp in addition to a specific mycorrhizal fungus required for seed germination (Department of Environment and Conservation 2008b). Replacing like-for-like habitat can therefore be difficult.

Previous conservation and recovery actions involving cultivation and translocation programs have had limited success and, as a result, Parks and Wildlife recommends that conservation efforts focus on protection and management of existing populations and critical habitat rather than further research. The proponent therefore proposed funding for the development and implementation of a management plan for potential *C. huegelii* critical habitat within A Class Nature Reserves 46919 and 46875, Bush Forever Site 300 and Whiteman Park.

Since the final Response to Submissions was provided to the EPA, further consultation with the WAPC and Whiteman Park have identified that the *C. huegelii* population within Whiteman Park is located on land leased to a third party. Therefore negotiations to undertake on-ground management works will also need to occur with the lessee. The EPA considers that this may affect the ability of the proponent to successfully carry out management activities in this area.

The EPA therefore undertook further consultation with Parks and Wildlife regarding an alternative location. Parks and Wildlife have identified Kooljerrenup Nature Reserve (Reserve 23756) which is located adjacent to the Peel Harvey Inlet. While the EPA recognises that this site is some distance from the development site, Parks and Wildlife have advised that it contains the second largest population of *C. huegelii* on the Swan Coastal Plain. The EPA considers that this alternative location is a more suitable location on which to undertake on-ground management.

The proponent has proposed funding for this plan for up to 10 years and the scope and funding of this plan would be determined in consultation with Parks and Wildlife and other landowners/managers and be in accordance with the Grand Spider Orchid (*Caladenia huegelii*) Recovery Plan (Department of Environment and Conservation 2008b). The proponent has consulted with

Parks and Wildlife regarding the types of management actions to be included in the plan, and has identified the following potential actions:

- weed and dieback mapping and control;
- management of controlled access such as the installation of cable fencing and heavy duty gates; and
- additional surveys to identify and/or confirm critical habitat and the locations and distribution of populations/individuals.

The EPA notes that offsets that focus on on-ground management are consistent with principle 3 of the WA Environmental Offsets Policy. Furthermore, principle 3 identifies that offsets should be relevant and proportionate to the environmental values being impacted, which for this proposal is habitat rather than individual plants. The EPA considers that on-ground management would also assist in achieving the objective of the Recovery Plan for this species as it would aid in abating threats to populations, as identified in principle 4 of the WA Environmental Offsets Policy. The EPA also considers undertaking these on-ground management actions in existing conservation reserves will ensure that the offset provides a secure and long-term benefit. The EPA therefore considers an offset which focuses on addressing the significant residual impact to *C. huegelii* habitat is appropriate for this proposal.

The EPA recommends conditions 16-12 to 16-18 which requires the proponent to prepare a *Caladenia huegelii* Habitat Management Plan to address the significant residual impact of 31.9 ha of critical habitat for this species through on-ground management actions. As a requirement of this condition, the proponent would need to identify activities to be undertaken, timeframes, funding arrangements, monitoring and reporting requirements and completion criteria.

Condition 16-17 also requires the proponent to continue implementing the plan until the completion criteria have been achieved, while 16-18 requires the proponent to review and revise the plan as and when directed by the Chief Executive Officer of the Office of the Environmental Protection Authority. This provides for adaptive management of the offset and will ensure that the objective will be achieved, consistent with principle 5 of the WA Environmental Offsets Policy and as discussed in the WA Environmental Offsets Guidelines.

SCP20a Offsets Strategy

As discussed in Section 3.1 Flora and Vegetation, SCP20a is the most diverse of all banksia communities on the Swan Coastal Plan and is now highly fragmented with many of the remaining occurrences being small. Threats identified by Parks and Wildlife include hydrological change, fire frequency, weed and dieback invasion, and loss of pollinators through loss of associated habitats.

The proponent has not yet identified a suitable site to counterbalance the significant residual impact to this community and consequently has proposed land acquisition and management. Should the proponent be unable to identify

a suitable site in a similar or better condition, the proponent has indicated it will undertake rehabilitation activities. Funding has been proposed for seven years, or until any relevant completion criteria have been met.

Consistent with the approach used for other assessments and provided for in the WA Environmental Offsets Guideline, the EPA notes that the proponent has used the Commonwealth's Offset Assessment Guide to determine an approximate offset quantum for SCP20a. To accurately use the Commonwealth's Offset Assessment Guide, site specific information regarding the values of the offset site is required. Therefore, as site specific detail is not available at this time, the proponent has used this guide to calculate an approximate quantum for a loss of 4 ha of SCP20a. If a site of similar quality is found, an offset of approximately 22.6 ha of SCP20a will be required.

Noting this, the EPA has therefore has recommended a condition requiring the proponent to use the Commonwealth Offsets Assessment Guide to determine the exact quantum required to offset SCP20a once suitable sites, their condition and the appropriate management actions and/or rehabilitation tasks required have been identified. The EPA considers this approach appropriate as, in accordance with principle 3 of the WA Environmental Offsets Policy, environmental offsets should be relevant and proportionate to the environmental values being impacted.

Parks and Wildlife have advised that approximately 560 ha of SCP20a remains. The data presented in the GGP DSIAR indicates that of the 441 ha remaining within the PPR, 31 of these occurrences occur on land managed by Parks and Wildlife with a further 352 occurring within Bush Forever Sites or Crown Reserves with conservation listed as the purpose of the reserve (Government of WA 2015b).

Principle 2 of the WA Environmental Offsets Policy, as discussed in the WA Environmental Offsets Guidelines, recognises the need for certainty and transparency with regard to the application of offsets. Given the remaining extent of SCP20a, the EPA recognises that it may be difficult to acquire the full requirement of approximately 22.6 ha of SCP20a in Good condition. However, in considering the appropriateness of offsets for this significant residual impact, the EPA acknowledges that many of the remaining occurrences are under pressure from edge effects including weeds, dieback and a decline in the quality of adjacent habitats and a consequential reduction in pollinators.

Principle 4 of the WA Environmental Offsets Policy recognises that offsets can include actions that complement park management plans or are listed in species recovery plans. While noting that a recovery plan has not been prepared for this community, the restoration of ecological functions in highly fragmented communities is consistent with GS 10 (EPA 2006c). Parks and Wildlife have advised that there are a number of populations within secure tenure where rehabilitation activities could be undertaken. The EPA also considers that there could be merit in either acquiring or establishing well vegetated buffers in Good condition or better around remnants of this TEC to assist in providing long-term resilience to edge effects. However, the EPA

expects that the proponent will take all reasonable measures to acquire SCP20a in the first instance.

The EPA therefore considers that allowing a more adaptive framework to offset this significant residual impact is appropriate, which is consistent with principle 5 of the WA Environmental Offsets Policy and as discussed in the WA Environmental Offset Guidelines. The EPA has therefore recommended conditions 16-19 to 16-22 requiring the proponent prepare a SCP20a Offsets Strategy. This plan would require the proponent to identify areas for protection, management and/or rehabilitation, which may comprise habitat necessary to maintain SCP20a, in addition to the conservation or enhancement of SCP20a itself.

Condition 16-21 also requires the proponent to continue implementing the plan until the completion criteria have been achieved, while 16-22 requires the proponent to review and revise the plan as and when directed by the Chief Executive Officer of the Office of the Environmental Protection Authority. This provides for adaptive management of the offset and will ensure that the objective will be achieved, consistent with principle 5 of the WA Environmental Offsets Policy and as discussed in the WA Environmental Offsets Guidelines.

4. Conditions

Section 44 of the EP Act requires that this assessment report must set out:

- what the EPA considers to be the key environmental factors identified in the course of the assessment; and
- the EPA's recommendations as to whether or not the proposal may be implemented, and, if the EPA recommends that implementation be allowed, the conditions and procedures to which implementation should be subject.

4.1 Recommended conditions

The EPA has developed a set of conditions that the EPA recommends be imposed if the proposal by the Commissioner for MRWA to construct and operate a freeway-standard dual carriageway between the Reid Highway/Tonkin Highway junction and the Great Northern Highway at Muchea is approved for implementation.

These conditions are presented in Appendix 5. Matters addressed in the conditions include the following:

(a) managing construction and post-construction impacts from the proposal including weeds, dieback, changes in surface water regimes and dust to ensure the impacts to flora and vegetation are minimised as far as practicable;
(b) ensuring that clearing or laydown areas aren't constructed within designated buffer areas to protect a single location of *Caladenia huegelii* and populations of *Grevillea curviloba* subsp. *incurva* and *Darwinia foetida;*

(c) implementing measures to ensure that indirect impacts to *Caladenia huegelii* habitat and populations of *Grevillea curviloba* subsp. *incurva* and *Darwinia foetida Claypans* are minimised as far as practicable;
(d) implementing measures to ensure that the condition of the TEC SCP20a '*Banksia attenuata* woodlands over species rich dense shrublands' is maintained or improved;
(e) undertaking progressive rehabilitation for areas identified by the proponent as not being required for ongoing operations;
(f) minimising impacts as far as practicable to conservation significant fauna during construction through the use of fauna spotters, appropriate design of fauna underpasses and preventing the clearing of trees currently occupied by nesting black cockatoos;
(g) implementing measures, including restricting the storage of fuels and chemicals, to ensure that there is no decline in water quality of the GUWPCA and the Ellen Brook;
(h) preventing the construction of laydown areas, stockpiles or chemical storage within the WHPZs and ensuring that infiltration basins are not constructed within 100 m of drinking water production wells;
(i) implementing measures to ensure that construction and operation of the proposal maintains predevelopment surface water flows and does not result in indirect impacts to *Darwinia foetida*, the TECs Claypans of the Swan Coastal Plain and Communities of Tumulus Springs (Organic Mound Springs, Swan Coastal Plain) and CCWs;
(j) ensuring that impacts from noise emissions on Amenity during operation of the proposal are managed consistent with the requirements of SPP 5.4 and EAG 13; and
(k) requiring that the significant residual impacts identified in this report are appropriately offset through the acquisition and management of land and/or through the provision of funding for management.

4.2 Consultation

In developing these conditions, the EPA consulted with the proponent, the WAPC, the DoW, Parks and Wildlife and the DER on matters of fact, technical feasibility and potential difficulties with implementation. Minor changes, which did not change the intent or scope, were made to the conditions.

4.3 Recommendations

That the Minister for Environment notes:

1. that the proposal assessed is for construction and operation of the Peth-Darwin National Highway (Swan Valley Section);
2. the key environmental factors identified by the EPA in the course of its assessment set out in Section 3; and
3. that the EPA has concluded that the proposal may be implemented to meet the EPA's objectives, provided the implementation of the proposal is carried out in accordance with the recommended conditions and procedures set out in Appendix 5 and summarised in Section 4.

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Appendix 1

List of Submitters

Organisations:

Bullsbrook Residents and Ratepayers Association Inc.
Department of Aboriginal Affairs
Department of Environment Regulation
Department of Lands
Department of Parks and Wildlife
Department of Planning
Department of Water
Maralla Land Syndicate Pty Ltd
Wildflower Society of Western Australia (Inc)

Individuals:

Chris and Danielle Cottier
Dr Lyn Dunstan
David Karr
Amanda Kirk
Trevor Solomons
3 x confidential submissions

Appendix 2

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Appendix 3

Summary of Identification of Key Environmental Factors and Principles

Environmental factors	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of whether a factor is a key environmental factor
LAND			
Flora and Vegetation	The proposal would result in the direct loss through clearing and disturbance of up to 206 ha of native vegetation, which includes: • 129.9 ha of vegetated Bush Forever areas; • 7.4 ha of Class A Nature Reserve 46920; • 0.25 ha of Class A Nature Reserve 46919; • 5.5 ha of the Yanga vegetation complex outside the Swan Coastal Plain Portion of the Perth Metropolitan Area. • 4 ha of FCT SCP20a TEC.	**Department of Parks and Wildlife** • The proponent should fulfil its commitment to undertake additional targeted flora surveys for threatened and priority flora to determine the significance of the impact of the proposal on *Meeboldina decipiens* subsp*. decipiens* ms and *Millotia tenufolia* var*. laevis.* • The Management Plan should incorporate monitoring and performance criteria for threatened and priority flora. • Measures to protect the communities of the Tumulus Springs (Organic Mound Springs) TEC adjacent to the development footprint should include water balance studies for pre- and post-development situations. **Bullsbrook Residents and Ratepayers Association** • Flora surveys were undertaken for a limited period which may preclude the identification of species. • **Wildflower Society of WA** • Proponent could implement further refinements to the design to reduce clearing.	Flora and Vegetation was identified as a preliminary key environmental factor at level of assessment and in the ESD. Having regard to the scale of vegetation clearing that would be undertaken and the potential for conservation significant flora and vegetation to be impacted, **Flora and Vegetation is considered to be a key environmental factor and is discussed in Section 3.1.**

Environmental factors	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of whether a factor is a key environmental factor
	• 31.9 ha of *Caladenia huegelii* critical habitat (no loss of individuals)	• Include proposed management measures for weeds, dieback and degradation of bushland through illegal activities (e.g. rubbish dumping, vandalism and arson. • The impact of the proposal on *Cyathochaeta teretifolia* is unclear. • **<u>Public submitters</u>** Public submissions raised the following matters in addition to those raised above: • Justification for the classification of vegetation condition in certain areas. • The potential impacts of the proposal on populations of *Caladenia huegelii, Grevillea curviloba* subsp. *incurva* and Priority flora. • The potential impacts of the proposal on the Thynnid wasp which is responsible for pollination of *Caladenia huegelii*. • Risk of the spread of *Phytophthora cinnamomi.* • Implementation of recommendations from the environmental consultants who undertook the Level 2 Flora Survey (Appendix C – page 105). • Lack of consideration for further mitigation measures (design) to reduce the amount of clearing required.	

Environmental factors	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of whether a factor is a key environmental factor
Terrestrial Fauna	The proposal would result in the direct loss of fauna habitat from the clearing of 207.2 ha of native vegetation. The proposal would result in the loss of: • 207.2 ha Carnaby's cockatoo foraging habitat; • 120.5 ha of forest red-tailed black cockatoo foraging habitat; • 17 ha of fauna linkage between two A Class Nature Reserves on Maralla Road; and • Nine species of priority fauna were found or have the potential to occur in	**Department of Parks and Wildlife** • Request that the proponent provides Parks and Wildlife with the opportunity to contribute to, and comment, on the planned development of an Environmental Management Plan relating to fauna management. **Bullsbrook Residents and Ratepayers Association** • The proposed underpass size and design appear very limiting to the types of fauna that would actively use them. • The proposal would displace fauna. The management of fauna during construction and operation such as monitoring and removing species should be considered. **Wildflower Society of WA** • The proposal may impact on sensitive fauna through noise and vibration. • The proposal would result in a significant loss of black cockatoo habitat. • Requested an explanation as to why fauna escape ramps are being used instead of the alternative one-way fauna gates that have been installed elsewhere.	Terrestrial Fauna was identified as a preliminary key environmental factor at level of assessment and in the ESD. Having regard to the scale of vegetation clearing and the potential for conservation significant fauna to be impacted, **Terrestrial Fauna is considered to be a key environmental factor and is discussed in Section 3.2.** The proposal is outside the western swamp tortoise policy area as defined in the *Environmental Protection (Western Swamp Tortoise Habitat) Policy 2011.* However, the EPA notes

Environmental factors	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of whether a factor is a key environmental factor
	the development envelope. There is the potential for indirect impacts on fauna habitat from the spread of weeds and dieback, rubbish dumping, changes to hydrological conditions, vehicle tracks and edge effects.	**<u>Public submitters</u>** Public submissions raised the following matters in addition to those raised above: • The proposal may impact on the wedge-tailed eagles which occur in the vicinity of the proposal. • Concerns over the effectiveness of fauna underpasses. • Concern over impacts on rainbow bee-eater active nesting sites. • Adequacy of fauna surveys. No comprehensive surveys for birds, reptiles or invertebrates undertaken.	that the proponent examined the potential has examined the potential impacts of the proposal on the western swamp tortoise. The proponent determined that: • no surface water flows into either Twin Swamp Nature Reserve or Ellen Brook Nature Reserve from the proposal; • groundwater levels are not expected to be impacted by the construction of the road embankment; • if dewatering is required detailed hydrogeological modelling would be undertaken to ensure

Environmental factors	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of whether a factor is a key environmental factor
			that Twin Swamps Nature Reserve is not impacted by drawdown; and • the risk to potential changes to groundwater quality in Twin Swamps Nature Reserve as a result of contamination or a spill is very low and furthermore would take approximately 60 years to travel through the groundwater to Twin Swamps and is therefore considered manageable should a spill occur, the EPA therefore considers that the proposal is unlikely to pose a risk to western swamp tortoise habitat

Environmental factors	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of whether a factor is a key environmental factor
			and does not require further evaluation in the report.
WATER			
Hydrological Processes and Inland Waters Environmental Quality	The proposal would directly impact seven CCWs, equating to an area of 14.8 ha. It would also result in indirect impacts of 1.2 ha of CCWs. Sections of the proposal, if constructed during winter, would require dewatering and would have a temporary and localised drawdown effect on local groundwater. Contamination of surface and groundwater has the potential to impact the	**Department of Water** • Many of the construction activities are incompatible land uses within P1 area of the GUWPCA. • The EMP does not clearly state the importance of the GUWPCA in terms of supplying Perth's drinking water and the various strategies and policies relevant to the area. The EMP should refer to more specific best-management practices. • The EMP should commit to working closely with the Water Corporation when constructing the proposed section in the GUWPCA P1 and P3 areas. • There is no mention of what quality of water should be used for dust suppression. • The Drainage Management Plan should commit to future consultation with the DoW. **Department of Parks and Wildlife** • That the estimated residual loss of wetland values, and the extent of wetlands to be monitored during	Hydrological processes and Inland Waters Environmental Quality were identified as preliminary key environmental factors at level of assessment and in the ESD. Having regard to the direct clearing of wetlands, indirect impacts on surface and groundwater quality, quantity and flows, and potential risks to groundwater quality in the GUWPCA **Hydrological Processes and Inland Waters Environmental**

Environmental factors	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of whether a factor is a key environmental factor
	Priority 1 Public Drinking Water Source Area during both construction and operation. The proposal has the potential to indirectly impact on the TEC Claypans of the Swan Coastal Plain at Muchea and the TEC Organic Mound Springs, Swan Coastal Plain at Gaston Road through a change in hydrological regimes and water quality.	and post construction, include wetlands that, while not mapped as CCW, may retain values commensurate with CCW. • The potential for indirect impacts on wetland values from the lowering of the water table can be minimised by restricting some construction activities to summer months, and managing drawdown associated with extraction bores in the vicinity of CCWs. **Wildflower Society of WA** • Lack of consideration for the importance of the role of native vegetation and soil type in respect to drainage. **Public** Public submissions raised the following matters in addition to those raised above: • Potential impacts of the proposal on the winter mound springs in the area. If the natural hydrology is altered recharge of the springs may be affected. • Potential impacts of drawdown on the local groundwater levels. • Implications of dewatering on local residents who reply on-groundwater for domestic use and nearby *Caladenia huegelii* and CCWs.	**Quality is considered to be a key environmental factor and is discussed in Section 3.3.**

Environmental factors	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of whether a factor is a key environmental factor
		• Maintenance of the function and quality of groundwater and CCWs within and adjacent to the project footprint. • Adequacy of proposed separation distances between construction and wetlands. • Susceptibility of wetland areas to exposure of ASS during construction. • Management of water quality in Saw Pit Gully should it be used as a possible outlet flow for flood over-topping events.	
PEOPLE			
Amenity (Noise and Vibration)	Noise and vibration impacts from construction and operation of the proposal.	**Department of Environment Regulation** • Potential underestimation of the traffic noise impact associated with this proposal due to the method adopted for the traffic noise modelling calibration. **Public Submitters** Public submissions raised the following matters in addition to those raised above: • Adequacy and implementation of the proposed noise mitigation measures.	Amenity (Noise and Vibration) was identified as a preliminary key environmental factor at level of assessment and in the ESD. Having regard to the noise impacts on noise-sensitive land uses during construction and operation, **Amenity (Noise and Vibration) is**

Environmental factors	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of whether a factor is a key environmental factor
		• Potential impacts of vibrations caused during construction on adjacent houses and proposed compensation.	**considered to be a key environmental factor and is discussed in Section 3.4.**
Heritage (Aboriginal)	Disturbance and clearance of Aboriginal Heritage places and objects within the proposal development envelope. Field surveys identified four registered sites and one lodged sites that could potentially be impacted by the proposal: <u>Bennett Brook (site ID 3692)</u> This is a large mythological site which includes the entire Bennett Brook and its banks. This site is of	**<u>Department of Aboriginal Affairs</u>** • A number of Registered Aboriginal Sites and other Aboriginal Heritage places overlap the area of the proposed development. • Potential impacts to Aboriginal heritage from the proposal can be addressed through the proposed management plan and the provisions of the *Aboriginal Heritage Act 1972.*	Heritage (Aboriginal) was not identified as a preliminary key environmental factor at level of assessment and in the ESD. Having regard to the: • Small scale of the impact to each lodged and registered site; • the specific measures proposed by the proponent to ensure that flows in the watercourses for site IDs 3692, 21620 and 3535 are maintained; • the proponent's consultation with the

Environmental factors	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of whether a factor is a key environmental factor
	significance because it was formed by the Waugal. The proposal intersects the Bennett Brook and minor tributaries in two locations. At one of these locations the proponent has proposed a dual use culvert to maintain stream flow. The other location of the Bennett Brook tributary is predominately an urban area. This site extends well beyond the proposal development envelope. <u>Temporary Camp (site ID 20058)</u> This site was destroyed in the 1990s.		South West Aboriginal Land and Sea Council and relevant Aboriginal people in identifying relevant Aboriginal Heritage places and objects and potential impacts; • the large proportion of each site remaining after the implementation of the proposal; • Guidance Statement No 41 Assessment of Aboriginal Heritage; and • the EPA's significance framework outlined in EAG 9, the EPA considers that it is unlikely that the proposal would have a significant impact on the physical and biological

Environmental factors	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of whether a factor is a key environmental factor
	<u>Lightening Swamp (site ID 21393)</u> This is a ceremonial and mythological site of high cultural significance and used for camping and hunting. The proposal intersects a small area of roadside vegetation on the edge of this site. <u>Chandala Brook (site ID 21620)</u> This site is a mythological site and comprises the watercourses near Muchea. It is part of DAA Complex 42. The proposal intersects this site in one location and the proponent proposes a dual use culvert to maintain stream flow.		surroundings that would affect Aboriginal Heritage places and objects and that the proposal can meet the objective of this factor. Accordingly **Heritage (Aboriginal) is not considered to be a key environmental factor.**

Environmental factors	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of whether a factor is a key environmental factor
	<u>Ellen Brook (Upper Swan) (site ID 3525)</u> This is a lodged mythological site and is part of the greater system of waterways of Ellen Brook that are associated with the Waugal. This site is very large and the proposal intersects with the site between approximately Maralla Road and its terminus at the Great Northern Highway. The proponent proposes a combination of culverts and bridges in seven locations to maintain stream flow. This site extends well beyond the proposal development envelope. Two new sites were identified (artefact		

Environmental factors	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of whether a factor is a key environmental factor
	scatters) during field surveys however these will not be impacted. Where identified Aboriginal Heritage sites meeting the *Aboriginal Heritage Act 1972* criteria cannot be avoided by the proposal, the proponent will apply for permissions under s18 of the *Aboriginal Heritage Act 1972* to use the land containing the Aboriginal Heritage site. If consent is received, the proponent will undertake required mitigation prior to distance work.		
Heritage (European)	Disturbance and clearance of European Heritage values in the	**<u>Department of Parks and Wildlife</u>** • Liaise with Parks and Wildlife regarding translocation of heritage cork trees and re-establishment of fencing	Heritage (European) was not identified as a preliminary key environmental factor at

Environmental factors	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of whether a factor is a key environmental factor
	proposal development envelope. The EPA notes that the proponent will consult with Parks and Wildlife regarding measures to minimise impacts on Dick Perry Reserve, including retaining and translocating cork trees and maintaining access through connections to the Principal Shared Path and fencing, designed in accordance with the requirements of bordering properties.	and access ways in Parks and Wildlife managed lands. **<u>Public Submitters</u>** Public submissions raised the following matters in addition to those raised above: • Concern that potential impacts on the local historical feature, Bulls Brook, have been overlooked.	level of assessment and in the ESD. Having regard to EAG 9, the EPA considers that it is unlikely that the proposal would have a significant impact European Heritage and that the proposal can meet the objective of this factor. Accordingly **Heritage (European) is not considered to be a key environmental factor.**
INTEGRATING FACTORS			
Offsets	Significant residual impacts include the clearing and disturbance of:	**<u>Department of Parks and Wildlife</u>** • Should the proposed survey of the Ioppolo Road offset site show that it does not comprise critical habitat for the threatened flora *Caladenia huegelii* and alternative offset package should focus on the	Offsets was identified as a preliminary key environmental factor at level of assessment and in the ESD.

Environmental factors	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of whether a factor is a key environmental factor
	• 4 ha of FCT SCP20a TEC; • 5.5 ha of Yanga Complex outside the Swan Coastal Plain Portion of the Perth Metropolitan Area; • 7.65 ha of Class A Nature Reserves; • 129.9 ha of Bush Forever areas; • 207.2 ha of Carnaby's cockatoo foraging habitat; • 120.5 ha of forest red-tailed black cockatoo foraging habitat; • 16 ha of CCW's; and • 31.9 ha of *Caladenia huegelii* critical habitat.	management and protection of existing populations or critical habitat, rather than on translocation options. • If offset proposal 3 conservation of TEC proves difficult to implement and alternative offset option for the loss of 0.4 ha of the southern wet shrublands, Swan Coastal Plain TEC should be developed and implemented in consultation with Parks and Wildlife. • That offset proposal 2 'Conservation of land comprising CCWs' be refined to align as far as practicable with the types of impacted wetlands in each consanguineous suite. **<u>Public Submitters</u>** Public submissions raised the following matters in addition to those raised above: • Consideration should be given to the suitability of Lot 5892 Maralla Road Bullsbrook as a potential offset site. • Even with proposed offsets, the proposal would result in an overall net loss of bushland, which includes important fauna habitat. The offset package does not include any proposed rehabilitation to address the net loss.	Having regard to the significant residual impacts of the proposal following the implementation of the mitigation hierarchy, **Offsets is considered to be a key environmental factor and is discussed in Section 3.5.**

Environmental factors	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of whether a factor is a key environmental factor
Rehabilitation and decommissioning	The proponent has identified the following area as likely to require rehabilitation and/or decommissioning: • areas disturbed during construction e.g. laydown areas that are not required for operation; and • Beechboro Road North, from Jules Steiner Memorial Drive to Gnangara Road would be decommissioned.	**<u>Wildflower Society of Western Australia and Public Submitters</u>** • The rehabilitation/revegetation project does not appear to include an objective to maintain biodiversity.	Rehabilitation and decommissioning was identified as a preliminary key environmental factor at level of assessment and in the ESD. However, having regard to: • EAG 9*;* • GS 6; • the small scale of rehabilitation works required; and • that the only area of decommissioning likely from the proposal is Beechboro Road North between Jules Steiner Memorial Drive Street and Gnangara Road, the EPA considers that it is unlikely the proposal would have a significant impact on Rehabilitation

Environmental factors	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of whether a factor is a key environmental factor
			and Decommissioning and the proposal can meet the objective for this factor. Accordingly, R**ehabilitation and Decommissioning is not considered to be a key environmental factor.** However, the EPA notes that the proposal will require some rehabilitation and decommissioning works but considers these impacts should be managed with other construction based impacts to Flora and Vegetation. The EPA has therefore assessed these impacts under the key environmental factor of Flora and Vegetation, which is discussed in Section 3.1.

Table A2 Summary of identification of principles

PRINCIPLES	
Environmental principles of the EP Act	
Principle	**Consideration**
1. The precautionary principle *Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.* *In application of this precautionary principle, decisions should be guided by –* *a) careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and* *b) an assessment of the risk-weighted consequences of various options.*	In considering this principle, the EPA notes that Flora and Vegetation, Terrestrial Fauna, Hydrological Processes and Inland Waters Environmental Quality and Amenity (Noise and Vibration) could be significantly impacted by this proposal. The assessment of these impacts is provided in this report. Investigations on the biological and physical environment undertaken by the proponent have provided sufficient certainty to assess risks and identify measures to avoid or minimise impacts. The EPA has recommended conditions to ensure relevant measures are undertaken by the proponent. From its assessment of this proposal, the EPA has concluded that there is not a threat of serious or irreversible harm.
2. The principle of intergenerational equity *The present generation should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations.*	In considering this principle, the EPA notes that the proponent has taken measures to avoid, minimise, rehabilitate (and offset) impacts in accordance with the mitigation hierarchy in the *WA Environmental Offsets Guidelines* (Government of WA 2014). In assessing this proposal the EPA has recommended that conditions be imposed on the proponent in relation to managing impacts on Flora and Vegetation, Terrestrial Fauna, Hydrological Processes and Inland Waters Environmental Quality. Conditions to offset the significant residual impacts

	relating to impacts to flora and vegetation, fauna habitat and wetlands have also been recommended. From its assessment of this proposal, the EPA has concluded that the health, diversity and productivity of the environment can be maintained and enhanced for the benefit of future generations.
3. The principle of the conservation of biological diversity and ecological integrity *Conservation of biological diversity and ecological integrity should be a fundamental consideration.*	In considering this principle, the proposal would result in impacts to flora and vegetation, fauna and wetlands. In assessing the proposal the EPA has considered these impacts and has taken into account measures proposed by the proponent to minimise impacts to flora and vegetation, fauna and wetlands and has recommended conditions to manage the impacts. The EPA has concluded that the proposal would not compromise the biological diversity or ecological integrity within this IBRA region. Through this assessment, the EPA has demonstrated that the conservation of biological diversity and ecological integrity was a fundamental consideration.
4. Principles relating to improved valuation, pricing and incentive mechanisms *(1) Environmental factors should be included in the valuation of assets and services.* *(2) The polluter pays principles – those who generate pollution and waste should bear the cost of containment, avoidance and abatement.* *(3) The users of goods and services should pay prices based on the full life-cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste.*	In considering this principle, the EPA notes that rehabilitation and ongoing management of the proposal would be a financial cost and would be the responsibility of the proponent. The EPA notes that proponent has used the Infrastructure Sustainability Council of Australia rating tool to maximise sustainability of the proposal. The EPA has demonstrated due regard to this principle during the assessment of this proposal.

(4) *Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structure, including market mechanisms, which enable those best placed to maximise benefits and/or minimize costs to develop their own solution and responses to environmental problems.*	
5. The principle of waste minimisation *All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.*	In considering this principle, the EPA notes that the proposal that the proponent has indicated it will undertake the construction of the proposal in accordance with the principles of waste minimisation in accordance with Main Roads Environmental Policy.
Environmental principles of the EPA	
1. Best practice *When designing proposals and implementing environmental mitigation and management actions, the contemporary best practice measures available at the time of implementation should be applied.*	In considering this principle, the EPA notes that the proponent has developed design considerations and mitigation measures using best practice measures to manage the potential impacts and risks. This is consistent with the relevant matters of GS 55 *Implementing Best Practice in proposals submitted to the Environmental Impact Assessment process*. These relevant matters include: • all relevant environmental quality standards must be met; • common pollutants should be controlled by proponents adopting Best Practicable Measures to protect the environment; • hazardous pollutants should be controlled to the Maximum Extent Achievable, which involves the most stringent measures available. For a small number of very hazardous and toxic pollutants, costs are not taken into account; • there is the responsibility for proponents not only to minimise adverse impacts, but also to consider improving the environment through rehabilitation and offsets where practicable.

	The EPA has demonstrated due regard to this principle during the assessment of this proposal.
2. Continuous improvement *The implementation of environmental practices should aim for continuous improvement in environmental performance.*	The PER document indicates that the various environmental management plans would be reviewed regularly and updated as necessary. Conditions have been recommended requiring the development of environmental management plans for this proposal. The EPA encourages adaptive management and continual improvement through environmental management plans (EPA EAG 17). The EPA has demonstrated due regard to this principle during the assessment of this proposal.

Appendix 4

Relevant EPA Policies and Guidance and identified matters

The EPA reviewed its policies and guidance documents for each environmental factor to determine their relevance to the assessment of the proposal. The EPA has outlined the relevant matters discussed in each policy and guidance document for the key environmental factors below.

1. Flora and Vegetation

The EPA considers that the following policy and guidance is relevant to its assessment of the proposal in relation to this factor:

- Position Statement 2 Environmental Protection of Native Vegetation in Western Australia (EPA 2000).
- Position Statement 3 Terrestrial biological surveys as an Element of Biodiversity Protection (EPA 2003).
- Guidance Statement 10 Level of Assessment for Proposals Affecting Natural Areas Within the System 6 Region and Swan Coastal Plain Portion of the System 1 Region (EPA 2006c).
- Environmental Protection Bulletin 20 Protection of Naturally Vegetated Areas Through Planning and Development (EPA 2013).
- Guidance Statement 51 Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia (EPA 2004a).
- Guidance Statement 6 Rehabilitation of Terrestrial Ecosystems (EPA 2006a).
- Technical Guide Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2015d).

Position Statement 2 *Environmental Protection of Native Vegetation in WA*.

Relevant matters discussed in Position Statement 2 for this assessment include the following, in relation to the EPA's consideration of biological diversity in assessing a proposal:

1. Avoid further clearing as far as practicable
2. A comparison of development scenarios, or options, to evaluate protection of biodiversity at the species and ecosystem levels, and demonstration that all reasonable steps have been taken to avoid disturbing native vegetation.
3. No known species of plant or animal is caused to become extinct as a consequence of the development and the risks to threatened species are considered to be acceptable.
4. No association or community of indigenous plants or animals ceases to exist as a result of the project.
5. There would be an expectation that a proposal would demonstrate that the vegetation removal would not compromise any vegetation type by taking it below the "threshold level" of 30% of the pre-clearing extent of the vegetation type.

6. Where a proposal would result in a reduction below the 30% level, the EPA would expect alternative mechanisms to be put forward to address the protection of biodiversity.
7. There is a comprehensive, adequate and secure representation of scarce endangered habitats within the project area and/or in areas which are biologically comparable to the project area, protected in secure reserves.
8. If the project area is large, the project area itself should include a comprehensive and adequate network of conservation areas and linking corridors whose integrity and biodiversity is secure and protected.
9. The on-site and off-site impacts of the project are identified and the proponent demonstrates that these impacts can be managed.

Position Statement 3 *Terrestrial biological surveys as an Element of Biodiversity Protection*.

Relevant matters discussed in Position Statement 3 for this assessment include:

1. The EPA expects proponents to demonstrate in their proposals that all reasonable measures have been undertaken to avoid impacts on biodiversity. Where some impact on biodiversity cannot be avoided, it is for the proponent to demonstrate that the impact will not result in unacceptable loss.
2. The EPA will use the IBRA as the largest unit for EIA decision-making in relation to the conservation of biodiversity.
3. The EPA expects proponents to ensure that terrestrial biological surveys provide sufficient information to address both biodiversity conservation and ecological function values within the context of the type of proposal being considered and the relevant EPA objectives for protection of the environment.
4. In the absence of information that could provide the EPA with assurance that biodiversity will be protected, the EPA will adopt the precautionary principle.

Position Statement No. 3 refers to definitions, principles and objectives in the first national biodiversity strategy *National Strategy for the Conservation of Australia's Biological Diversity* (Commonwealth of Australia, 1996). The EPA notes that the most recent version of the strategy, *Australia's Biodiversity Conservation Strategy 2010–2030* (Commonwealth of Australia, 2010), refers to a shortened definition of biological diversity and contains different principles. The 2010 Strategy also notes that a review of the 1996 Strategy found it difficult to objectively measure performance against the qualitative objectives in the 1996 Strategy and that there have been shifts in environmental management approaches regarding biodiversity conservation. Therefore, the EPA has not considered the matters relating to the 1996 Strategy to be relevant for this assessment

Guidance Statement 10 *Level of Assessment for Proposals Affecting Natural Areas Within the System 6 Region and Swan Coastal Plain Portion of the System 1 Region*.

Relevant matters discussed in Guidance Statement 10 for this assessment include:

1. Table 1 identifies that proposals that impact Bush Forever sites, Threatened Ecological Communities and Vegetation Complexes with less than 10 per cent remaining should be treated differently to proposals that impact other environmental attributes. It also identifies the EPA's objective for a range of environmental attributes on the Swan Coastal Plain, including that it is preferred that developments are located in cleared areas.
2. Bush Forever should be implemented in accordance with the published document (Government of WA 2000). Further to this there is the presumption against any further development adversely impacting on the regionally significant values of bush forever sites. This guidance statement provides guidance to proponents that they should conduct a thorough appraisal of all development and site selection options that avoid direct or indirect impacts on natural areas prior to presenting a proposal for environmental impact assessment.
3. Criteria used by the EPA to determine regionally significant natural areas, including Bush Forever Sites. The criteria are listed below:
    - Representation of ecological communities
    - Diversity
    - Rarity
    - Maintaining ecological processes or natural systems
    - Scientific or evolutionary importance
    - General criteria for protection of wetland, streamline, and estuarine fringing vegetation and coastal vegetation.

Environmental Protection Bulletin 20 *Protection of naturally vegetated areas through planning and development*.

Relevant matters discussed in Position Statement 3 for this assessment include:

1. Locate development on cleared land.
    - The most important areas for protection should be identified, in consultation with the relevant agencies, and development over intact natural areas should be avoided.
    - The EPA has a general presumption against the clearing of regionally significant natural areas. Where development over naturally vegetated areas is unavoidable, development should be focused within cleared parts of the site, followed by more degraded areas, as determined by site survey.
2. Protect large consolidated naturally vegetated areas.
    - Development should be designed to retain naturally vegetated areas in large consolidated blocks which are representative of the biodiversity values in the area, to avoid fragmentation or isolation.
    - Large consolidated blocks should:

- include the best condition naturally vegetated areas on site and ensure that they are representative of the area.
- have a low edge to area ratio, which is determined based on the size and shape of the consolidated block. Large naturally vegetated areas are preferred over long or irregular shaped retained naturally vegetated areas.

- Fragmentation of larger naturally vegetated areas into smaller pockets of vegetation results in the in loss of habitat values and degradation of vegetation. Small areas of vegetation have low viability, higher management costs to maintain their condition and are more susceptible to weeds, pest invasion and other degrading processes.

3. Ecological linkages should be planned in the regional context and connect large naturally vegetated areas.
   - While ecological linkages are desirable, they should not be established at the expense of large consolidated naturally vegetated areas.
4. Ensure clearing and ongoing management responsibilities in retained naturally vegetated areas.
   - Retained naturally vegetated areas should be placed under secure tenure and managed by a body which is prepared and willing to accept the long term management responsibilities and costs for the area.
   - In areas covered by a region scheme, high value retained naturally vegetated areas are best retained through reservation and vesting for conservation purposes.
5. Infrastructure should not be located within consolidated retained naturally vegetated areas.
   - Services and infrastructure, including roads and other transport corridors, should not be located within or through consolidated naturally vegetated areas.
   - Infrastructure within naturally vegetated areas disrupts the connectivity of these areas and reduces the environmental values and long term viability of the area through fragmentation and edge effects.

Guidance Statement 51 *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in WA*.

Relevant matters discussed in Guidance Statement No 51 for this assessment include:

1. Surveys are planned and designed appropriately.
2. The analysis, interpretation and reporting is of a suitable quality and consistent methodology to enable the EPA to judge the impacts of proposals on flora and vegetation.
3. The environment, in particular significant flora and vegetation biodiversity is identified and protected.
4. Survey data is capable of underpinning long-term observation and measurement for later compliance and audit purposes.

Guidance Statement 6 *Rehabilitation of Terrestrial Ecosystems*.

Relevant matters discussed in Guidance Statement No 6 for this assessment include:

1. Undertake flora, vegetation and fauna surveys required to provide baseline information for environmental management and to assess environmental significance.
2. Information about the diversity of plants and their capacity to recruit from seeds.
3. The setting of rehabilitation objectives that take into account the complexity of constraints to effective rehabilitation.
4. The setting of completion criteria that are attainable in realistic timeframes and ensure rehabilitation objectives have been met.
5. The use of similar rehabilitation objectives and completion criteria within particular industries and within geographical regions when appropriate.

Technical Guide *Flora and Vegetation Surveys for Environmental Impact Assessment*

Relevant matters discussed in the Technical Guide for this assessment include:

- The level of survey, survey effort and methods used should be appropriate to the bioregion, the local and regional context and the size of the proposal; and
- The analysis, interpretation and reporting undertaken is of a suitable quality and of consistent methodology to enable the EPA to determine the impacts of proposals on flora and vegetation.

Guidance Statement 33 *Environmental Guidance for Planning and Development*

Since the publication of Guidance Statement 33, and following the Review of the Environmental Impact Assessment process in Western Australia (EPA, 2009), a number of the EPA's policy, guidance and position statements, referred to in Guidance Statement 33, have been reviewed and are no longer

current. Where there is an inconsistency between current policy considerations and Guidance Statement 33 considerations, current policy prevails.

In relation to Flora and Vegetation, the EPA considers that the above policies provide a more contemporary policy framework. Therefore Guidance Statement 33 is not considered a relevant policy for this factor.

2. Terrestrial Fauna

The EPA considers that the following policy and guidance is relevant to its assessment of the proposal in relation to this factor

- Guidance Statement 33 Environmental Guidance for Planning and Development (EPA 2008a).
- Position Statement 3 Terrestrial biological surveys as an element of biodiversity protection (EPA 2002).
- Environmental Protection Bulletin 20 Protection of Naturally Vegetated Areas Through Planning and Development (EPA 2013).
- Guidance Statement 56 Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia (EPA 2004b).
- Technical Guide Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment (EPA 2010).
- Guidance Statement 20 Sampling of Short Range Endemic Invertebrate Fauna for Environmental Impact Assessment in Western Australia (EPA 2009).

Guidance Statement 33 *Environmental Guidance for Planning and Development*

Since the publication of Guidance Statement 33, and following the Review of the Environmental Impact Assessment process in Western Australia (EPA, 2009), a number of the EPA's policy, guidance and position statements, referred to in Guidance Statement 33, have been reviewed and are no longer current. Where there is an inconsistency between current policy matters and Guidance Statement 33 matters, current policy prevails.

Relevant matters discussed in Guidance Statement 33 for this assessment include:

1. Protect and manage adequate natural areas
    - Protect and manage fauna by keeping each ecological community above 30% of their pre-clearing levels.
    - Protect all native habitats that significant fauna rely on for their survival.
    - The protection of fauna is best achieved by retaining some large, relatively intact bushland areas with a variety of habitat types. Retaining small areas of native habitat is also of value as this may enable the continuation of some species.
    - The values of large and small areas of native habitat are enhanced by maintaining and enhancing ecological linkages between these areas.

- Having regard for the importance of maintaining biodiversity and the difficulty in reversing biodiversity declines, impacts on native habitat, particularly clearing, should be avoided wherever possible.

2. Adopt an ecosystem management approach to managing fauna numbers, species and interdependent assemblages.
3. Design and manage land use and development to avoid direct and indirect adverse impacts on key native fauna and fauna habitat.
4. Development should not result in species extinction or increase any threats to their survival.
5. Integrate land use planning with biodiversity protection and consult with relevant parties and consult with relevant parties when there may be impacts on significant native fauna or fauna habitat.
6. Obtain adequate information on fauna and fauna habitat to allow informed decision-making.
7. Demonstrate that the mitigation hierarchy has been considered.

Position Statement 3 *Terrestrial biological surveys as an Element of Biodiversity Protection*.

Relevant matters discussed in Position Statement 3 for this assessment include:

1. The EPA expects proponents to demonstrate in their proposals that all reasonable measures have been undertaken to avoid impacts on biodiversity. Where some impact on biodiversity cannot be avoided, it is for the proponent to demonstrate that the impact will not result in unacceptable loss.
2. The EPA will use the IBRA as the largest unit for EIA decision-making in relation to the conservation of biodiversity.
3. The EPA expects proponents to ensure that terrestrial biological surveys provide sufficient information to address both biodiversity conservation and ecological function values within the context of the type of proposal being considered and the relevant EPA objectives for protection of the environment.
4. In the absence of information that could provide the EPA with assurance that biodiversity will be protected, the EPA will adopt the precautionary principle.

Position Statement No. 3 refers to definitions, principles and objectives in the first national biodiversity strategy *National Strategy for the Conservation of Australia's Biological Diversity* (Commonwealth of Australia, 1996). The EPA notes that the most recent version of the strategy, *Australia's Biodiversity Conservation Strategy 2010–2030* (Commonwealth of Australia, 2010), refers to a shortened definition of biological diversity and contains different principles. The 2010 Strategy also notes that a review of the 1996 Strategy found it difficult to objectively measure performance against the qualitative objectives in the 1996 Strategy and that there have been shifts in environmental management

approaches regarding biodiversity conservation. Therefore, the EPA has not considered the matters relating to the 1996 Strategy to be relevant for this assessment.

Environmental Protection Bulletin 20 *Protection of naturally vegetated areas through planning and development*.

Relevant matters discussed in Environmental Protection Bulletin 20 for this assessment include:

1. Locate development on cleared land.
   - The most important areas for protection should be identified, in consultation with the relevant agencies, and development over intact natural areas should be avoided.
   - The EPA has a general presumption against the clearing of regionally significant natural areas. Where development over naturally vegetated areas is unavoidable, development should be focused within cleared parts of the site, followed by more degraded areas, as determined by site survey.
2. Protect large consolidated naturally vegetated areas.
   - Development should be designed to retain naturally vegetated areas in large consolidated blocks which are representative of the biodiversity values in the area, to avoid fragmentation or isolation.
   - Large consolidated blocks should:
     - include the best condition naturally vegetated areas on site and ensure that they are representative of the area.
     - have a low edge to area ratio, which is determined based on the size and shape of the consolidated block. Large naturally vegetated areas are preferred over long or irregular shaped retained naturally vegetated areas.
   - Fragmentation of larger naturally vegetated areas into smaller pockets of vegetation results in the in loss of habitat values and degradation of vegetation. Small areas of vegetation have low viability, higher management costs to maintain their condition and are more susceptible to weeds, pest invasion and other degrading processes.
3. Ecological linkages should be planned in the regional context and connect large naturally vegetated areas.
   - While ecological linkages are desirable, they should not be established at the expense of large consolidated naturally vegetated areas.
4. Ensure clearing and ongoing management responsibilities in retained naturally vegetated areas.
   - Retained naturally vegetated areas should be placed under secure tenure and managed by a body which is prepared and willing to accept the long term management responsibilities and costs for the area.
   - In areas covered by a region scheme, high value retained naturally vegetated areas are best retained through reservation and vesting for conservation purposes.
5. Infrastructure should not be located within consolidated retained naturally vegetated areas.

- Services and infrastructure, including roads and other transport corridors, should not be located within or through consolidated naturally vegetated areas.
- Infrastructure within naturally vegetated areas disrupts the connectivity of these areas and reduces the environmental values and long term viability of the area through fragmentation and edge effects.

Guidance Statement 56 *Terrestrial Fauna Surveys for Environmental Impact Assessment in WA*.

Relevant matters discussed in Guidance Statement 56 for this assessment include:

- The scale and methods of fauna and faunal assemblage survey is planned and designed appropriately for the region;
- The survey, analysis, interpretation and reporting undertaken for EIA is of a suitable quality and of consistent methodology to enable the EPA to judge the impacts of proposals on fauna and faunal assemblages;
- The environment, in particular conservation significant fauna and significant faunal assemblages are identified and protected; and
- Survey data is capable of underpinning long-term observation and measurement of later compliance and audit purposes.

Technical Guide *Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment*.

Relevant matters discussed in the Technical Guide for this assessment include:

- The level of survey, survey effort and methods used should be appropriate to the province, faunal group and size of the proposal; and
- The analysis, interpretation and reporting undertaken is of a suitable quality and of consistent methodology to enable the EPA to judge the impacts of proposals on fauna and faunal assemblages.

Guidance Statement 20 *Sampling of Short Range Endemic Invertebrate Fauna for Environmental Impact Assessment in Western Australia*

Relevant matters discussed in Guidance Statement 20 for this assessment include:

1. ensure the protection of key habitats for short range endemic species;
2. maintain the distribution, abundance and productivity of populations of short range endemic taxa;
3. ensure that the conservation status of short range endemic taxa is not adversely changed as a result of development proposals; and
4. ensure that proposals do not potentially threaten the viability of, or lead to the extinction of, any short range endemic species.

The EPA identified this policy as relevant during the preparation of the Environmental Scoping Document. However, the proponent undertook a desktop survey and determined that suitable habitat for short range endemic species was not present within the development envelope. The EPA therefore does not consider this policy relevant for this assessment.

3. Hydrological Processes and Inland Waters Environmental Quality

The EPA considers that the following policy and guidance is relevant to its assessment of the proposal in relation to this factor:

- Position Statement 4 *Environmental Protection of Wetlands* (EPA 2004c).
- Guidance Statement 33 *Environmental guidance for planning and development* (EPA 2008a).
- *Position Statement 7 Principles of environmental protection* (EPA 2004d).
- *Environmental Protection (Gnangara Mound Crown Land) Policy 1992.*
- *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992.*

Position Statement 4 *Environmental Protection of Wetlands.*

Relevant matters discussed in Position Statement 4 for this assessment include:

1. Protect the environmental values and functions of wetlands in WA.
2. Protect, sustain and, where possible, restore the biological diversity of wetland habitats in WA.
3. Protect the environmental quality of the wetland ecosystems of WA through sound management in accordance with the concept of "wise use", as described in the Ramsar Convention, and ecologically sustainable development principles, regardless of land use or activity.
4. Have as an aspirational goal no net loss of wetland values and functions.

Guidance Statement 33 *Environmental guidance for planning and development.*

Since the publication of Guidance Statement 33, and following the Review of the Environmental Impact Assessment process in WA (EPA, 2009), a number of the EPA's policy, guidance and position statements, referred to in Guidance Statement 33, have been reviewed and are no longer current. Where there is an inconsistency between current policy matters and Guidance Statement 33 matters, current policy prevails.

Relevant matters discussed in Guidance Statement 33 for this assessment include:

Protection of wetlands

1. Avoid direct, indirect and cumulative impacts that may affect the attributes and functions of wetlands where possible.
2. Key management actions should be undertaken near protected wetlands including protecting the wetland, rehabilitation, implementing setbacks and management of activities outside the buffer to avoid adverse impacts.

3. Manage activities in catchment areas to protect key attributes and functions of wetlands.
4. The EPA urges that all CCW and appropriate buffers are fully protected.
5. The EPA urges that all reasonable measures are taken to minimise the potential impacts on REW and appropriate buffers.
6. In the case of MUW, the EPA urges that all reasonable measures are taken to retain the wetland's hydrological functions (including on-site water infiltration and flood detention) and, where possible, other wetland functions.

Protection of Public Drinking Water Sources

1. To minimise the potential for adverse impacts on PDWSAs, the EPA urges that people carrying out approved activities implement continuous improvement and adopt best practice measures
2. Key guidance for new land uses or developments or expansion of existing activities in Priority 1, 2 and 3 areas in PDWSAs is provided in the Department of Water's Water Quality Protection Note Land Use Compatibility in PDWSAs.
3. Land uses and development in all priority source protection areas that have the potential to impact detrimentally on the quality and/or quantity of water should not be permitted unless it can be demonstrated by the proponent, on advice from the DoW, that such impacts can be satisfactorily managed. (note this is from SPP 2.7 however GS 33 states EPA supports the implementation).
4. the acceptability of the location of the proposed land use or development having regard to PDWSA protection.
5. the detailed design, intensity of development and management measures to be implemented
6. The protection of the water resource may be assisted by conditions requiring the preparation and implementation of environmental management plans for developments and land uses based on best practice; revegetation; repair of degraded or contaminated areas; continuous improvement of environmental management; monitoring of impacts; and contingency plans to be implemented in the event of specified triggers

Total water cycle management

1. The EPA favours the application of a total water cycle management approach that recognises that water supply, stormwater and wastewater management are interrelated components of surface water and groundwater catchment systems.

Best practice and continuous improvement

1. Activities that have the potential to adversely affect water resources should adopt the principles of best practice, continuous improvement and waste avoidance and minimisation.

Position Statement 7 *Principles of environmental protection*

This position statement was listed in the EPA's ESD as a relevant guideline, however, it was withdrawn in June 2015 and the relevant principles were

incorporated into the revised EAG 8. This policy was therefore not considered relevant to the assessment of this proposal.

Environmental Protection (Gnangara Mound Crown Land) Policy 1992

This policy was listed in the EPA's ESD for this proposal as a relevant policy, however was revoked in November 2015. Some aspects of this policy are out of date and since its gazettal a range of other policy and regulatory mechanisms have been introduced which afford ongoing protection of the Gnangara Mound. Some of these include:

- *Metropolitan Water Supply Sewage and Drainage Act 1909* and Metropolitan Water Supply Sewage and Drainage By-laws 1981;
- Ministerial Statement 819 (Department of Water) which has superseded the water level criteria of this policy;
- the Environmental Protection (Unauthorised Discharges) Regulations 2004;
- the environmental harm provisions of the EP Act;
- Environmental Protection (Clearing of Native Vegetation) Regulations 2004;
- Statement of Planning Policy 2.2 Gnangara Groundwater Protection and 2.7 public Drinking Water Source;
- DoW's Water Quality Protection Notes and Allocation Plans; and
- Bush Forever (Government of Western Australia 2000).

This policy was therefore not considered relevant to the assessment of this proposal for this factor.

Environmental Protection (Swan Coastal Plain Lakes) Policy 1992

This policy was listed in the EPA's ESD for this proposal as a relevant policy, however this policy was revoked in November 2015. Lakes covered by this policy are adequately protected by other statutory, policy and planning mechanisms put in place since this policy was established. Some of which include:

- Environmental Protection (Clearing of Native Vegetation) Regulations 2004;
- Environmental Protection (Unauthorised Discharges) Regulations 2004;
- the environmental harm provisions of the EP Act;
- Part IV of the EP Act, where significant impacts to CCWs are required to be referred to the EPA;
- the 1996 Geomorphic Wetland Dataset;
- State Planning Policy 2.9 *Water Resources* (2006); and
- Bush Forever (Government of Western Australia 2000).

This policy was therefore not considered relevant to the assessment of this proposal for this factor.

4. Amenity (noise and vibration)

The EPA considers that the following policy and guidance is relevant to its assessment of the proposal in relation to this factor:

- Environmental Assessment Guideline 13 *EPA consideration of environmental impacts from noise* (EPA 2014a).

Environmental Assessment Guideline 13 *EPA consideration of environmental impacts from noise*

Relevant matters discussed in Environmental Assessment Guideline 13 for this assessment include:

1. The EPA expects proponents to use best practice noise management, for all noise forms, to minimise impacts on human health and amenity.
2. The EPA expects proponents to achieve compliance with the requirements of the *Environmental Protection (Noise) Regulations 1997* or State Planning Policy 5.4 *Road and Rail Transport Noise and Freight Considerations in Land Use Planning* where applicable, and other accepted standards.
3. The proponent is expected to demonstrate that impacts from noise emissions have been avoided, minimised and mitigated using best practice and technology.
4. If the proposal cannot demonstrate that it meets assigned levels in the noise regulations or the criteria in SPP 5.4 then Amenity and/or Human Health will likely be considered a key environmental factor, and conditions recommended to ameliorate the impacts of noise and meet the EPA's objectives.
5. If, for a road or rail proposal, it has been identified that SPP 5.4 noise criteria cannot be met, the proponent is expected to follow the procedures provided for in the SPP to implement 'reasonable and practicable measures' to reduce noise impacts. This includes consulting with the community to identify the best overall solutions for noise management.

Guidance Statement 33 Environmental Guidance for Planning and Development

Since the publication of Guidance Statement 33, and following the Review of the Environmental Impact Assessment process in Western Australia (EPA, 2009), a number of the EPA's policy, guidance and position statements, referred to in Guidance Statement 33, have been reviewed and are no longer current. Where there is an inconsistency between current policy matters and Guidance Statement 33 matters, current policy prevails.

In relation to Amenity (Noise and Vibration), the EPA considers that the above policy provides a more contemporary policy framework. Therefore Guidance Statement 33 is not considered a relevant policy for this factor.

5. Offsets (Integrating factor)

The EPA considers that the following policy and guidance is relevant to its assessment of the proposal in relation to this factor:

- WA Environmental Offsets Guidelines (Government of WA 2014).
- WA Environmental Offsets Policy (Government of WA 2011).
- Environmental Protection Bulletin 1 Environmental Offsets (EPA 2014b).

WA Environmental Offsets Policy.

Relevant matters discussed in the Environmental Offsets Policy for this assessment include:

1. Environmental offsets will only be considered after avoidance and mitigation options have been pursued.
2. Environmental offsets are not appropriate for all projects (circumstances).
3. Environmental offsets will be cost-effective, as well as relevant and proportionate to the significance of the environmental value being impacted.
4. Environmental offsets will be based on sound environmental information and knowledge.
5. Environmental offsets will be applied within a framework of adaptive management.
6. Environmental offsets will be focussed on longer term strategic outcomes.

WA Environmental Offsets Guidelines.

Relevant matters discussed in the Environmental Offsets Guidelines for this assessment include:

1. Environmental offsets will only be applied where the residual impacts of a project are determined to be significant, after avoidance, minimisation and rehabilitation have been pursued.
2. Proponents must apply the mitigation hierarchy (avoid, minimise, rehabilitate and offset) to reduce the potential impacts of a proposal on the environment.
3. The residual impact significance model outlines on how significance is determined and when an offset is likely to be required, or may be required, in relation to relevant EPA environmental factors.
4. In determining the significance of an impact (and the requirement for an offset) it is important to consider the impacts in the regional context (cumulative impacts).
5. An offset needs to be relevant not only to the environmental value being impacted but also to the associated attributes which may be lost

or are at risk. Impacts to an environmental value are required to be offset by actions that benefit the same environmental value being impacted.

6. The offsets guidelines provides a methodology for determining an appropriate offset by identifying the key elements which should be considered. Quantitative tools, such as an offsets calculator, may also be used in certain circumstances, however these tools must be used with care and have regard to the reasonableness of the outcome they deliver.

7. If an impact is permanent, offsets must ensure a long lasting environmental benefit and be capable of being maintained into the future.

Environmental Protection Bulletin 1 *Environmental Offsets.*

Relevant matters discussed in Environmental Protection Bulletin 1 for this assessment include:

1. The EPA adopts the WA Environmental Offset Policy and WA Environmental Offset Guidelines for application through the environmental impact assessment process. Each proposal is assessed on its merits and there may be circumstances where the EPA may depart from the guidelines, which will be explained in its report to the Minister for Environment.

2. Where the EPA is of the view that a significant residual impact remains after avoidance, minimisation and rehabilitation efforts, the EPA will ensure that any offsets are recommended as conditions of approval in the EPA's report to the Minister for Environment, as well as including details on the rationale for the offset.

3. It is the EPA's preference to recommend specific offset conditions to the Minister rather than identifying the need for an offset plan to be developed post-approval.

4. As part of an Environmental Review document, proponents must include a section discussing how it has applied the mitigation hierarchy to its proposal. Offsets should be addressed in a separate section of the document, after the assessment of environmental factors.

5. If it is likely that a proposal will have a significant residual impact, the proponent should provide further details on the proposed offset, as outlined in the bulletin. The final decision on the need for and appropriateness of any offsets will be determined by the EPA at the end of the assessment process.

Guidance Statement 33 Environmental Guidance for Planning and Development

Since the publication of Guidance Statement 33, and following the Review of the Environmental Impact Assessment process in Western Australia (EPA, 2009), a number of the EPA's policy, guidance and position statements,

referred to in Guidance Statement 33, have been reviewed and are no longer current. Where there is an inconsistency between current policy matters and Guidance Statement 33 matters, current policy prevails.

In relation to Offsets, the EPA considers that the above policies provide a more contemporary policy framework. Therefore Guidance Statement No. 33 is not considered a relevant policy for this factor.

Guidance Statement 19 *Environmental Offsets – Biodiversity*

This guidance statement was listed in the EPA's Environmental Scoping Document (EPA 2014c) as a relevant guideline, however, it was withdrawn in August 2014 and replaced by the abovementioned documents. The proponent addressed the above policies within the PER.

Position Statement 9 *Environmental Offsets*

This position statement was listed in the EPA's Environmental Scoping Document (EPA 2014c) as a relevant guideline, however, it was withdrawn in August 2014 and replaced by the abovementioned documents. The proponent addressed the above policies within the PER.

Appendix 5

Identified Decision-making Authorities and Recommended Environmental Conditions

Identified Decision-making Authorities

Section 44(2) of EP Act specifies that the EPA's report must set out (if it recommends that implementation be allowed) the conditions and procedures, if any, to which implementation should be subject. This Appendix contains the EPA's recommended conditions and procedures.

Section 45(1) requires the Minister for Environment to consult with decision-making authorities, and if possible, agree on whether or not the proposal may be implemented, and if so, to what conditions and procedures, if any, that implementation should be subject.

The following decision-making authorities have been identified for this consultation:

Decision-making Authority	Approval
1. Minister for Environment	*Wildlife Conservation Act 1950* Taking of protected flora and fauna
2. Minister for Transport	*Main Roads Act 1930*
3. Minister for Water	*Rights in Water and Irrigation Act 1914* Water extraction licence and Bed and Banks permit
4. Minister for Aboriginal Affairs	*Aboriginal Heritage Act 1972* section 18 approval
5. Minister for Planning	*Planning and Development Act 2005* Scheme amendments
6. Minister for Lands	*Land Administration Act 1997* Transfer of Crown Lands
7. Mid-West Wheatbelt (Central) Joint Development Assessment Panel	*Planning and Development Act 2005* Development Approval
8. Metropolitan East Joint Development Assessment Panel	*Planning and Development Act 2005* Development Approval
9. Department of Environment Regulation	*Environmental Protection Act 1986* Part V Clearing

Note: In this instance, agreement is only required with DMAs 1-6 since these DMAs are Ministers.

RECOMMENDED ENVIRONMENTAL CONDITIONS

STATEMENT THAT A PROPOSAL MAY BE IMPLEMENTED

(Environmental Protection Act 1986)

PERTH-DARWIN NATIONAL HIGHWAY (SWAN VALLEY SECTION)

Proposal: The proposal is to construct and operate a dual carriageway highway from the intersection of Tonkin Highway and Reid Highway in Malaga to the intersection of the Great Northern Highway and Brand Highway in Muchea.

Proponent: Commissioner for Main Roads Western Australia
Australian Business Number 50 860 676 021

Proponent Address: Waterloo Crescent

EAST PERTH WA 6004

Assessment Number: 1994

Report of the Environmental Protection Authority: 1569

Pursuant to section 45 of the *Environmental Protection Act 1986* it has been agreed that the proposal described and documented in Table 2 of Schedule 1 may be implemented and that the implementation of the proposal is subject to the following implementation conditions and procedures:

Note: Words and expressions used in this Statement shall have the same respective meanings as provided for in the EP Act, relevant EPA Environmental Assessment Guidelines or as provided for in Schedule 1 Table 3 of this Statement.

1 Proposal Implementation

1-1 When implementing the proposal, the proponent shall not exceed the authorised extent of the proposal as defined in Table 2 in Schedule 1, unless amendments to the proposal and the authorised extent of the proposal have been approved under the EP Act.

2 Contact Details

2-1 The proponent shall notify the CEO of any change of its name, physical address or postal address for the serving of notices or other correspondence within twenty eight (28) days of such change. Where the proponent is a corporation or an association of persons, whether incorporated or not, the postal address is that of the principal place of business or of the principal office in the State.

3 Time Limit for Proposal Implementation

3-1 The proponent shall not commence implementation of the proposal after five (5) years from the date on this Statement, and any commencement, prior to this date, must be substantial.

3-2 Any commencement of implementation of the proposal, on or before five (5) years from the date of this Statement, must be demonstrated as substantial by providing the CEO with written evidence, on or before the expiration of five (5) years from the date of this Statement.

4 Compliance Reporting

4-1 The proponent shall prepare, submit and maintain a Compliance Assessment Plan to the CEO at least six (6) months prior to the first Compliance Assessment Report required by condition 4-6, or prior to implementation, whichever is sooner.

4-2 The Compliance Assessment Plan shall indicate:

(1) the frequency of compliance reporting;

(2) the approach and timing of compliance assessments;

(3) the retention of compliance assessments;

(4) the method of reporting of potential non-compliances and corrective actions taken;

(5) the table of contents of Compliance Assessment Reports; and

(6) public availability of Compliance Assessment Reports.

4-3 After receiving notice in writing from the CEO that the Compliance Assessment Plan satisfies the requirements of condition 4-2 the proponent shall assess compliance with conditions in accordance with the Compliance Assessment Plan required by condition 4-1.

4-4 The proponent shall retain reports of all compliance assessments described in the Compliance Assessment Plan required by condition 4-1 and shall make those reports available when requested by the CEO.

4-5 The proponent shall advise the CEO of any potential non-compliance within seven (7) days of that non-compliance being known.

4-6 The proponent shall submit to the CEO the first Compliance Assessment Report fifteen (15) months from the date of issue of this Statement addressing the twelve (12) month period from the date of issue of this Statement and then annually from the date of submission of the first Compliance Assessment Report, or as otherwise agreed in writing by the CEO.

The Compliance Assessment Report shall:

(1) be endorsed by the proponent's Chief Executive Officer or a person delegated to sign on the Chief Executive Officer's behalf;

(2) include a statement as to whether the proponent has complied with the conditions;

(3) identify all potential non-compliances and describe corrective and preventative actions taken;

(4) be made publicly available in accordance with the approved Compliance Assessment Plan; and

(5) indicate any proposed changes to the Compliance Assessment Plan required by condition 4-1.

5 Public Availability of Plans and Reports

5-1 Subject to condition 5-2, within a reasonable time period approved by the CEO of the issue of this Statement and for the remainder of the life of the proposal the proponent shall make publicly available, in a manner approved by the CEO, all environmental plans and reports required under this Statement.

5-2 If any parts of the plans or reports, referred to in condition 5-1 contains particulars of:

(1) a secret formula or process; or

(2) confidential commercially sensitive information; or

(3) the location of threatened species or other important environmental assets that may be potentially harmed if their location was published;

the proponent may submit a request for approval from the CEO to not make these data publicly available. In making such a request the proponent shall provide the CEO with an explanation and reasons why those parts of the plans or reports should not be made publicly available.

6 Infrastructure Plan (Terrestrial Fauna, Hydrological Processes, Inland Waters Environmental Quality, Amenity (Noise))

6-1 The proponent shall demonstrate that the proposal is designed and constructed consistent with the authorised extent(s) as referred to in Table 2 in Schedule 1 in order to meet the following environmental objectives:

(1) minimise direct and indirect impacts to conservation significant terrestrial fauna;

(2) minimise impacts to hydrological regimes of surface water;

(3) minimise impacts to the quality of groundwater and surface water; and

(4) minimise impacts to amenity as low as reasonable practicable,

through the implementation of conditions 6-2 to 6-5.

6-2 The proponent shall prepare and submit a pre-construction Infrastructure Plan which is to be approved by the CEO prior to the commencement of ground disturbing activities. The pre-construction Infrastructure Plan shall include:

(1) the alignment, dimensions and locations of the key proposal elements as referred to in Columns 1 and 2 of Table 2 in Schedule 1;

(2) the dimensions and locations of fauna underpasses and fauna fencing as referred to in Columns 1 and 2 of Table 2 in Schedule 1. Fauna underpass dimensions and locations should be consistent with the approved Fauna – Construction – Condition Environmental Management Plan as required by condition 12;

(3) the design and locations of culverts and bridges as referred to in Columns 1 and 2 of Table 2 in Schedule 1;

(4) the design and location of bioretention swales and infiltration basins in the vicinity of Ellen Brook and within the GUWPCA, consistent with the approved Inland Waters Environmental Quality – Hydrological Processes – Condition Environmental Management Plan as required by condition 13;

(5) the dimensions and locations of noise walls as referred to in Columns 1 and 2 of Table 2 in Schedule 1, consistent with the approved Amenity (Noise) – Condition Environmental Management Plan; and

(6) spatial data for the proposal elements as detailed in 6-2(1), 6-2(2), 6-2(3), 6-2(4) and 6-2(5).

6-3 The proponent may review and revise the pre-construction Infrastructure Plan required by condition 6-2, or shall review and revise the pre-construction Infrastructure Plan required as and when directed by the CEO;

6-4 The revised pre-construction Infrastructure Plan shall be the Infrastructure Plan used for implementing construction, following receipt in writing from the CEO that the revised pre-construction Infrastructure Plan satisfies the requirements set out in condition 6-2.

6-5 The proponent shall prepare and submit a post-construction Infrastructure Report to confirm that the key elements of the proposal as referred to in Columns 1 and 2 of Table 2 in Schedule 1 were constructed in accordance with the requirements of condition 6-2, within six (6) months following the completion of construction, or as otherwise agreed in writing by the CEO. The post-construction Infrastructure Report shall include:

(1) the alignment, dimensions and locations of the key proposal elements as referred to in Columns 1 and 2 of Table 2 in Schedule 1;

(2) the dimensions and locations of fauna underpasses and fauna fencing as referred to in Columns 1 and 2 of Table 2 in Schedule 1. Fauna underpass dimensions and locations should be consistent with the approved Fauna – Construction – Condition Environmental Management Plan as required by condition 12;

(3) the design and locations of culverts and bridges as referred to in Columns 1 and 2 of Table 2 in Schedule 1;

(4) the design and location of bioretention swales and infiltration basins in the vicinity of Ellen Brook and within the GUWPCA, consistent with the approved Inland Waters Environmental Quality – Hydrological Processes – Condition Environmental Management Plan as required by condition 13;

(5) the dimensions and locations of noise walls as referred to in Columns 1 and 2 of Table 2 in Schedule 1, consistent with the approved Amenity (Noise) – Condition Environmental Management Plan; and

(6) spatial data for the proposal elements as detailed in 6-5(1), 6-5(2), 6-5(3), 6-5(4) and 6-5(5).

7 Condition Environmental Management Plans (management based)

7-1 Prior to the commencement of ground disturbing activities, or as otherwise agreed in writing by the CEO, the proponent shall prepare and submit Condition Environmental Management Plans to the satisfaction of the CEO to

demonstrate that the **environmental objectives** in conditions 9-1, 10-1, 11-1, 12-1 and 15-1 will be met.

7-2 The Condition Environmental Management Plans shall:

(1) prioritise risk-based **management actions** that will be implemented to meet the environmental management objectives in conditions 9-1, 10-1, 11-1, 12-1 and 15-1;

(2) specify measurable **management targets** for determining the efficacy of the risk-based management actions;

(3) specify **monitoring** to be conducted to measure the efficacy of management actions against management targets;

(4) specify, in the event that the management targets are not achieved a procedure for **revision** of management actions and changes to proposal activities. The procedure shall include an investigation to determine the cause of the management targets being exceeded;

(5) provide the format and timing for annual reporting required by condition 4-6 for:

(a) verification of the implementation of management actions to demonstrate that conditions 9-1, 10-1, 11-1, 12-1 and 15-1 have been met for the reporting period; and

(b) reporting on the efficacy of management actions against management targets.

(6) provide for reporting when management actions are not implemented.

7-3 After receiving notice in writing from the CEO that a Condition Environmental Management Plans satisfies the requirements of condition 7-2 for conditions 9-1, 10-1, 11-1, 12-1 and 15-1, the proponent shall prior to the commencement of ground disturbing activities:

(1) implement the provisions of the approved Condition Environmental Management Plans; and

(2) continue to implement the approved Condition Environmental Management Plans until the CEO has confirmed by notice in writing that the proponent has met the relevant objectives specified in the approved Condition Environmental Management Plan and no longer needs to implement that particular Condition Environmental Management Plan.

7-4 In the event that monitoring, tests, surveys or investigations indicate that management actions specified in a Condition Environmental Management Plan

are not implemented or that management targets specified in a Condition Environmental Management Plans are exceeded, the proponent shall:

(1) report the exceedance or failure to implement management actions in writing within 7 days of identification;

(2) investigate to determine the cause of the management actions not being implemented and/or management targets being exceeded;

(3) investigate to provide information for the determination by the CEO of potential environmental harm or alteration of the environment that occurred due to the failure to implement management actions;

(4) provide a **report to the CEO** within 60 days of the reporting required by condition 7-4(1). The report shall include:

(a) cause for failure to implement management actions and/or management targets exceeded;

(b) the findings of the investigation required by conditions 7-4(2) and 7-4(3);

(c) details of revised and/or additional management actions to be implemented to prevent exceedance of the management targets and/or ensure implementation of management actions;

(d) relevant changes to proposal activities; and

(e) measures to prevent, control or abate the environmental harm which may have occurred.

7-5 The proponent may review and revise the Condition Environmental Management Plans, or as otherwise specified by the CEO.

7-6 The proponent shall implement the latest revision of the Condition Environmental Management Plan, which the CEO has confirmed by notice in writing, satisfies the requirements of condition 7-2.

8 Condition Environmental Management Plans (outcome based)

8-1 Prior to the commencement of ground disturbing activities, or as otherwise agreed in writing by the CEO, the proponent shall prepare and submit Condition Environmental Management Plans to the satisfaction of the CEO to demonstrate that the **environmental outcomes** in conditions 13-1 and 14-1 will be met.

8-2 The Condition Environmental Management Plans shall:

(1) specify **trigger criteria** that will trigger the implementation of trigger level actions if exceeded;

(2) specify threshold criteria that:

(a) provides a limit beyond which the environmental outcomes identified in conditions 13-1 and 14-1 are not achieved; and

(b) will trigger the implementation of **threshold contingency actions** if exceeded.

(3) specify **monitoring** to determine if trigger criteria and threshold criteria are exceeded;

(4) specify **trigger level actions** to be implemented in the event that trigger criteria have been exceeded;

(5) specify **threshold contingency actions** to be implemented in the event that threshold criteria are exceeded;

(6) provide the format and timing for the reporting of monitoring results against trigger criteria and threshold criteria to demonstrate that conditions 13-1 and 14-1 have been met over the reporting period in the Compliance Assessment Report required by condition 4; and

(7) provide for reporting of exceedances of the trigger and threshold criteria.

8-3 After receiving notice in writing from the CEO that the Condition Environmental Management Plans satisfies the requirements of condition 8-2 for conditions 13-1 and 14-1, the proponent shall prior to the commencement of ground disturbing activities:

(1) implement the provisions of the Condition Environmental Management Plans; and

(2) continue to implement the Condition Environmental Management Plans until the CEO has confirmed by notice in writing that the proponent has demonstrated the outcomes specified in conditions 13-1 and 14-1 have been met.

8-4 In the event that monitoring indicates exceedance of trigger criteria and/or threshold criteria specified in the Condition Environmental Management Plans, the proponent shall:

(1) report the exceedance in writing within 7 days of the exceedance being identified;

(2) immediately implement the trigger level actions and/or threshold contingency actions specified in the Condition Environmental

Management Plans and continue implementation of those actions until the trigger criteria are being met, or until the CEO has confirmed by notice in writing that it has been demonstrated that the environmental outcomes in conditions 13-1 and 14-1 are being met and implementation of the trigger level actions and/or threshold contingency actions are no longer required;

(3) investigate to determine the cause of the trigger criteria and/or threshold criteria being exceeded;

(4) identify additional measures required to prevent the trigger and/or threshold criteria being exceeded in the future;

(5) investigate to determine potential environmental harm or alteration of the environment that occurred due to threshold criteria being exceeded; and

(6) provide a **report to the CEO** within 60 days of the exceedance being reported. The report shall include:

(a) details of trigger level actions or threshold contingency actions implemented;

(b) the effectiveness of the trigger level actions or threshold contingency actions implemented, monitored and measured against trigger criteria and threshold criteria;

(c) the findings of the investigations required by condition 8-4(3) and 8-4(5);

(d) additional measures to prevent the trigger or threshold criteria being exceeded in the future; and

(e) measures to prevent, control or abate the environmental harm which may have occurred.

8-5 The proponent:

(1) may review and revise the Condition Environmental Management Plans, or

(2) shall review and revise the Condition Environmental Management Plans as and when directed by the CEO.

8-6 The proponent shall implement the latest revision of the Condition Environmental Management Plans, which the CEO has confirmed by notice in writing, satisfies the requirements of condition 8-2.

9 Flora and Vegetation – Construction – Condition Environmental Management Plan

9-1 The proponent shall manage the construction of the proposal to meet the following **environmental objectives**:

(1) to ensure that *Phytophthora cinnamomi* is not introduced into disease free areas by construction activities during construction;

(2) to ensure that impacts to flora and vegetation from dust are minimised as far as practicable during construction; and

(3) to ensure that impacts to flora and vegetation from the introduction or spread of weeds are minimised as far as practicable during construction,

through implementation of the Flora and Vegetation – Construction – Condition Environmental Management Plan approved by the CEO.

9-2 The proponent shall prepare the Flora and Vegetation – Construction – Condition Environmental Management Plan required by condition 7-1 on advice of the Department of Parks and Wildlife.

9-3 For the purpose of establishing **management targets** as required by condition 7-2(2), if adequate site specific *Phytophthora cinnamomi* and weed mapping is not available the proponent shall undertake **baseline surveys** prior to ground disturbing activities, or as agreed by the CEO.

9-4 In the event baseline surveys are required, prior to the commencement of ground disturbing activities the proponent shall prepare in consultation with the Department of Parks and Wildlife, and submit a Baseline Survey Plan(s) to the CEO. The Baseline Survey Plan(s) shall:

(1) when implemented, determine the baseline state of areas identified in condition 9-4(3) so that ongoing monitoring can determine that conditions 9-1(1) and 9-1(3) are being met;

(2) detail the proposed methodology for the baseline surveys;

(3) identify and spatially define the proposed survey locations and reference/control sites and provide rationale for the location of the sites;

(4) include a description and map of the areas that are free from *Phytophthora cinnamomi;*

(5) include a description and map of the areas that are free from weeds and for those areas that contain weeds, provide the level of weed cover and type; and

(6) detail the proposed frequency and timing for the baseline surveys.

9-5 After receiving notice in writing from the CEO that the Baseline Survey Plan(s) satisfies the requirements of condition 9-4, the proponent shall undertake the baseline surveys in accordance with the requirements of the Baseline Survey Plan(s).

On completion of the baseline surveys the proponent shall report to the CEO on the following:

(1) completion of the baseline surveys in accordance with the Baseline Survey Plan(s); and

(2) the results of the baseline surveys.

9-6 The proponent shall undertake **monitoring** as required by condition 7-2(3) for a **period of 3 years post construction** in order to demonstrate that the environmental objectives for condition 9-1 have been met.

9-7 In the event that monitoring required by condition 9-6 indicates that the environmental objectives for conditions 9-1 have not been met the proponent shall undertake the requirements of condition 7-4.

9-8 The proponent shall not undertake clearing or construct any laydown areas or stock piles within the 50 m buffer of *Caladenia huegelii*, as delineated in figure 2 of Schedule 1 and defined by geographic coordinates in Schedule 2.

9-9 The proponent shall not undertake clearing or construct any laydown areas or stock piles within the 10 m buffer, as delineated in figure 3 of Schedule 1 and defined by geographic coordinates in Schedule 2, of:

(1) Grevillea curviloba subsp. incurva; and

(2) Darwinia foetida.

10 Flora and Vegetation – Indirect Impacts and Threatened Flora and Communities – Condition Environmental Management Plan

10-1 The proponent shall manage the implementation of the proposal to meet the following **environmental objectives**:

(1) to ensure that indirect impacts, including but not limited to weeds, unauthorised access, increased fire risk and litter, changes to surface water regimes, to flora and vegetation, including but not limited to *Caladenia huegelii* habitat, *Grevillea curviloba* subsp. *incurva*, *Darwinia foetida*, Conservation Category Wetlands, *Claypans of the Swan Coastal Plain* and *Communities of Tumulus Springs (Organic Mound Springs, Swan Coastal Plain)* are minimised as far as practicable; and

(2) to maintain or improve the condition of the remaining extent of SCP 20a as shown in figure 4,

through implementation of the Flora and Vegetation – Indirect Impacts and Threatened Flora and Communities – Condition Environmental Management Plan approved by the CEO.

10-2 The proponent shall prepare the Flora and Vegetation – Indirect Impacts and Threatened Flora and Communities – Condition Environmental Management Plan required by condition 7-1 on advice of the Department of Parks and Wildlife and the Western Australian Planning Commission.

11 Flora and Vegetation – Progressive Rehabilitation Condition Environmental Management Plan

11-1 The proponent shall manage the implementation of the proposal to meet the following **environmental objectives**:

(1) to progressively rehabilitate the areas of native vegetation cleared as a result of implementation of the proposal that are no longer required for construction activities or not required for ongoing operations; and

(2) to rehabilitate the section of Beechboro Road North from Jules Steiner Memorial Drive to Gnangara Road within twelve months of decommissioning this section of road,

through implementation of the Flora and Vegetation – Progressive Rehabilitation Condition Environmental Management Plan approved by the CEO.

11-2 The proponent shall identify and map areas to be rehabilitated as required by condition 11-1.

11-3 Those areas to be rehabilitated as identified in condition 11-2 shall not include areas required for ongoing operations including, but not limited to, drainage basins, road embankments and median strips.

11-4 The proponent shall prepare the Flora and Vegetation – Progressive Rehabilitation Condition Environmental Management Plan required by condition 7-1 on advice of the Department of Parks and Wildlife.

11-5 The **management targets** as required by condition 7-2(2) must include rehabilitation **completion criteria** using locally native species.

11-6 The proponent shall not plant known species of foraging habitat for black cockatoos, including but not limited to, *Banksia* spp., *Hakea* spp., *Grevillea* spp. and *Eucalyptus* spp. within 10 m of the constructed road carriageway.

12 Fauna – Construction – Condition Environmental Management Plan

12-1 The proponent shall manage the construction of the proposal to meet the following **environmental objective**:

(1) to ensure that impacts to conservation significant fauna are minimised as far as practicable **during final design and construction** of the proposal,

through implementation of the Fauna – Construction – Condition Environmental Management Plan approved by the CEO.

12-2 The proponent shall prepare the Fauna – Construction – Condition Environmental Management Plan required by condition 7-1 on advice of the Department of Parks and Wildlife.

12-3 The Fauna – Construction - Condition Environmental Management Plan shall include **management actions**, including but not limited to:

(1) best practice design, including shape, size, furniture and sky lights of fauna underpasses;

(2) trapping and relocation of ground dwelling fauna prior to clearing;

(3) presence of fauna spotters during clearing;

(4) dispersal and relocation of fauna identified by fauna spotters as required by condition 12-3(3) during clearing;

(5) any trenching activities; and

(6) ensuring that if clearing is to be undertaken, the proponent shall use an appropriately experienced black cockatoo expert to thoroughly inspect the area for Black Cockatoo breeding activity, in particular nesting, and if the area is found to be in use, clearing in the area shall be postponed until such time as determined suitable, on the advice of the Department of Parks and Wildlife.

13 Inland Waters Environmental Quality – Hydrological Processes – Condition Environmental Management Plan

13-1 The proponent shall manage the **construction and operation** of the proposal to meet the following **environmental outcome**:

(1) the construction and operation of the proposal shall not result in a decline in water quality of the GUWPCA and the Ellen Brook,

through implementation of the Inland Waters Environmental Quality – Hydrological Processes – Condition Environmental Management Plan approved by the CEO.

13-2 The proponent shall prepare the Inland Waters Environmental Quality – Hydrological Processes – Condition Environmental Management Plan required by condition 8-1 on advice of the Department of Water.

13-3 For the purpose of establishing **trigger criteria** required by condition 8-2(1), if adequate site specific water quality data is not available the proponent shall undertake **baseline surveys** prior to the commencement of ground disturbing activities in the GUWPCA and in the vicinity of Ellen Brook.

13-4 In the event baseline surveys are required, the proponent shall prepare in consultation with the Department of Water, and submit a Baseline Survey Plan to the CEO. The Baseline Survey Plan shall:

(1) when implemented, determine the baseline water quality within the GUWPCA and the Ellen Brook;

(2) detail the proposed methodology for the baseline surveys;

(3) identify and spatially define the proposed survey locations and reference/control sites and provide rationale for the location of the sites; and

(4) detail the proposed frequency and timing for the baseline surveys.

13-5 After receiving notice in writing from the CEO that the Baseline Survey Plan satisfies the requirements of condition 13-4, the proponent shall undertake the baseline surveys in accordance with the requirements of the Baseline Survey Plan.

13-6 On completion of the baseline surveys the proponent shall report to the CEO on the following:

(1) completion of the baseline surveys in accordance with the Baseline Survey Plan; and

(2) the results of the baseline surveys.

13-7 The proponent shall specify **threshold criteria** that are consistent with the *Australian Drinking Water Guidelines* (NHMRC & ARMCANZ 1996), or its revisions, as required by condition 8-2(2).

13-8 The proponent shall not construct any laydown areas, stock piles or store chemicals within the well head protection zones in the GUWPCA.

13-9 Any fuel or chemicals stored within the GUWPCA shall:

(1) be contained within double-lined fuel storage tanks;

(2) not exceed an individual storage tank capacity of 5,000 L;

(3) be placed in bunds capable of storing 125% of the capacity of the largest storage tank; and

(4) not be located within well head protection zones.

13-10 The proponent shall not construct infiltration basins, including bio-retention basins, within 100 m of drinking water production wells within the GUWPCA.

14 Flora and Vegetation – Inland Waters Environmental Quality – Hydrological Processes – Condition Environmental Management Plan

14-1 The proponent shall manage the construction of the proposal to meet the following **environmental outcomes**:

(1) to ensure that construction and operation of the proposal, including from dewatering and groundwater abstraction, does not result in indirect impacts to the *Claypans of the Swan Coastal Plain* and *Communities of Tumulus Springs (Organic Mound Springs, Swan Coastal Plain)* and Conservation Category Wetlands as shown in figures 5 and 6; and

(2) to ensure that construction of the proposal maintains predevelopment surface water flows to the Darwinia foetida, Claypans of the Swan Coastal Plain and Communities of Tumulus Springs (Organic Mound Springs, Swan Coastal Plain) and Conservation Category Wetlands as shown in figures 3, 5 and 6,

through implementation of the Flora and Vegetation – Inland Waters Environmental Quality – Hydrological Processes – Condition Environmental Management Plan approved by the CEO.

14-2 The proponent shall prepare the Flora and Vegetation – Inland Waters Environmental Quality – Hydrological Processes – Condition Environmental Management Plan required by condition 8-1 on advice of the Department of Water and Department of Parks and Wildlife.

14-3 The proponent shall undertake **baseline surveys** prior to ground disturbing activities for the purpose of establishing **trigger** and **threshold** criteria as required by condition 8-2.

14-4 Prior to the commencement of ground disturbing activities, the proponent shall prepare in consultation with the Department of Water and the Department of Parks and Wildlife, and submit a Baseline Survey Plan(s) to the CEO. The Baseline Survey Plan(s) shall:

(1) when implemented, determine the baseline state of areas identified in condition 14-4(3) so that ongoing monitoring can determine that conditions 14-1(1) and 14-1(2) will be met;

(2) detail the proposed methodology for the baseline surveys;

(3) identify and spatially define the proposed survey locations and reference/control sites and provide rationale for the location of the sites; and

(4) detail the proposed frequency and timing for the baseline surveys.

14-5 After receiving notice in writing from the CEO that the Baseline Survey Plan satisfies the requirements of condition 14-4, the proponent shall undertake the baseline surveys in accordance with the requirements of the Baseline Survey Plan.

14-6 On completion of the baseline surveys the proponent shall report to the CEO on the following:

(1) completion of the baseline surveys in accordance with the Baseline Survey Plan; and

(2) the results of the baseline surveys.

14-7 The proponent shall undertake **monitoring** as required by condition 8-2(3) for a **period of 3 years,** or as otherwise agreed in writing by the CEO, post construction in order to demonstrate that the outcomes in condition 14-1(1) and 14-1(2) have been met.

14-8 In the event that monitoring required by condition 14-7 indicates that the outcomes in condition 14-1(1) and 14-1(2) have not been met the proponent shall undertake the requirements of condition 8-4.

14-9 The proponent shall not construct laydowns areas or stock piles within 50 m of *Claypans of the Swan Coastal Plain* and *Communities of Tumulus Springs (Organic Mound Springs, Swan Coastal Plain)* and Conservation Category Wetlands as shown in figures 5 and 6.

15 Amenity (Noise) – Condition Environmental Management Plan

15-1 The proponent shall construct the proposal to meet the following **environmental objectives**:

(1) to ensure that impacts to the noise amenity of existing sensitive receptors delineated in figure 7 of Schedule 1 and defined by geographic coordinates in Schedule 2, as a result of the ongoing operation of the proposal are minimised as low as reasonably practicable; and

(2) to ensure that the impacts to the noise amenity of existing sensitive receptors, are consistent with section 5.3 of State Planning Policy 5.4 for properties south of Maralla Road,

through implementation of the Amenity (Noise) – Condition Environmental Management Plan approved by the CEO.

15-2 The Amenity (Noise) – Condition Environmental Management Plan shall include **management actions** for:

(1) the design of noise mitigation measures, including but not limited to noise attenuation barriers and noise walls;

(2) the procedures to monitor the effectiveness of noise mitigation measures;

(3) the procedures to consult with the affected landowners delineated in figure 7 of Schedule 1 and defined by geographic coordinates in Schedule 2, regarding additional noise mitigation measures; and

(4) the procedures for noise complaint management and a response framework.

16 Residual Impacts and Risk Management Measures

16-1 The objective of conditions 16-2 to 16-22 is to offset the following significant residual impacts:

(1) 4 ha of Threatened Ecological Community SCP 20a, 'Banksia attenuata woodlands over species rich dense shrublands';

(2) 5.5 ha of Yanga Vegetation Complex;

(3) 31.9 ha of *Caladenia huegelii* critical habitat;

(4) 129.9 ha of Bush Forever sites;

(5) 7.65 ha of A Class Nature Reserves;

(6) 207.2 ha of *Calyptorhynchus latirostris* (Carnaby's black cockatoo) foraging habitat;

(7) 120.5 ha of *Calyptorhynchus banksii naso* (forest red-tailed black cockatoo) foraging habitat; and

(8) 16 ha of Conservation Category Wetlands.

Ioppolo Road Site Land Acquisition and Management Plan

16-2 Prior to the commencement of ground disturbing activities, or as otherwise agreed in writing by the CEO, the proponent shall submit an Ioppolo Road Site Land Acquisition and Management Plan to the requirements of the CEO, with the objective of counterbalancing the significant residual impact to:

(1) 7.65 ha of A Class Nature Reserves;

(2) 202 ha of *Calyptorhynchus latirostris* (Carnaby's black cockatoo) foraging habitat; and

(3) 99.1 ha of *Calyptorhynchus banksii naso* (forest red-tailed black cockatoo) foraging habitat.

16-3 The Ioppolo Road Site Land Acquisition and Management Plan shall:

(1) identify the environmental attributes of the land to be acquired which must contain:

(a) at least 673.5 ha of *Calyptorhynchus latirostris* (Carnaby's black cockatoo) potential foraging habitat; and

(b) at least 279 ha of *Calyptorhynchus banksii naso* (forest red-tailed black cockatoo) potential foraging habitat;

(2) detail the arrangements and funding for the upfront works associated with establishing the conservation reserve and ongoing management of the land acquired on advice from the Department of Parks and Wildlife;

(3) identify activities to be undertaken including improvement actions for areas identified as being in a degraded condition or cleared areas requiring rehabilitation;

(4) detail timeframes for undertaking improvement actions and management activities;

(5) identify roles and responsibilities of the proponent and any agreements with third parties;

(6) detail completion criteria; and

(7) include monitoring and reporting requirements.

16-4 After receiving notice in writing from the CEO that the Ioppolo Road Site Land Acquisition and Management Plan satisfies the requirements of condition 16-3, the proponent shall:

(1) prior to the commencement of ground disturbing activities, commence the implementation of the actions in accordance with the requirements of the approved Ioppolo Road Site Land Acquisition and Management Plan; and

(2) continue to implement the approved Ioppolo Road Site Land Acquisition and Management Plan until the CEO has confirmed by notice in writing that it has been demonstrated that the completion criteria in the Ioppolo Road Site Land Acquisition and Management Plan have been met and therefore the implementation of the actions is no longer required.

16-5 Prior to the commencement of ground disturbing activities, or as otherwise agreed in writing by the CEO, the proponent shall acquire, or fully fund the

acquisition of, the land identified in the approved Ioppolo Road Site Land Acquisition and Management Plan, as required by condition 16-2, for the purpose of conservation. The land identified in the approved Ioppolo Road Site Land Acquisition and Management Plan shall be vested to the Conservation and Parks Commission for the purpose of conservation of flora and fauna.

16-6 The proponent shall review and revise the Ioppolo Road Site Land Acquisition and Management Plan as and when directed by the CEO.

16-7 The proponent shall implement the latest revision of the Ioppolo Road Site Land Acquisition and Management Plan, which the CEO has confirmed by notice in writing, satisfies the requirements of condition 16-2.

Land Acquisition and Rehabilitation Offsets Strategy

16-8 Within twelve months of the publication of this Statement, the proponent shall prepare and submit a Land Acquisition and Rehabilitation Offsets Strategy to the CEO, with the objective of counterbalancing the significant residual impact to:

(1) 5.5 ha of Yanga Vegetation Complex;

(2) 129.9 ha of Bush Forever sites;

(3) 5.2 ha of *Calyptorhynchus latirostris* (Carnaby's black cockatoo) foraging habitat;

(4) 21.4 ha of *Calyptorhynchus banksii naso* (forest red-tailed black cockatoo) foraging habitat; and

(5) 16 ha of Conservation Category Wetlands.

16-9 The Land Acquisition and Rehabilitation Offsets Strategy required by condition 16-8 shall:

(1) identify an area or areas to be protected, managed and/or restored for conservation or enhancement of the values identified in condition 16-8;

(2) identify the area(s) of land to be acquired which must contain:

(a) no less than 48 ha of wetlands which are of the same quality as Conservation Category Wetlands at the time of acquisition or after rehabilitation;

(b) 181 ha with vegetation communities and/or complexes and conditions commensurate with the Bush Forever sites being impacted; and

(c) no less than 5.5 ha of Yanga Complex;

(3) include a completed WA Offsets Template, as described in the WA Environmental Offsets Guidelines 2014, as well as the Commonwealth's Offset Assessment Guide, to demonstrate how the proposed offset counterbalances the significant residual impact to;

(a) 5.2 ha of *Calyptorhynchus latirostris* (Carnaby's black cockatoo) potential foraging habitat; and

(b) 21.4 ha of *Calyptorhynchus banksii naso* (forest red-tailed black cockatoo) potential foraging habitat;

(4) identify the environmental attributes of the offset area(s);

(5) commit to a protection mechanism for any areas of land acquisition, being either the area is ceded to the Crown for the purpose of conservation, or the area is managed under a Conservation Covenant in perpetuity;

(6) if any land is to be ceded to the Crown for the purpose of conservation, the proponent will determine:

(a) the quantum of, and provide funds for, the upfront works associated with establishing the conservation area;

(b) the quantum of, and provide a contribution of funds for, the management of this area for no less than seven years;

(c) the quantum identified in conditions 16-9(6)(a) and 16-9(6)(b) shall provide for the requirements defined in condition 16-9(7)(a) to be met; and

(d) an appropriate management body for the ceded land;

(7) state the management and/or rehabilitation actions to be undertaken including:

(a) the objectives and targets to be achieved, including completion criteria;

(b) the consistency of the objectives and targets identified in condition 16-9(7)(a) with the management objectives of the relevant Recovery Plans;

(c) management and/or rehabilitation actions and a timeframe for the actions to be undertaken;

(d) risk management;

(e) funding arrangements and timing of funding for conservation activities; and

(f) monitoring, reporting and evaluation mechanisms for management and/or rehabilitation actions;

(8) define the role of the proponent and/or any third parties.

16-10 After receiving notice in writing from the CEO that the Land Acquisition and Rehabilitation Offsets Strategy satisfies the requirements of condition 16-9, the proponent shall:

(3) implement the actions in accordance with the requirements of the approved Land Acquisition and Rehabilitation Offsets Strategy; and

(4) continue to implement the approved Land Acquisition and Rehabilitation Offsets Strategy until the CEO has confirmed by notice in writing that it has been demonstrated that the completion criteria in the Land Acquisition and Rehabilitation Offsets Strategy have been met and therefore the implementation of the actions is no longer required.

16-11 The proponent shall review and revise the Land Acquisition and Rehabilitation Offsets Strategy as and when directed by the CEO.

Caladenia huegelii Habitat Management Plan

16-12 Prior to commencement of ground disturbing activities, or as otherwise agreed in writing by the CEO, the proponent shall prepare and submit a *Caladenia huegelii* Habitat Management Plan to maintain or improve the conservation status of *Caladenia huegelii,* to the requirements of the CEO.

16-13 The proponent shall prepare the *Caladenia huegelii* Habitat Management Plan required by condition 16-12 on advice of the Department of Parks and Wildlife and the Western Australian Planning Commission.

16-14 The *Caladenia huegelii* Habitat Management Plan identified in condition 16-12, shall include details on the:

(1) activities to be undertaken;

(2) consistency of the activities identified in 16-14(1) with the management objectives of the relevant Recovery Plan;

(3) timeframes for undertaking management activities;

(4) roles and responsibilities;

(5) funding arrangements for implementation of the plan;

(6) monitoring, reporting and evaluation mechanisms; and

(7) completion criteria.

16-15 The *Caladenia huegelii* Habitat Management Plan required by condition 16-12 shall apply to A Class Nature Reserves 23756, 46919 and 46875 and Bush Forever Site 300.

16-16 The activities to be undertaken as identified in condition 16-14(1) shall address the requirement for:

(1) the provision of Cable fencing and heavy duty gates;

(2) weed mapping and control;

(3) Phytophthora cinnamomi mapping;

(4) the implementation of a hygiene plan based on the mapping as identified in condition 16-16(3);

(5) *Caladenia huegelii* surveys and critical habitat mapping; and

(6) other activities to be undertaken that would maintain or improve the conservation status of *Caladenia huegelii.*

16-17 Prior to commencement of ground disturbing activities, and after receiving notice in writing from the CEO on the advice of the Department of Parks and Wildlife that the *Caladenia huegelii* Habitat Management Plan satisfies the requirements of conditions 16-13 to 16-16, or as otherwise agreed by the CEO, the proponent shall implement the *Caladenia huegelii* Habitat Management Plan until the CEO advises implementation may cease.

16-18 The proponent shall review and revise the *Caladenia huegelii* Habitat Management Plan as and when directed by the CEO.

SCP 20a Offsets Strategy

16-19 The proponent shall undertake an offset with the objective of counterbalancing the significant residual impact to:

(1) 4 ha of Threatened Ecological Community SCP 20a, '*Banksia attenuata woodlands over species rich dense shrublands*' as a result of the implementation of the proposal.

16-20 Within twelve months of the publication of this Statement, the proponent shall prepare and submit an SCP 20a Offsets Strategy to the CEO. The SCP 20a Offsets Strategy shall:

(1) identify an area or areas to be protected, managed and/or rehabilitated for conservation or enhancement of SCP 20a, or habitat necessary to maintain or enhance SCP 20a, identified in condition 16-19(1);

(2) include a completed WA Offsets Template, as described in the WA Environmental Offsets Guidelines 2014, as well as the Commonwealth's Offset Assessment Guide, to demonstrate how the proposed offset counterbalances the significant residual impact;

(3) identify the environmental attributes of the offset area(s);

(4) commit to a protection mechanism for any areas of land acquisition, being either the area is ceded to the Crown for the purpose of conservation, or the area is managed under a Conservation Covenant in perpetuity;

(5) if any land is to be ceded to the Crown for the purpose of conservation, the proponent will identify:

(a) the quantum of, and provide funds for, the upfront works associated with establishing the conservation area;

(b) the quantum of, and provide a contribution of funds for, the management of this area for no less than seven years;

(c) the quantum identified in conditions 16-20(5)(a) and 16-20(5)(b) shall provide for the requirements defined in condition 16-20(6)(a) to be met; and

(d) an appropriate management body for the ceded land;

(6) state the management and/or rehabilitation actions to be undertaken including:

(a) the objectives and targets to be achieved, including completion criteria;

(b) management and/or rehabilitation actions and a timeframe for the actions to be undertaken;

(c) funding arrangements and timing of funding for conservation activities; and

(d) monitoring, reporting and evaluation mechanisms for management and/or rehabilitation actions;

(7) define the role of the proponent and/or any third parties.

16-21 After receiving notice in writing from the CEO that the SCP 20a Offsets Strategy satisfies the requirements of condition 16-20, the proponent shall:

(1) implement the actions in accordance with the requirements of the approved SCP 20a Offsets Strategy; and

(2) continue to implement the approved SCP 20a Offsets Strategy until the CEO has confirmed by notice in writing that it has been demonstrated that the completion criteria in the SCP 20a Offsets Strategy have been met and therefore the implementation of the actions is no longer required.

16-22 The proponent shall review and revise the SCP 20a Offsets Strategy as and when directed by the CEO.

Schedule 1

Table 1: Summary of the Proposal

Proposal Title	Perth-Darwin National Highway (Swan Valley Section)
Short Description	The proposal is to construct and operate a new 38 km long section of the Perth-Darwin National Highway between Malaga and Muchea, Western Australia. The proposal would consist of a dual carriageway highway and would connect the intersection of Tonkin Highway and Reid Highway in Malaga with the Great Northern Highway and Brand Highway in Muchea.

Table 2: Location and authorised extent of physical and operational elements

Column 1	Column 2	Column 3
Element	**Location**	**Authorised Extent**
Clearing and disturbance for road corridor, drainage structures including infiltration and bioretention basins and swales, laydowns, bridges and culverts, fauna fencing, fauna underpasses, noise walls, road train assembly area and principal shared path.	Located within the development envelope as shown in Figure 1.	Clearing and disturbance of no more than 746 ha consisting of up to 206 ha of native vegetation. This includes up to: • 129.9 ha of Bush Forever areas; • 0.4 ha of Class A Nature Reserve 46920; • 0.2 ha of Class A Nature Reserve 46919; • 32.6 ha of Gnangara-Moore River State Forest No. 65; • 4 ha of Floristic Community Type SCP 20a Threatened Ecological Community; • 31.9 ha of *Caladenia huegelii* critical habitat; • 2 ha of *Grevillea curviloba* subsp. *incurva* critical habitat; and • 16 ha of Conservation Category Wetlands, within a 985 ha development envelope.
Noise walls	Located within the development envelope as shown in Figure 1.	Height of noise walls to be no more than 5 m on residential boundaries between Reid Highway and south of Maralla Road.

Table 3: Abbreviations and Definitions

Acronym or Abbreviation	Definition or Term
CEO	The Chief Executive Officer of the Department of the Public Service of the State responsible for the administration of section 48 of the *Environmental Protection Act 1986*, or his delegate.
Drinking water production wells	Means a well owned and operated by the Water Corporation and from which groundwater is extracted for the provision of a public water supply as defined in the *Metropolitan Water Supply, Sewage and Drainage By-laws 1981* or its revisions.
EPA	Environmental Protection Authority
EP Act	*Environmental Protection Act 1986*
GUWPCA	Gnangara Underground Water Pollution Control Area as delineated in the *Metropolitan Water Supply, Sewage and Drainage By-laws 1981* or its revisions.
ha	Hectare
km	Kilometre
L	Litre
m	Metre
Nesting activity	Evidence of either eggs or fledglings in the nest.
OEPA	Office of the Environmental Protection Authority
Recovery Plans	Means Recovery Plans as adopted under the EPBC Act or State endorsed Interim Recovery Plans for Threatened Species or Communities.
Rehabilitation	To maximise the return of biodiversity by reinstating self-sustaining and functional ecosystems based on local species.
SCP	Swan Coastal Plain
State Planning Policy 5.4	State Planning Policy 5.4 *Road and Rail transport Noise and Freight Considerations in Land Use Planning* (2009), prepared under section 26 of the *Planning and Development Act 2005* by the Western Australian Planning Commission.
Well head protection zone	Means that area within a pollution area that surrounds a wellhead as defined and delineated in the *Metropolitan Water Supply, Sewage and Drainage By-laws 1981* or its revisions.

Figures (attached)

Figure 1 Perth-Darwin National Highway development envelope
(This figure is a representation of the coordinates in Schedule 2)

Figure 2 *Caladenia huegelii* 50 m buffer
(This figure is a representation of the coordinates in Schedule 2)

Figure 3 *Grevillea curviloba* subsp. *incurva* and *Darwinia foetida* 10 m buffer
(This figure is a representation of the coordinates in Schedule 2)

Figure 4 Remaining extent of Floristic Community Type SCP 20a outside the development envelope

Figure 5 Southern section of the alignment showing the development envelope and Conservation Category Wetlands

Figure 6 Northern section of the alignment showing the development envelope and Conservation Category Wetlands, *Claypans of the Swan Coastal Plain* and *Mound Springs of the Swan Coastal Plain*

Figure 7 Existing noise sensitive receptors north of Maralla Road
(This figure is a representation of the coordinates in Schedule 2)

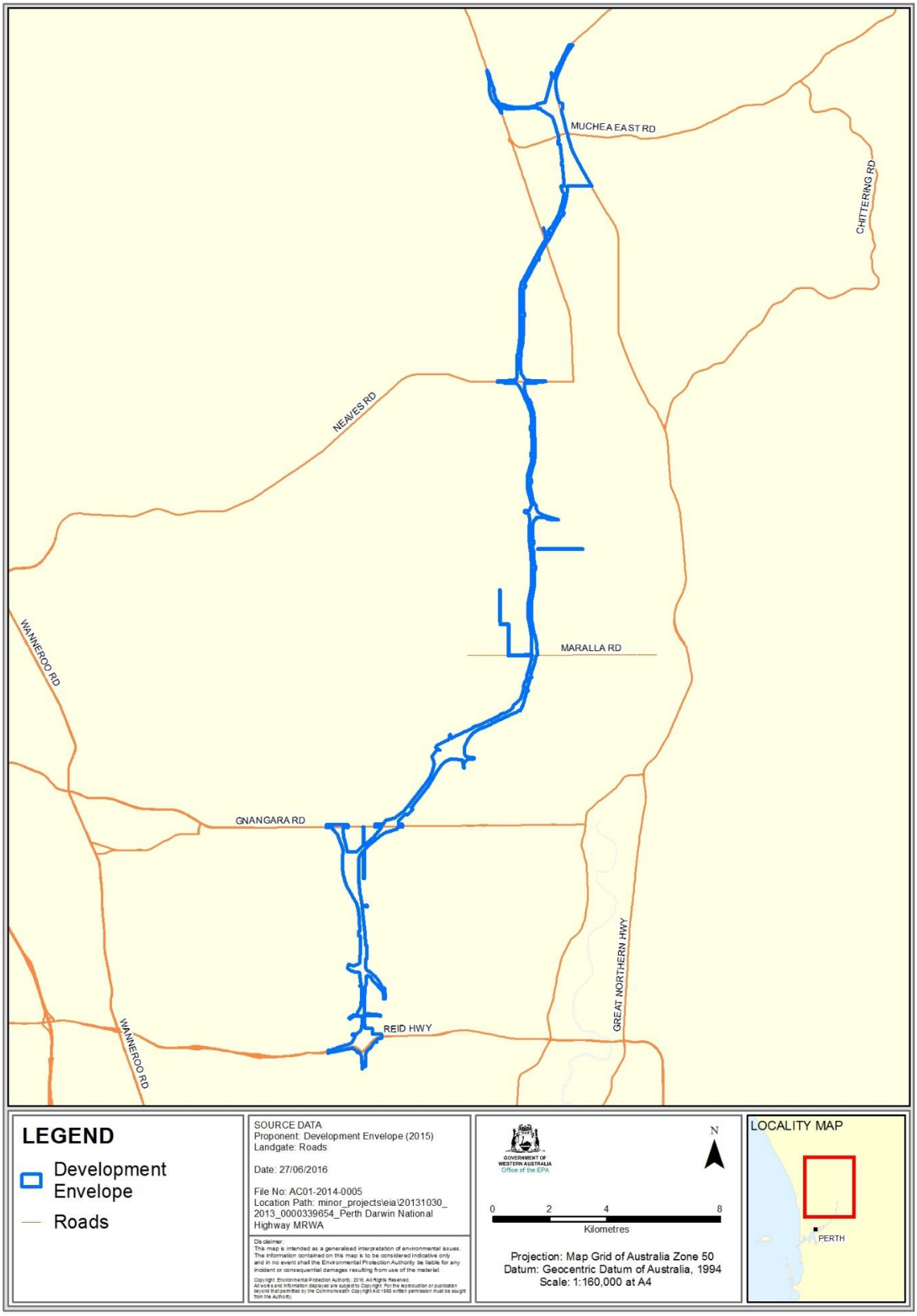

Figure 1 – Perth-Darwin National Highway development envelope.

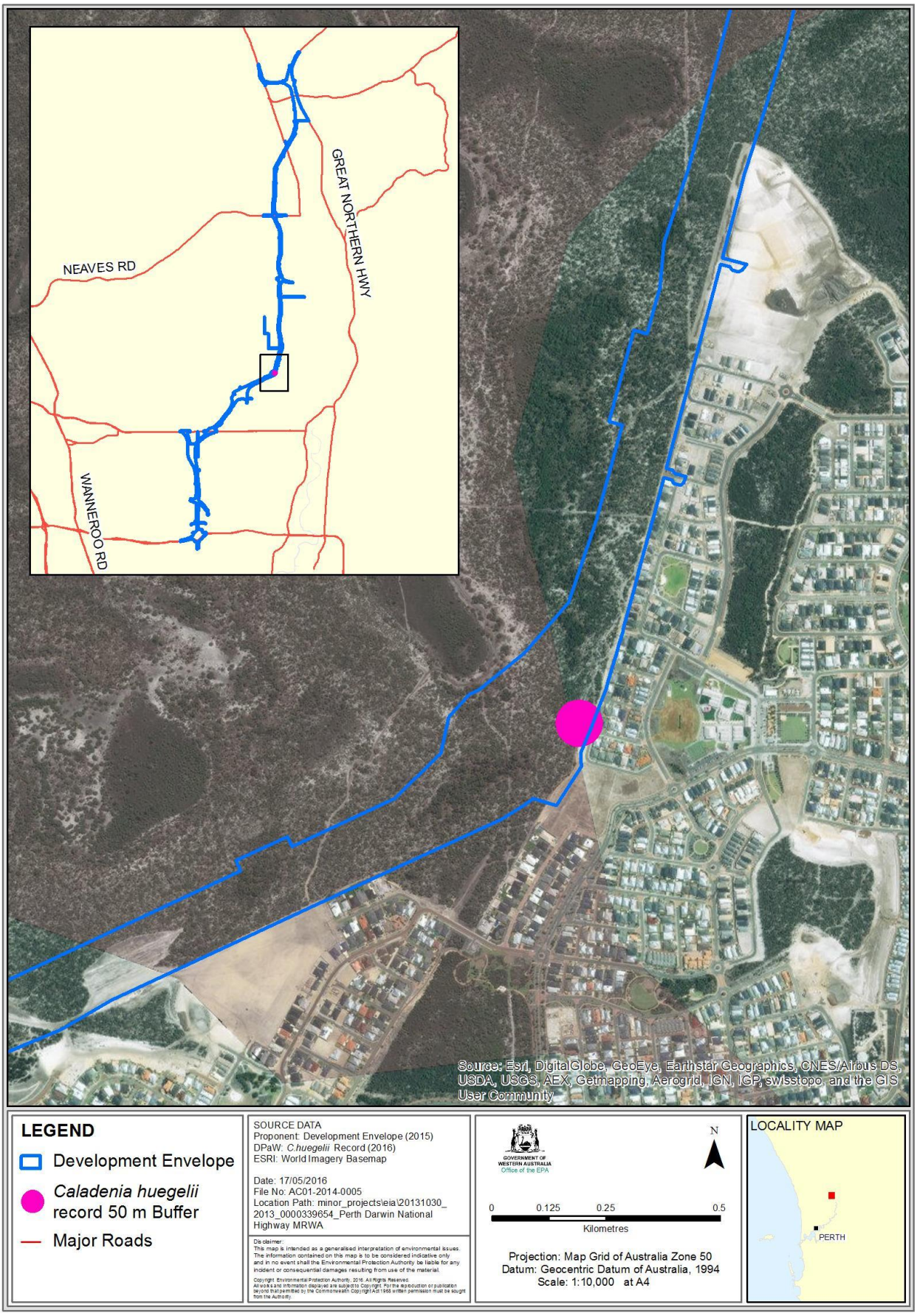

Figure 2 – *Caladenia huegelii* 50 m buffer

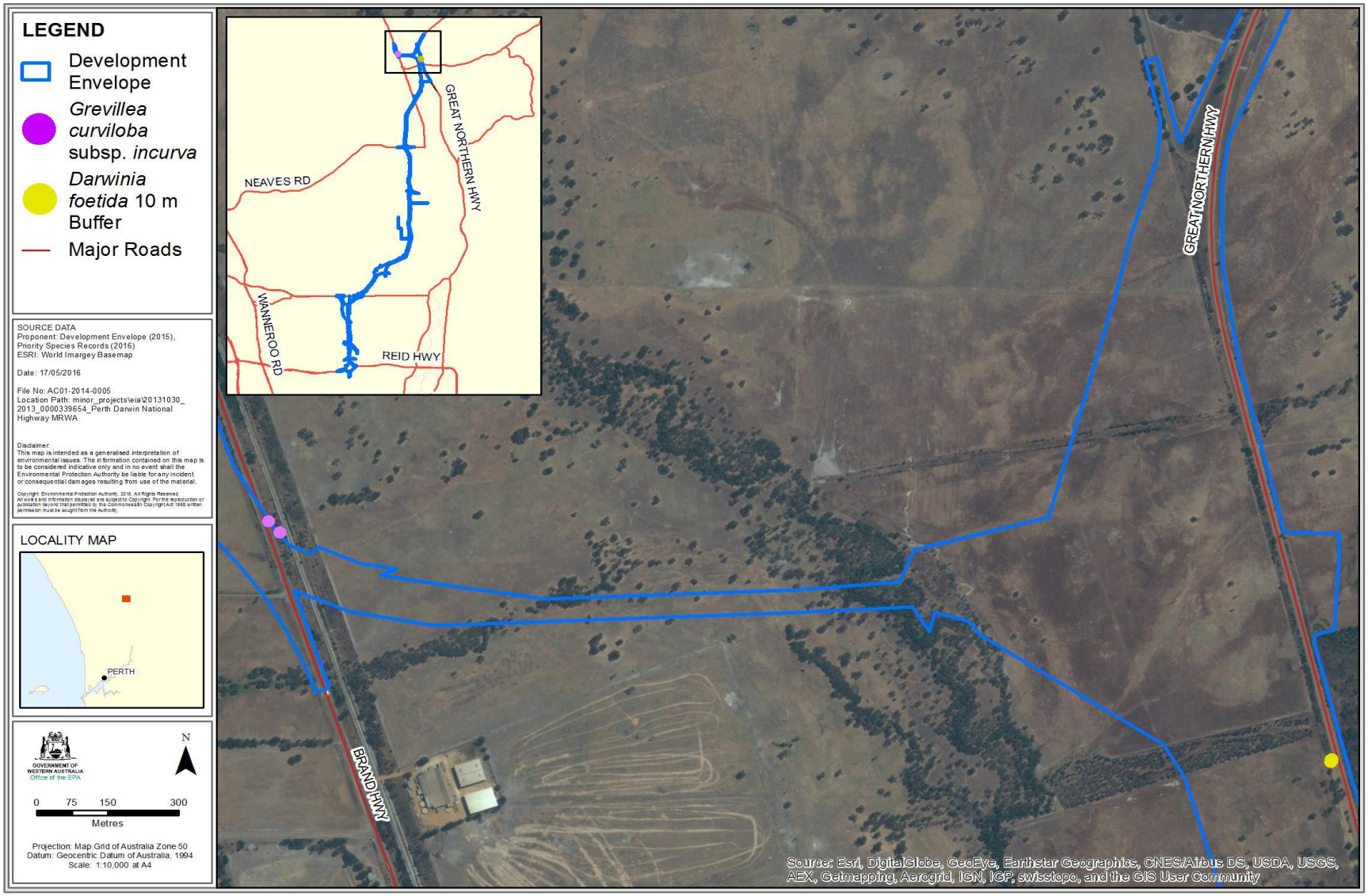

Figure 3 – *Grevillea curviloba* subsp. *incurva* and *Darwinia foetida* 10 m buffer

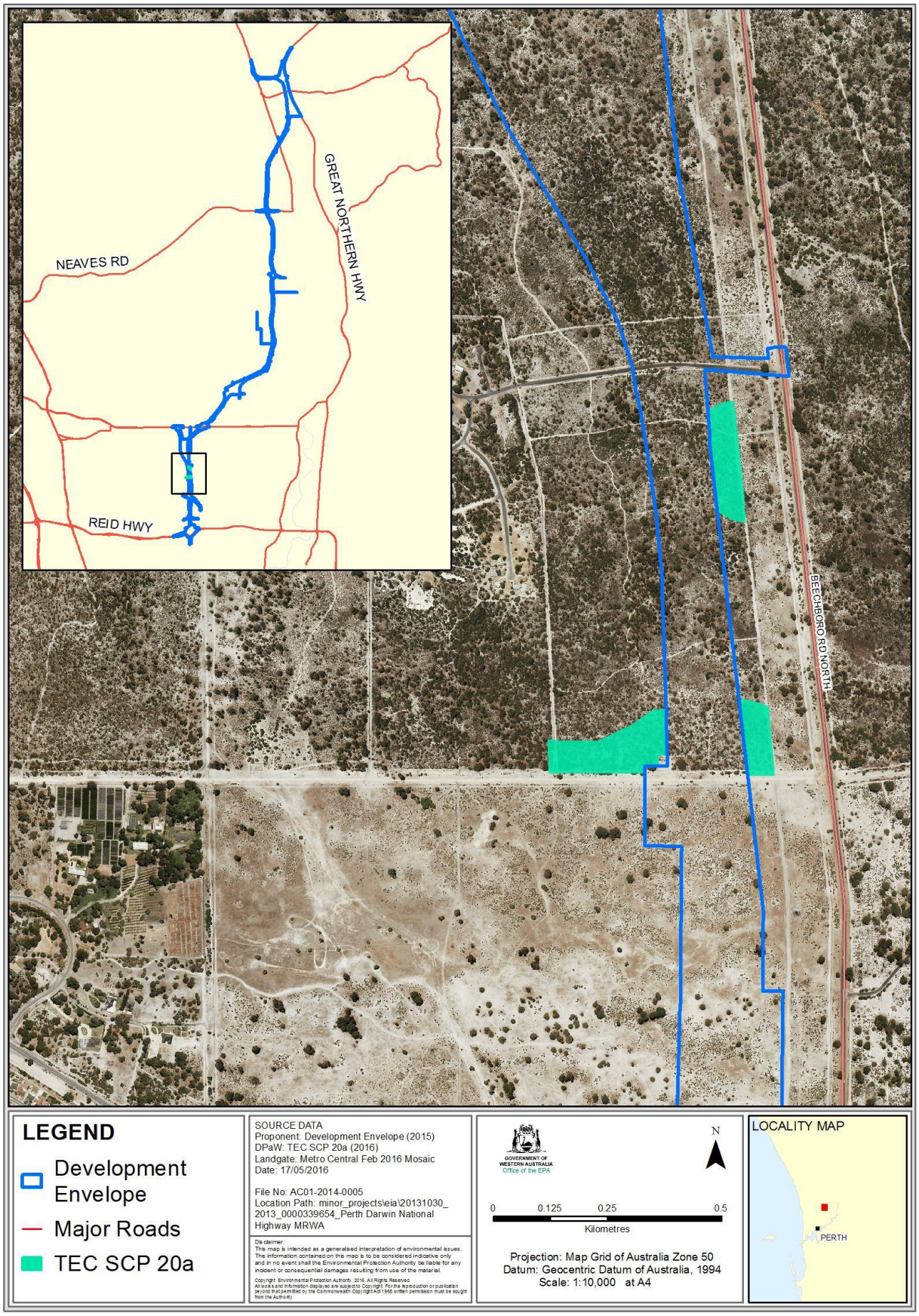

Figure 4 – Remaining extent of Floristic Community Type SCP 20a outside the development envelope

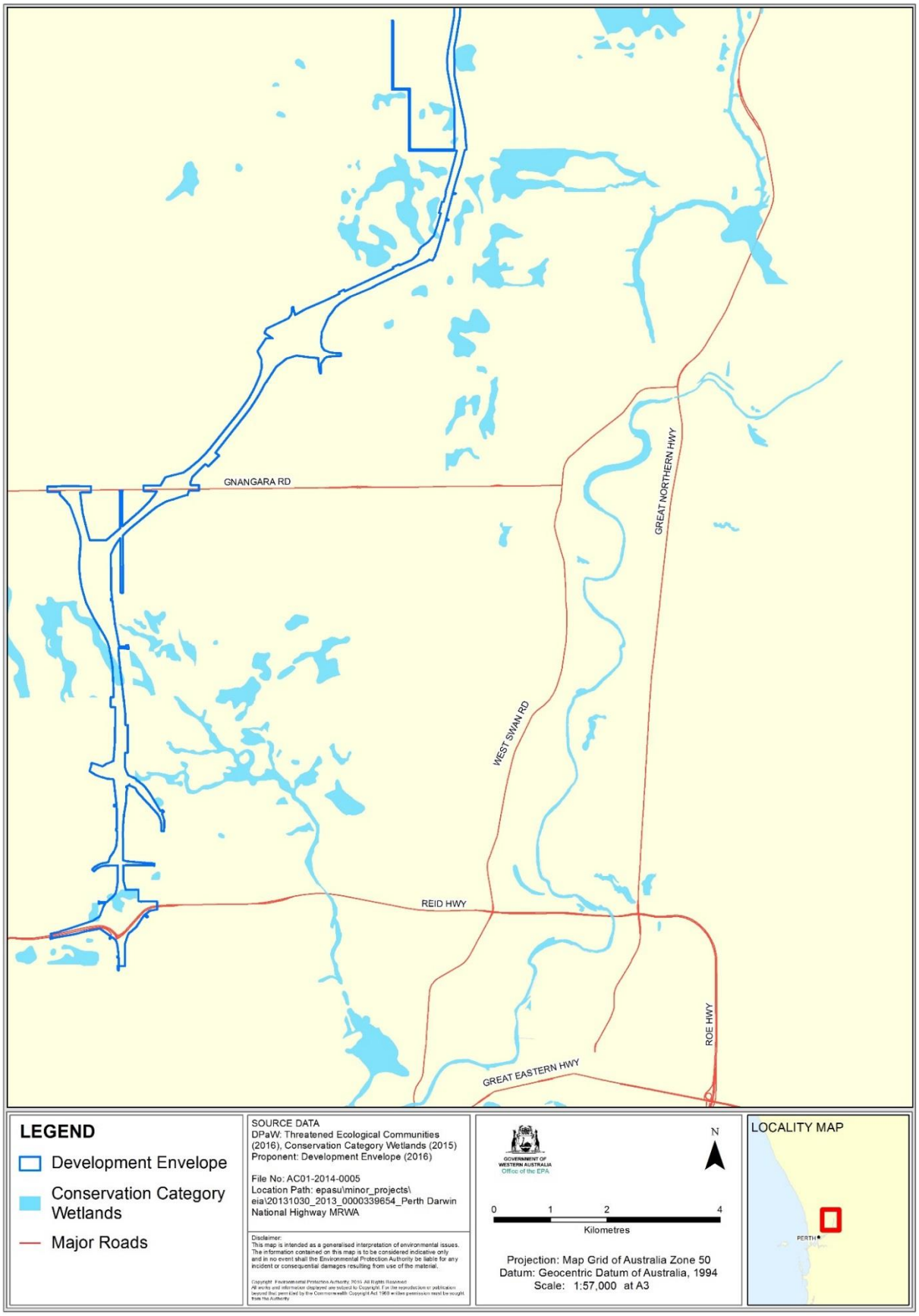

Figure 5 – Southern section of the alignment showing the development envelope and Conservation Category Wetlands

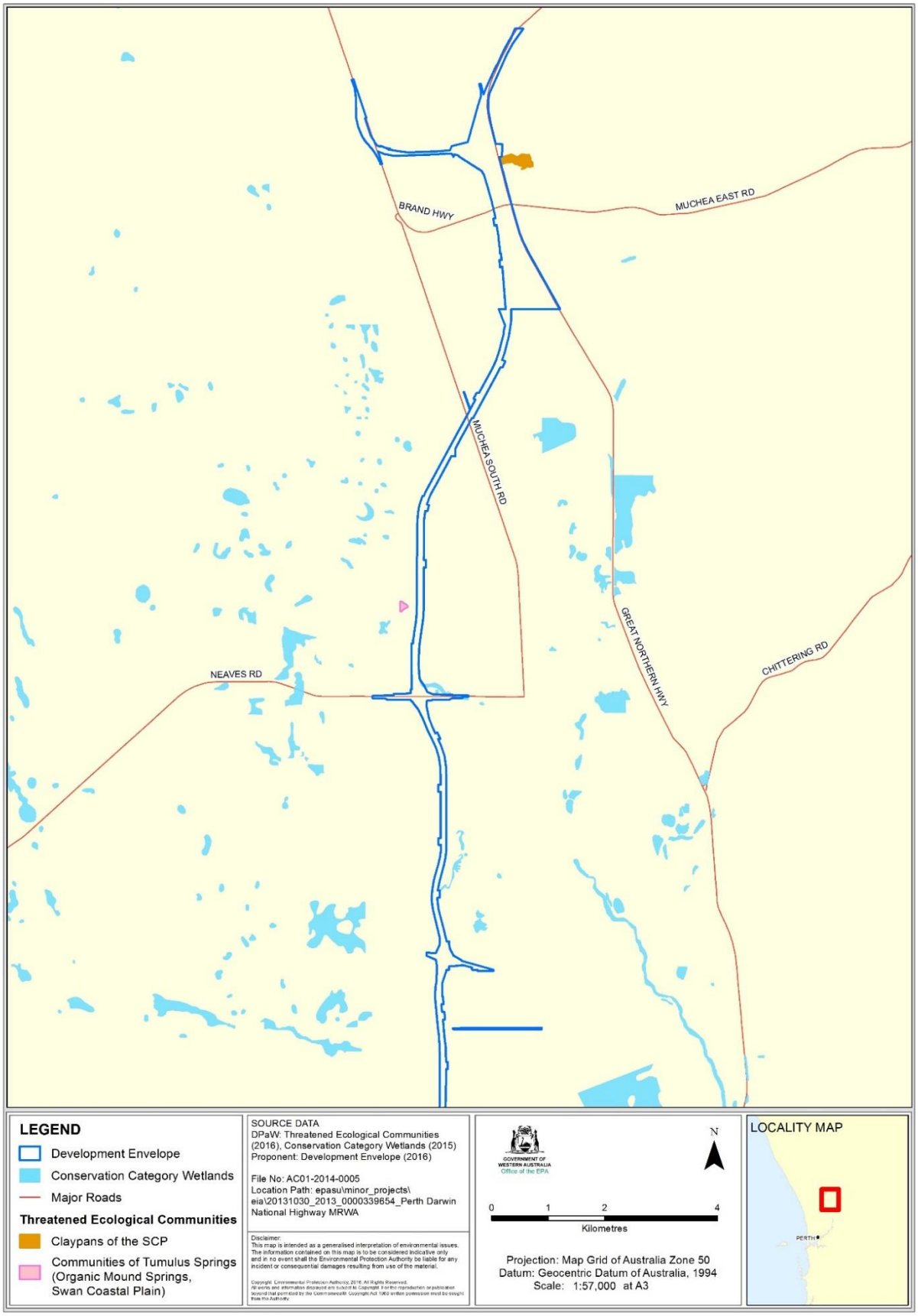

Figure 6 - Northern section of the alignment showing the development envelope and Conservation Category Wetlands, *Claypans of the Swan Coastal Plain* and *Mound Springs of the Swan Coastal Plain*

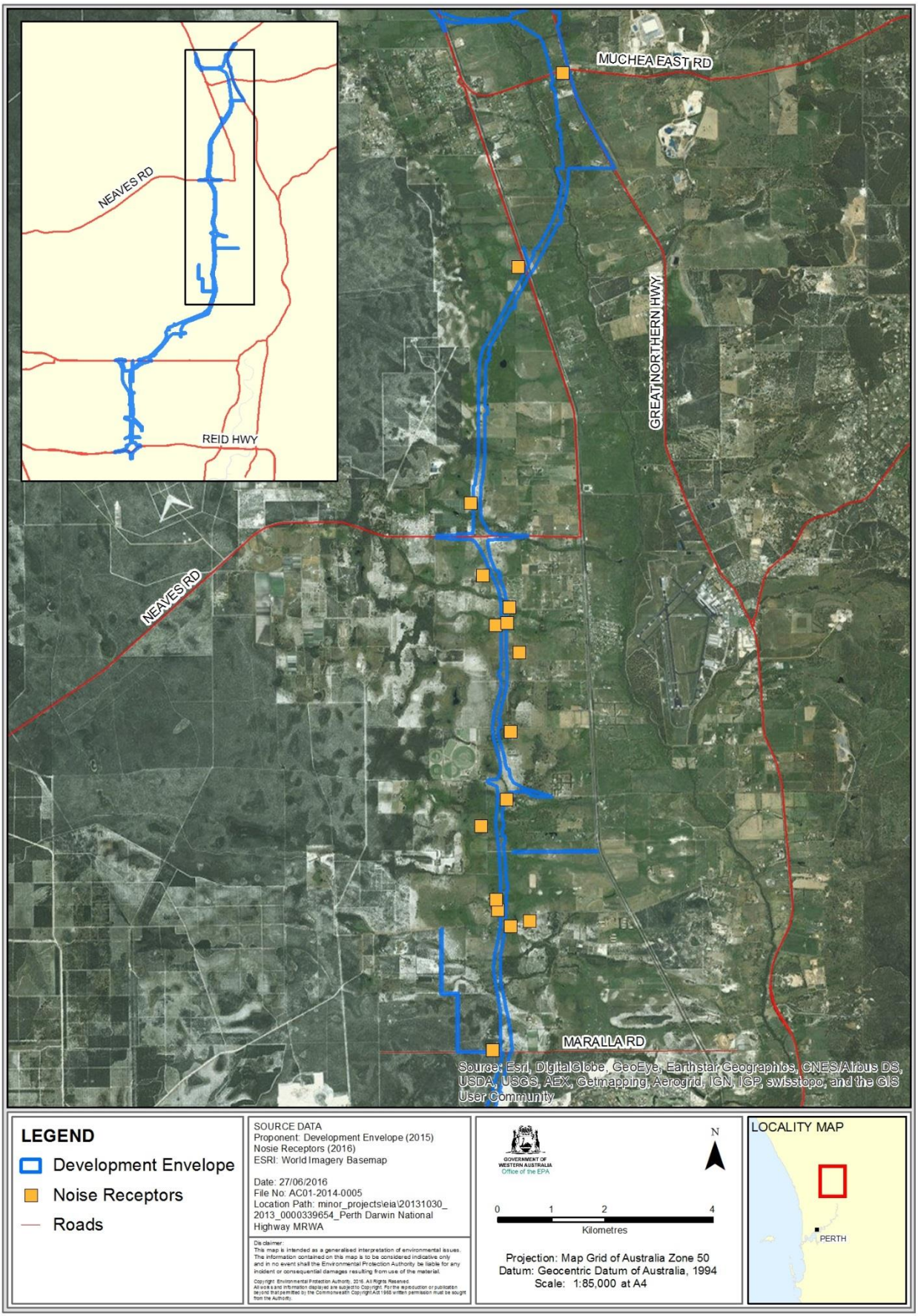

Figure 7 – Existing noise sensitive receptors north of Maralla Road

Schedule 2

Coordinates defining the Perth-Darwin National Highway Development Envelope in Figure 1 are held by the Office of the Environmental Protection Authority, Document Reference Number 2016-1466664076274.

Coordinates defining the 50 m buffer *Caladenia huegelii* 50 m buffer in Figure 2 are held by the Office of the Environmental Protection Authority, Document Reference Number 2016-1466664076274.

Coordinates defining the *Grevillea curviloba* subsp. *incurva* and *Darwinia foetida* 10 m buffer in Figure 3 are held by the Office of the Environmental Protection Authority, Document Reference Number 2016-1466664076274.

Coordinates defining the existing noise sensitive receptors in Figure 7 are held by the Office of the Environmental Protection Authority, Document Reference Number 2016-1466664076274.

Appendix 6

Summary of Submissions and Proponent's Response to Submissions

Provided on CD in hardcopies of this report and on the EPA's website at www.epa.wa.gov.au