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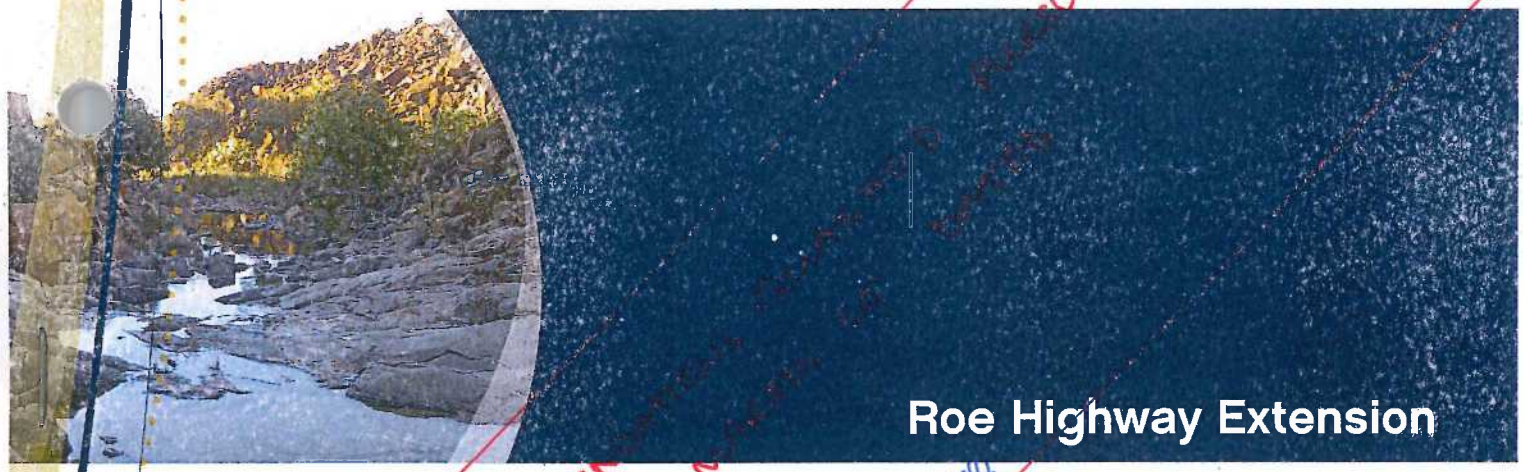
Report and recommendations of the Environmental Protection Authority



Roe Highway Extension

Main Roads Western Australia

REPORT AND RECOMMENDATIONS ... RELEVANT ... TO THE ORDER OF ... 16 DECEMBER 2015 9/2/16

THE SEAL OF THE SUPREME COURT OF WESTERN AUSTRALIA

Report 1489

September 2013

Public Environmental Review
Environmental Impact Assessment Process Timelines

Date	Progress stages	Time (weeks)
18/05/2009	Level of Assessment set (date appeals process completed)	
15/06/2010	Final Environmental Scoping Document (ESD) approved	**56**
20/06/2011	Public Environmental Review (PER) released for public review	**53**
12/09/2011	Public review period for PER closed	**12**
05/06/2013	Final Proponent response to PER issues raised	**90**
10/09/2013	Provision of the EPA Report to the Minister	**14**
13/09/2013	Publication of EPA report (three days after report to Minister)	**3 days**
27/09/2013	Close of appeals period	**2**

STATEMENT ON TIMELINES

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 agreed timeline objective for the completion of the assessment and provision of a recommendation to the Minister.

Dr Paul Vogel
Chairman

10 September 2013

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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 proposal by Main Roads Western Australia (MRWA) to extend Roe Highway approximately five kilometres from its current terminus at the Kwinana Freeway in Jandakot to Stock Road in Coolbellup.

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

- 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 include in the report any other advice and recommendations as it sees fit.

The EPA is also required to have regard for the principles set out in section 4A of the EP Act.

Key environmental factors and principles

The EPA decided that the following key environmental factors relevant to the proposal required detailed evaluation in the report:

(a) Inland waters environmental quality;

(b) Hydrological processes;

(c) Flora and vegetation;

(d) Terrestrial fauna;

(e) Amenity (Noise); and

(f) Offsets.

There were a number of other factors which were relevant to the proposal, but the EPA is of the view that the information set out in Appendix 3 provides sufficient evaluation.

The following principles were considered by the EPA in relation to the proposal:

(a) The precautionary principle;

(b) The principle of intergenerational equity;

(c) The principle of the conservation of biological diversity and ecological integrity;

(d) Principles relating to improved valuation, pricing and incentive mechanisms; and

(e) The principles of waste minimisation.

Background and context

Roe Highway serves as a ring road that allows north-south traffic to bypass the Perth Central Business District and inner suburbs. It currently runs between the Great Northern Highway and the Kwinana Freeway. The proposed extension to Roe Highway is largely located within a primary regional road reserve in the Metropolitan Region Scheme (MRS) that has been in existence since 1963.

Since creation of the road reserve, there have been numerous studies and reports on the transport and freight requirements of the ring road system and also the alternatives and benefits to extending the Roe Highway west of Kwinana Freeway.

A portion of the MRS road reserve adjoins the Beeliar Regional Park. The Beeliar Regional Park has been created around two chains of wetlands that have been identified as having regionally significant conservation, landscape and recreation values.

In 2003, the EPA provided advice to the Minister for Environment on the key environmental values that would be affected if the Roe Highway extension was to proceed (Report (then Bulletin) 1088). This advice was provided pursuant to Section 16 of the EP Act, in order to inform studies undertaken as part of the then Government's Freight Network Review. As the advice did not constitute a formal assessment of a proposal by the EPA, there was no right of appeal against this report and no environmental approval was issued.

In terms of the environmental values, the EPA identified that the road reservation runs between North Lake and Bibra Lake, which are within the Beeliar Regional Park. The area's regional significant values have been recognised through its inclusion in System Six area M93 and Bush Forever site 244. Other environmental values were also broadly set out in Section 2 of EPA Report 1088.

The EPA's conclusion was as follows:

> *"The EPA concludes that any proposal for the construction of Roe Highway Stage 8 through the Beeliar Regional Park would be extremely difficult to be made environmentally acceptable. It is accepted that through design and construction there is the potential to manage and minimise the potential impacts to a certain extent. However the EPA is of the opinion that the overall impacts of construction within the road reserve, or any alignment through the Beeliar Regional Park in the vicinity of North Lake and Bibra Lake, would lead to the ecological values of the area as a whole being diminished in the long-term. Every effort should be made to avoid this."*

In reaching this conclusion, it was noted by the EPA at the time that there were no specific design details on the alignment for the Roe Highway Extension and therefore the EPA's review was based on the overall assumption that the road would be constructed entirely in the MRS road reserve. The EPA had an expectation that more detailed information would be provided regarding any future proposal to construct the highway.

The EPA's advice in Report 1088 therefore sets the overarching context for the environmental impact assessment of this proposal.

Assessment and conclusion

The EPA has considered and assessed the proposal by MRWA to extend Roe Highway approximately five kilometres from its current terminus at the Kwinana Freeway in Jandakot to Stock Road in Coolbellup.

Due to the history of the project and the environmental values of the area, the EPA received 3,283 submissions during the public review period for the proponent's Public Environmental Review document.

Of fundamental importance in this assessment is the proponent's application of the avoidance and minimisation principles and the extent to which it has mitigated potential impacts on the environmental values identified by the EPA in Report 1088 and the key environmental factors identified in this report.

From the outset, the EPA notes that the proponent has recognised the regionally significant environmental values of the area and has sought to apply innovative planning and design measures, and construction techniques to a level which has not been applied to other major road proposals in Western Australia.

The EPA has also noted that through proponent's extensive consultation and, planning and design work it has avoided and minimised impacts on wetlands, native vegetation and native fauna through the following measures:

- alignment of the proposal along the western section of Hope Road, between Bibra and North lakes, and along the existing high tension power line corridor through Roe Swamp, to already disturbed areas so as to minimise clearing;
- maximised use of degraded areas to avoid impacts on high and medium quality vegetation;
- use of a minimum width highway median to minimise the width of the clearing footprint;
- relocation of the original Bibra Drive interchange to a new location (Murdoch Drive Extension interchange) in cleared government-owned land to the east. This is to minimise impact on conservation category wetlands (including Roe Swamp) and high quality vegetation and fauna habitat. The EPA notes that if the highway interchange was kept to the area where it was designated in the MRS road reserve, it would not only have a significantly greater

direct impact on the Roe Swamp, but there would be little to no opportunity to maintain a level of north-south ecological connectivity;

- replacement of embankments and batters with retaining walls to minimise clearing near wetlands and heritage value locations;
- retention of minimum widths of existing vegetation to maintain ecological linkages in key areas;
- design of bridges over a portion of Roe Swamp and south-east of Horse Paddock Swamp to minimise interruption to surface and potential subsurface flows. This will also serve to maintain ecological linkages for fauna species and long-term genetic transference of flora species;
- the use of top-down construction methods to build the bridge at Roe Swamp. This will reduce the clearing footprint by removing the need for ground level access by machinery and vehicles, which is especially important in this area;
- reconfiguration of the Kwinana Freeway Interchange to retain areas previously set aside as environmental offsets for Roe Highway Stage 7;
- locating bioretention basins such that existing trees will be retained and already cleared areas will be excavated for the basins. Some of these wetlands will be rehabilitated to develop a reconstructed wetland environment;
- preparing a rehabilitation strategy for areas in the development envelope that are no longer required following the completion of construction; and
- prepared management plans and strategies to limit residual impacts and ensure impacts are no greater than predicted.

After having considered the proponent's application and demonstration of avoiding and minimising environmental impacts through the above planning and design measures, and the proponent's management measures to ensure the impacts are no greater than predicted, the EPA notes that the residual impacts in relation to the environmental factors of Vegetation and Flora and Terrestrial Fauna are as follows:

- clearing of 97.8 hectares (ha) of native vegetation which includes 5.4 ha of Beeliar Regional Park and 7 ha of Bush Forever site 244;
- loss of 78 ha foraging habitat and 2.5 ha potential nesting habitat for the Carnaby's Black Cockatoo and Forest Red-tailed Black-Cockatoo (species listed under the Wildlife Conservation Act 1950 and Commonwealth Environment Protection and Biodiversity Conservation Act 1999);
- clearing of 6.8 ha of wetlands (includes Roe Swamp and a small portion of Bibra Lake and Horse Paddock Swamp), including wetlands protected under the Environmental Protection (Swan Coastal Plain Lakes) Policy 1992 (EPP wetland) and Conservation Category Wetlands (CCWs); and

- fragmentation of wetlands and fauna habitat.

The EPA considers the above residual impacts to be significant and they would therefore need to be counterbalanced through the provision of environmental offsets.

The proponent has proposed a package of environmental offset measures in the PER, which aims to counterbalance the above significant residual impacts. Based on the proponent's offsets package and consistent with other offsets recommended in recent assessments, the EPA has required the following offset components to be included in the recommended conditions:

- Land acquisition which is to contain a number of environmental values, including a minimum of 234 ha of Carnaby's Cockatoo and Red-tailed Cockatoo foraging habitat, 7.5 ha of potential breeding habitat for both species and 7 ha of Conservation Category Wetland area. This must be made up of land parcels of a minimum of 100 ha in size.

- A Wetland Restoration Program to be undertaken at North Lake and Horse Paddock Swamp, involving revegetation and weed control. The EPA has also recommended the program include a community consultation and involvement component given the notable work undertaken in the local area.

- The transfer of 14.5 ha of surplus MRS road reserve into Beeliar Regional Park, as well as an Arum Lily Control Program to be implemented over this area. This will increase the level of protection of the site as well as provide enhancement works.

- The preparation and implementation of a Typha orientalis control program at Thomsons Lake, an internationally listed Ramsar Wetland, prior to the construction of the proposal. Typha orientalis is a great threat to native vegetation in the reserve. The program will help address fragmentation by improving the quality of habitat available around the proposal site.

The EPA is satisfied that the proponent has adequately demonstrated that all efforts have been made to avoid or minimise environmental impacts to vegetation and flora and terrestrial fauna. In addition, the proponent has proposed management measures to limit residual impacts to acceptable levels and satisfactorily counterbalance the significant residual impacts through the above offset measures.

There will also be indirect residual impacts from the construction and operation of the proposal on the key environmental factors of Inland Waters Environmental Quality and Hydrological Processes. The EPA considers that these indirect residual impacts can be adequately managed subject to the following management measures:

During construction

- No dewatering at any stage.
- No abstraction of groundwater for construction purposes within 1.5 km of Bibra Lake, North Lake and Roe Swamp.
- Preparation and implementation of management plans to manage the potential exposure of ASS during excavation.

Following construction

- Construction and implementation of drainage basins, including a bioretention component in all basins to treat road runoff and provide recharge groundwater as close as possible to source.
- Implementation of a Water Management Strategy to minimise impacts on the water balance in the project area.
- Delineation of a 'zone of indirect impact' to account for small and localised changes to hydrology impacting on native vegetation.
- Construction of two bridges at Roe Swamp and north of Bibra Lake to maintain surface and groundwater hydrology and reduce habitat fragmentation and vegetation clearing.

The EPA has also assessed the potential impacts of the proposal from noise emissions on the environmental factor of Amenity. West of Progress Drive and east of Bibra Drive, the alignment is located within close vicinity of residences and sensitive land uses on either side.

Predicted traffic noise levels were evaluated in accordance with State Planning Policy 5.4 *Road and Rail Transport Noise and Freight Considerations in Land Use Planning*. As a result of the noise predictions, the proponent has proposed to construct noise barriers where the road may impact on residential amenity. The EPA considers the proponent has adequately evaluated the potential impacts from noise and proposed adequate measures to mitigate noise levels to meet target noise levels where required. Further consultation with nearby residents would be required to determine the final details and heights of the noise walls before construction.

The EPA has therefore concluded that the proposal would meet the EPA's objectives for the key environmental factors assessed and as such it recommends the proposal be approved subject to the recommended environmental conditions summarised below.

Recommendations

That the Minister for Environment:

1. notes that the proposal assessed is to extend Roe Highway approximately five kilometres from its current terminus at the Kwinana Freeway in Jandakot to Stock Road in Coolbellup;
2. considers the report on the key environmental factors and principles as set out in Section 5;

3. notes the proponent's application of the avoidance and minimisation principles and the extent to which it has mitigated potential impacts on environmental values identified by the EPA in Report 1088 and the key environmental factors identified in this report;
4. notes that the EPA has concluded that the proposal can be managed to meet the EPA's objectives, provided there is satisfactory implementation by the proponent of the recommended conditions set out in Appendix 4 and summarised in Section 7;
5. imposes the conditions and procedures recommended in Appendix 4 of this report; and
6. notes the EPA's other advice presented in Section 8 in relation to impacts to social surroundings.

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 MRWA to extend Roe Highway approximately five kilometres from its current terminus at the Kwinana Freeway in Jandakot to Stock Road in Coolbellup, is approved for implementation.

These conditions are presented in Appendix 4. Matters addressed in the conditions include the following:

(a) ensuring the final road alignment and detailed design does not result in any additional impacts beyond those authorised through requiring the proponent to submit an Infrastructure Plan detailing the alignment, dimensions and locations of the key proposal elements prior to construction (condition 6);

(b) requiring the Roe Swamp bridge to be constructed using 'top down' construction methods, not allowing the abstraction of groundwater for construction within 1.5 km of North Lake, Bibra Lake and Roe Swamp, and not allowing dewatering at any stage of the proposal (condition 7);

(c) minimising the impacts to hydrological processes and groundwater quality from the ongoing operation of the proposal through requiring the preparation and implementation of a Drainage Management and Monitoring Plan (condition 8);

(d) minimising impacts to wetland quality associated with the implementation of the proposal through requiring the preparation and implementation of a Wetlands Monitoring and Management Plan (condition 9);

(e) ensuring the ongoing implementation of the proposal does not cause any detectible adverse effects on flora and vegetation communities immediately outside of the 'zone of indirect impacts', through the preparation and implementation of a Flora and Vegetation Monitoring and Management Plan (condition 10);

(f) ensuring that the proposal is designed, constructed and maintained to facilitate movement of fauna within Beeliar Regional Park and minimising impacts as a result of fragmentation through the preparation and implementation of a Fauna Management Plan (condition 11); and

(g) requiring the proponent to offset significant residual impacts to fauna, vegetation and wetlands (condition 12).

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1. Introduction

This report provides the advice and recommendations of the Environmental Protection Authority (EPA) to the Minister for Environment on the key environmental factors and principles for the proposal by Main Roads Western Australia (MRWA) to extend Roe Highway approximately five kilometres from its current terminus at the Kwinana Freeway in Jandakot to Stock Road in Coolbellup.

The proposed Roe Highway Extension was referred to the EPA on 20 April 2009 under the *Environmental Protection Act 1986* (EP Act). On 18 May 2009 the EPA determined the level of assessment for the proposal at Public Environmental Review (PER) with a review period of six weeks. Following appeals on this level of assessment, on 2 November 2009 the Minister for Environment determined that the proposal should be assessed as a PER with a review period of 12 weeks. The proposal is being assessed under the *Environmental Impact Assessment (Part IV Division 1) Administrative Procedures 2002* as these were the applicable procedures at the time that the Level of Assessment was set. The proponent prepared the environmental scoping document (ESD), which was approved by the EPA on 15 June 2010. The proponent prepared the final PER document and the public review period ran from 20 June 2011 to 12 September 2011. During the public review period 3,283 submissions were received.

The proposal was determined to be a controlled action under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) in September 2009 as it may impact on Matters of National Environmental Significance (MNES). These matters include listed threatened species and communities (sections 18 and 18A) and listed migratory species (sections 20 and 20A). The proposal is being assessed under the bilateral agreement between the Commonwealth and Western Australian Governments.

Further details of the proposal are presented in Section 4 of this report. Section 5 discusses the key environmental factors and principles for the proposal. Section 6 discusses the matters of national environmental significance. The conditions to which the proposal should be subject, if the Minister determines that it may be implemented, are set out in Section 7. Section 8 provides other advice by the EPA and Section 9 presents the EPA's recommendations.

Appendix 5 contains a summary of submissions and the proponent's response to submissions and is included as a matter of information only and does not form part of the EPA's report and recommendations. Issues arising from this process, and which have been taken into account by the EPA, appear in the report itself.

2. Background and planning context

The Roe Highway and the Reid Highway form a ring road system which surrounds the Perth Metropolitan Region. The ring road is intended to provide for passenger traffic and a freight route connecting Fremantle Port to various industrial areas of Perth. The Roe Highway road reserve was set aside in the Metropolitan Region Scheme (MRS) in 1963.

The highway was constructed using a staged approach with the initial construction beginning in 1981. Stage 7 of the Roe Highway was completed in 2006 and terminates at Kwinana Freeway. Stage 7 of the Roe Highway was subject to formal assessment by the EPA in June 2004 (EPA Report 1138) and received environmental approval from the Minister for the Environment in October 2004. The development of the final stage of the Roe Highway (this proposal) proposes to extend the highway five kilometres west from the terminus of Stage 7 at Kwinana Freeway in Jandakot to Stock Road in Coolbellup.

Since 1963 there have been several reports and studies on the transport and freight requirements of the ring road system. Between 2001 and 2002, the previous State Government undertook a review of the transport and freight requirements (The Metropolitan Freight Network Review). As part of this review the EPA was requested to provide advice on the environmental values of the area under Bulletin 1088, which is discussed in Section 3 (Report 1088). In 2003, the Freight Network Study reported that the Roe Highway extension was not required and that freight could travel to the coast using the existing road network.

Based on more contemporary transport studies, the State Government made a commitment to reinstate the development of the Roe Highway extension. MRWA contends that extending Roe Highway would:

- complete the key strategic link in Perth's road network, connecting Reid Highway, Great Northern Highway in the Midland area to Tonkin Highway, Kwinana Freeway and Stock Road;
- improve efficiency and ease traffic on parallel east-west roads such as South Street and Leach Highway;
- improve safety and reduce traffic congestion within the regional road network;
- improve access to the Murdoch Activity Centre, including the future Fiona Stanley Hospital;
- provide improved access to the Fremantle Inner Harbour;
- form part of the key freight route to the proposed bulk and container port developments and the expanding Kwinana industrial area; and
- remove trucks from residential areas along Leach Highway between Stock Road and Kwinana Freeway, which will improve safety, reduce noise and improve the general amenity in this area.

To give effect to this Government commitment, MRWA commenced planning and design work with a view to identify an environmentally acceptable design concept and obtain relevant approvals for the proposal.

In 2009 the Minister for Transport created South Metro Connect, a collaboration between MRWA and AECOM, responsible for the project design of the Roe Highway extension in consultation with the community and stakeholders. South Metro Connect (on behalf of the proponent) has commenced project planning and consultation on the best design and alignment of the road within the project boundaries and is currently in the process of obtaining the necessary government approvals, including environmental assessment and approval under Part IV of the EP Act.

The EPA notes that a considerable number of submissions raised issues relating to the justification of the proposed highway, including the consideration of alternative alignment options outside the MRS Road Reserve. The EPA acknowledges the process that was used in identifying the alignment for the Roe Highway extension involved a high level of community consultation and notes that the highest ranked alignment option was subsequently adopted by the proponent for environmental assessment. The EPA can only assess the proposal as referred and presented to it by the proponent. In doing so however, the EPA has taken into account all the opportunities the proponent has examined to avoid and minimise impacts to the environment.

3. EPA Bulletin 1088

In response to a request from the then Minister for Planning and Infrastructure to the then Minister for the Environment and Heritage, the EPA issued Report 1088 under Section 16 of the EP Act to provide environmental advice on the key environmental values associated with the road reserve for Roe Highway Stage 8 that were likely to be impacted.

The concluding statement from Bulletin 1088 is as follows:

> *"The EPA concludes that any proposal for the construction of Roe Highway Stage 8 through the Beeliar Regional Park would be extremely difficult to be made environmentally acceptable. It is accepted that through design and construction there is the potential to manage and minimise the potential impacts to a certain extent. However the EPA is of the opinion that the overall impacts of construction within the road reserve, or any alignment through the Beeliar Regional Park in the vicinity of North Lake and Bibra Lake, would lead to the ecological values of the area as a whole being diminished in the long-term. Every effort should be made to avoid this."*

This advice was provided pursuant to Section 16 of the EP Act, in order to inform studies undertaken as part of the then Government's Freight Network Review. As the advice did not constitute a formal assessment of a proposal by

the EPA, there was no right of appeal against this report and no environmental approval was issued.

In reaching the above conclusions, it was noted by the EPA at the time that there were no specific design details on the alignment for the Roe Highway Extension and therefore the EPA's review was based on the overall assumption that the road would be constructed entirely in the MRS road reserve. The EPA had an expectation that more detailed information would be provided regarding any future proposal to construct the highway

Report 1088 did not take into account the potential reduction in environmental impacts that may occur as a result of design work, such as retaining walls and aligning the road outside the MRS reserve (for some sections) to reduce wetland impacts, engineering measures such as bridges, and offsets for significant residual impacts on environmental values.

The EPA now has significantly more detail than previously provided, specifically on the proposed avoidance and mitigation measures for potential impacts including the proposed alignment, construction methods, altered interchanges, environmental management and offsets. These are discussed further in relation to the key environmental factors in Section 5 of this report.

The proponent considers it has provided a proposal using best practice studies, avoidance of potential impacts and mitigation measures. The EPA is obliged to consider the environmental merits of this proposal in the context of its 2003 advice provided in Bulletin 1088, and provide its recommendations to the Minister for Environment.

4. The proposal

MRWA proposes to construct the Roe Highway Extension by extending Roe Highway approximately five kilometres from its current terminus at the Kwinana Freeway in Jandakot to Stock Road in Coolbellup (Figures 1(a) and 1(b)).

The proposal is located approximately 14 kilometres (km) south of Perth within the Swan Coastal Plain Bioregion. The proposed project is oriented east-west, largely within a road reserve that was set aside in the MRS in 1963. Approximately 5.4 ha of the Beeliar Regional Park north of the MRS road reserve boundary, and 7 ha of Bush Forever site 244 will be resumed for the road construction.

The road will be a dual carriageway with two lanes in each direction, separated by a concrete barrier in place of a median strip. Two bridges are also proposed as part of the extension, to pass over Roe Swamp and the area between Bibra Lake and Horse Paddock Swamp.

The total development envelope of the proposal is 167 ha, with up to 97.8 ha of native vegetation being cleared, and almost 7 ha of wetland areas being cleared. Groundwater abstraction is proposed for construction, but no dewatering is proposed at any stage.

The EPA also notes that future amendments to the MRS will be required for the portion of the road outside of the existing road reserve near Roe Swamp. The inclusion of road reserve areas surplus to the proposal requirements into Beeliar Regional Park, will also require an MRS amendment. These amendments will need to be referred to the EPA in accordance with the *Planning and Development Act 2005* for assessment under Part IV of the EP Act. The Beeliar Regional Park Management plan (CALM, 2006) recognises that there is likely to be future changes to the boundary of the park as a result of infrastructure projects and other development proposals, subject to them receiving the relevant environmental approvals.

The main characteristics of the proposal are summarised in Table 1 below. A detailed description of the proposal is provided in Section 1.5 of the PER (Southmetro Connect, 2011).

Table 1: Summary of key proposal characteristics

Component	Description

Clearing and disturbance for road corridor, drainage, and noise walls.	Clearing and disturbance of less than:
	• 97.8 ha of native vegetation consisting of;
	  o 79 ha remnant vegetation;
	  o 18.8 ha revegetated areas; and
	• 0.95 ha of EPP wetlands,
	within a 167 ha development envelope.

Bridges	Roe Swamp bridge minimum length of 120 m. Horse Paddock Swamp/Bibra Lake bridge minimum length 70 m.
Noise Walls	Height of noise walls to be capped at: • 4.4 m on residential boundaries; and • 5.0 m on non-residential boundaries.
Groundwater Abstraction	Up to 140,000 kL.

Hectares (ha) metres (m) Kilolitres (kL)
Environmental Protection (Swan Coastal Plain Lakes) Policy 1992 (EPP wetlands)

Since the release of the PER, no substantial changes have been made to the project. Elements of the road design have been refined and further management measures proposed, but there have been no additional impacts outside of the development envelope designated in the PER.

The potential impacts of the proposal initially predicted by the proponent in the PER document (Southmetro Connect, 2011) and their proposed management are summarised in Table 1 (Executive Summary) of the proponent's document.

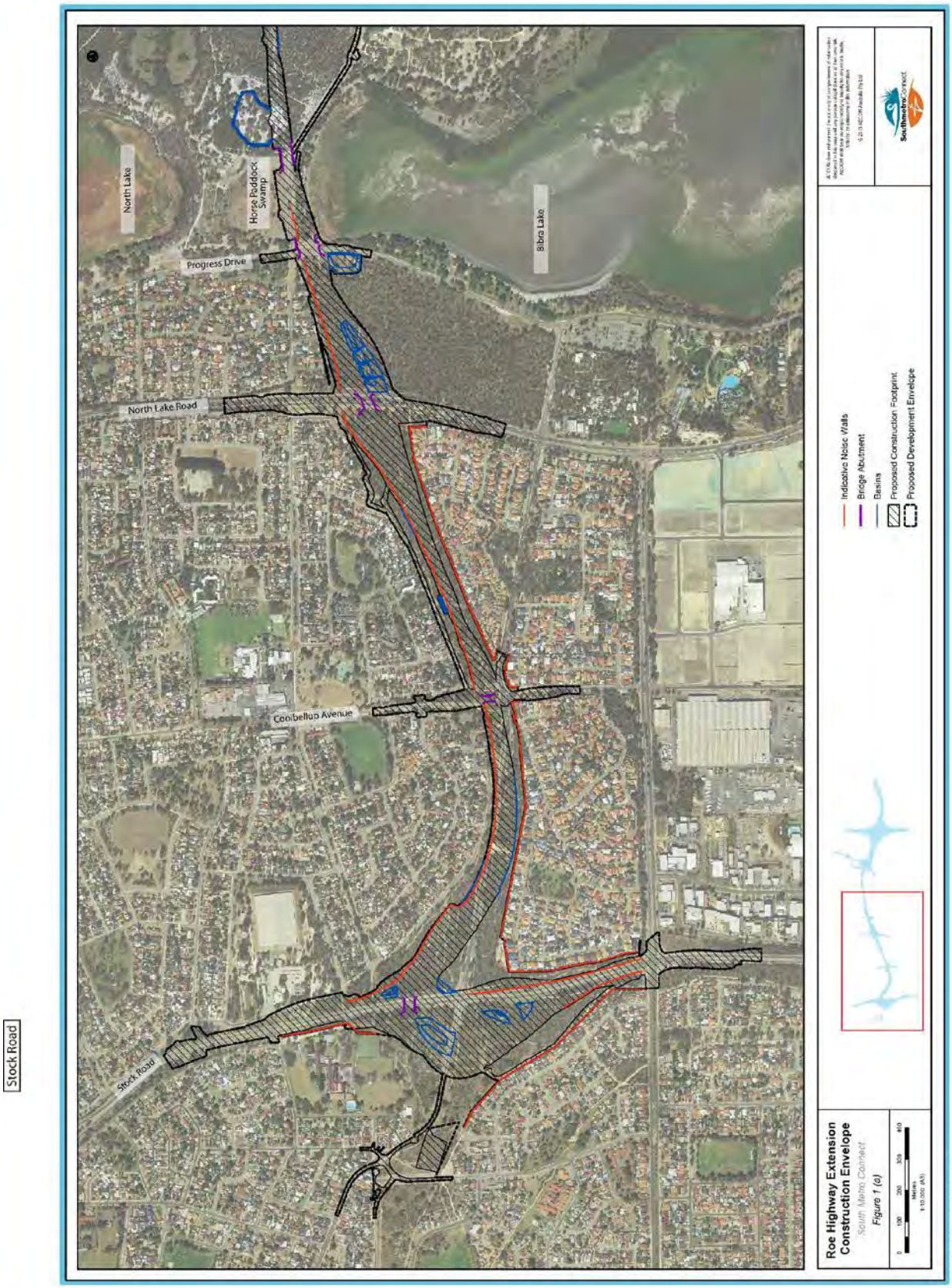

Figure 1(a) - Western section of Roe Highway Extension development envelope

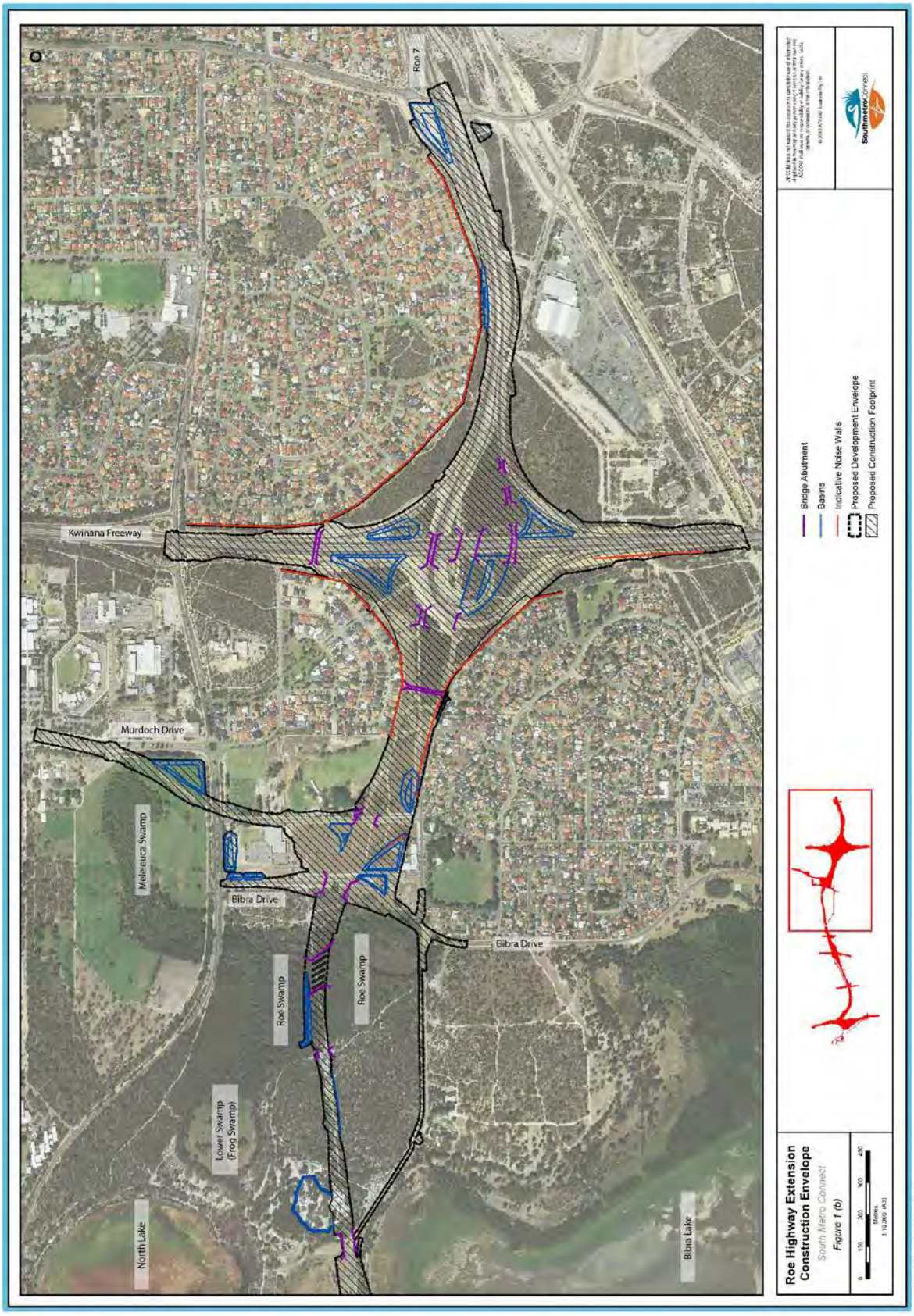

Figure 1(b) - Eastern section of Roe Highway Extension development envelope

5. Key environmental factors and principles

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for Environment on the key environmental factors relevant to the proposal and the conditions and procedures, if any, to which the proposal should be subject. In addition, the EPA may make recommendations as it sees fit.

The identification process for the key factors selected for detailed evaluation in this report is summarised in Appendix 3. The reader is referred to Appendix 3 for the evaluation of factors not discussed below. A number of these factors, such as heritage, air quality and visual amenity, are relevant to the proposal, but the EPA is of the view that the information set out in Appendix 3 provides sufficient evaluation.

It is the EPA's opinion that the following key environmental factors for the proposal require detailed evaluation in this report:

a) Inland waters environmental quality;

b) Hydrological processes;

c) Flora and vegetation;

d) Terrestrial fauna;

e) Amenity (Noise); and

f) Offsets.

The above key factors were identified from the EPA's consideration and review of all environmental factors generated from the PER document and the submissions received, in conjunction with the proposal characteristics.

Details on the key environmental factors and their assessment are contained in Sections 5.1 - 5.6. The description of each factor shows why it is relevant to the proposal and how it will be affected by the proposal. The assessment of each factor is where the EPA decides whether or not a proposal meets the environmental objective set for that factor.

The following principles were considered by the EPA in relation to the proposal:

a) The precautionary principle;

b) The principle of intergenerational equity;

c) The principle of the conservation of biological diversity and ecological integrity;

d) Principles relating to improved valuation, pricing and incentive mechanisms; and

e) The principles of waste minimisation.

Summary of proponent's application of avoidance and minimisation principles

Of fundamental importance in this assessment is the proponent's application of the avoidance and minimisation principles and the extent to which it has mitigated potential impacts ont the environmental values identified by the EPA in Report 1088 and the key environmental factors identified in this report.

From the outset, the EPA notes that the proponent has recognised the regionally significant environmental values of the area and has sought to apply innovative planning and design measures, and construction techniques to a level which has not been applied to other major road proposals in Western Australia.

The EPA has also noted that through proponent's extensive consultation and, planning and design work it has avoided and minimised impacts on wetlands, native vegetation and native fauna through the following measures:

- alignment of the proposal along the western section of Hope Road, between Bibra and North lakes, and along the existing high tension power line corridor through Roe Swamp, to already disturbed areas to minimise clearing;
- maximised use of degraded areas to avoid impacts on high and medium quality vegetation;
- use of a minimum width highway median to minimise the width of the clearing footprint;
- relocation of the original Bibra Drive interchange to a new location (Murdoch Drive Extension interchange) in cleared government-owned land to the east. This is to minimise impact on conservation category wetlands (including Roe Swamp) and high quality vegetation and fauna habitat. The EPA notes that if the highway interchange was kept to the area where it was designated in the MRS road reserve, it would not only have a significantly greater direct impact on the Roe Swamp, but there would be little to no opportunity to maintain a level of north-south ecological connectivity;
- replacement of embankments and batters with retaining walls to minimise clearing near wetlands and heritage value locations;
- retention of minimum widths of existing vegetation to maintain ecological linkages in key areas;
- design of bridges over a portion of Roe Swamp and south-east of Horse Paddock Swamp to minimise interruption to surface and potential subsurface flows. This will also serve to maintain ecological linkages for fauna species and long-term genetic transference of flora species;
- the use of top-down construction methods to build the bridge at Roe Swamp. This will reduce the clearing footprint by removing the need for ground level access by machinery and vehicles, which is especially important in this area;

- reconfiguration of the Kwinana Freeway Interchange to retain areas previously set aside as environmental offsets for Roe Highway Stage 7;
- locating bioretention basins such that existing trees will be retained and already cleared areas will be excavated for the basins. Some of these wetlands will be rehabilitated to develop a reconstructed wetland environment;
- preparing a rehabilitation strategy for areas in the development envelope that are no longer required following the completion of construction; and
- prepared management plans and strategies to limit residual impacts and ensure impacts are no greater than predicted.

5.1 Inland waters environmental quality

The EPA's environmental objective for this factor is *to maintain the quality of groundwater and surface water, sediment and biota so that the environmental values, both ecological and social, are protected*.

The area considered for the assessment of this factor is the wetlands on both sides of the proposal development envelope, between Bibra Drive and Progress Drive, and the groundwater system beneath the proposal.

The proposal is located on the Jandakot Groundwater System. The regional flow of this system is in a westerly direction from the Jandakot Mound (east of Kwinana freeway) and discharges in the near-shore marine environment of Cockburn Sound (Southmetro Connect, 2011).

Wetlands within the proposal area form part of the eastern chain of Beeliar Wetlands, running parallel to the coast. The Beeliar Wetlands can be considered of international and national significance, as Beeliar Regional Park has been placed on the *Interim List of the Register of the National Estate*, and North Lake and Bibra Lake have been identified as 'A Class Reserves' and entered into the *National Trust's List of Classified Heritage places*. Many wetland areas in the Park have also been identified as locations listed under the Japan-Australia (JAMBA), China-Australia (CAMBA) and Republic of Korea Australia (ROKAMBA) Migratory Bird Agreements.

Wetlands that are likely to be impacted by the proposal include Horse Paddock, Roe and Melaleuca swamps which are Conservation Category Wetlands (CCWs) on the Swan Coastal Plains Geomorphic dataset (Figure 2). CCWs are high priority wetlands which support a high level of environmental attributes and functions. Surveys undertaken by the proponent however describes Horse Paddock Swamp to be completely degraded and largely devoid of native vegetation, apart from some scattered *Eucalyptus rudis* and *Melaleuca rhaphiophylla*. Horse Paddock Swamp is protected under the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992* (EPP wetland), but the proposal does not intersect with this boundary.

The proposal also impacts on Bibra Lake which is a 'Multiple Use' wetland that is also protected as an EPP wetland, with the proposal intersecting both the Multiple Use and EPP wetland boundary (Figure 2). A wetland is identified as an EPP wetland if it contained an area of standing water of more than 1000 square metres as at 1 December 1991. The policy prohibits the filling, excavating, mining, discharge or disposal of effluent into and construction or alteration of a drainage system of an identified wetland, unless authorised under the EP Act.

The key environmental issues are considered to be the:

- impacts of construction activities (soil disturbance and excavation) on acid sulfate soils; and
- ongoing impacts from road runoff during the operation of the proposal.

Construction (Acid Sulfate Soils)

The majority of the eastern half of the development envelope is classified as Moderate to Low risk of Acid Sulfate Soils (ASS). The areas associated with the wetlands between Bibra Drive and Progress Drive (Bibra Lake, North Lake and Roe Swamp) are classified as High to Moderate risk.

No dewatering is proposed for the construction of the road formation or concrete footings as construction activities will occur above the water table.

Pile driving for the bridge construction at Roe Swamp is proposed to be undertaken in a manner that avoids the need to bring drill spoil to the surface which could result in the disturbance of ASS and water acidification (Southmetro Connect, 2013). The bridge at Horse Paddock Swamp will be constructed on spread footings, which is unlikely to require excavation beneath maximum groundwater levels. There is also a small area of excavation of wetland sediments, along the north-western edge of Bibra Lake, and the potential relocation of Murdoch Drain near Roe Swamp, which could also result in disturbance of ASS.

The proponent has committed to develop an ASS Management Plan (ASSMP) following more detailed ground investigations in accordance with the Department of Environment Regulation's (DER's) Acid Sulfate Soils Guidelines Series, and a Construction Environmental Management Plan (CEMP) to manage potential risks associated with the small areas that are likely to experience ASS exposure (Southmetro Connect, 2013).

The EPA considers the proponent's avoidance of excavation beneath the water table and dewatering during construction will significantly reduce the risk of soil acidification and degradation of groundwater quality. The EPA has therefore recommended condition 7-4 to ensure that no dewatering occurs.

The portions of the development envelope which coincide with areas mapped as 'High to Moderate risk' of ASS are small and considered to be manageable. The use of spread footings between Bibra Lake and Horse

Paddock Swamp, and driven piles at Roe Swamp in the manner described in section 6.5.1 of the PER will further minimise disturbance to ASS (Southmetro Connect, 2011).

The EPA considers any potential residual impacts in the event of ASS exposure from unavoidable construction activities can be managed by the proponent through the proposed ASSMP and CEMP. Through the development of these plans, the proponent will undertake further detailed groundwater and soil investigations based on the final design of the road, develop site-specific management protocols for managing the risk of ASS exposure and consult with the DER on the adequacy of the investigations and protocols.

The EPA has recommended condition 7-5 to require the proponent to prepare and implement the ASSMP on advice from the DER, to manage the potential risk of ASS exposure and prevent the acidification of groundwater and wetlands due to any excavation or relocation of Murdoch Drain. In view of the proponent's construction techniques and the recommended conditions, the risk to inland waters environmental quality from construction is considered to be low.

Operations

The EPA notes that the road design takes into consideration the risk of road accidents causing spills and contamination during operation, including the installation of concrete barriers where retaining walls and bridges are proposed. In addition, a concrete barrier will be installed above the embankment adjacent to Horse Paddock Swamp. These measures ensure that the majority of incidents will be fully contained within the road area. The stormwater management system has also been designed to contain spills through kerb design, oil separators in the drainage system and the collection of all run-off into basins.

For the rare event that an incident results in a chemical spill within the road near wetlands, an Emergency Response Plan will be developed in coordination with the DER and the DPaW to ensure that spillages are contained as much as practicable (Southmetro Connect, 2011).

The ongoing source of pollutants from road run-off would contain hydrocarbons, heavy metals, and sediment normally associated with traffic on all major roads. Standard road drainage measures will need to be applied to prevent direct run-off into wetlands and groundwater, and manage stormwater flows. The proponent's strategies for managing drainage on water quality include:

- pit and pipe networks adjacent to the kerb line in the new road formation;
- the location of the drainage basins such that stormwater is infiltrated close to the source;

- systems for the removal of gross pollutants, solids that settle, oils and floatables, located under the road embankment/verge and upstream of discharge points;
- headwall and outlet protection, to reduce the energy of road runoff prior to entering the bioretention basin and causing damage. This will be located as close to the road embankment as practicable, and may include rock protection, vegetation debris and other energy diffusing vegetation to reduce velocities; and
- bioretention basins, to provide additional water quality treatment, located in areas that have been identified as currently degraded or cleared of vegetation. Although the basins will be engineered systems, they are expected to provide enhancement of degraded areas by introducing native wetland vegetation to support aesthetic, ecological, social and environmental aspects, as well as water quality and quantity management objectives.

The EPA supports the proponent's management of stormwater through the combination (and co-location) of bioretention and infiltration basins. The EPA notes that the vegetated bioretention basins operate by directing stormwater through planted surface vegetation and then run-off is allowed to percolate through a filter. Most of the pollutants would be retained through adsorption and some biological uptake. The most important functioning element in a bioretention basin is the planted vegetation, which aids microbial communities in biodegradation and assimilation of contaminants collected at the treatment site (Southmetro Connect, 2011). The EPA also notes that the basins located close to wetlands will incorporate a vegetated bioretention system embedded within the footprint of the overall infiltration basins.

The proponent has also prepared a Water Management Strategy (WMS) with the aim of minimising impacts on the total water-cycle of the proposal. The Department of Water (DoW) has reviewed the proposed WMS and advised that it is considered satisfactory subject to minor amendments regarding the use and capacity of bioretention areas. The proponent has modified the WMS in accordance with these requested changes (Southmetro Connect, 2013). All infiltration basins are proposed to contain a bioretention component which will act as a 'vegetated treatment element' to improve stormwater and run-off water quality prior to entering the groundwater and downstream wetlands.

The EPA has recommended condition 8 which requires bioretention and infiltration basins to be developed consistent with the proponent's WMS, to treat road run-off prior to recharge to local wetlands via groundwater. A Drainage Management and Monitoring Plan is required to be prepared, in consultation with DoW, once the detailed design of the road is completed. The purpose of the plan is to manage, monitor and demonstrate the effectiveness of the constructed basins.

The EPA considers that one of the important components of the plan is to continue to build on the baseline data for groundwater and wetland water/sediment quality in order to develop water quality triggers for evaluating

the effectiveness of the basins. If the basins are not performing effectively then the plan will need to include specific measures such as:

- regular cleaning including removal of litter, plant debris and accumulated sediments;
- repairing eroded or sparsely vegetated areas;
- removing and replacing dead and diseased vegetation;
- the removal and remediation of contaminated soils; and
- a review of the drainage basin location, size, filter media and bioretention component.

The EPA notes that one of the key objectives of the Beeliar Regional Park Management Plan is to minimise further degradation to the quality of the wetlands and surrounding vegetation (Department of Conservation and Land Management (CALM), 2006). Regular monitoring of wetland water levels, water chemistry, flora and fauna does occur at most wetlands within the park and is undertaken by a number of State and local government authorities.

The EPA considers that to reduce the risk of the proposal causing a significant adverse change in wetland health and/or quality, the proponent should monitor the health and quality of Bibra Lake, Roe Swamp and North Lake, and provide management measures to be implemented should a significant change occur. The monitoring of wetland environmental quality should be consistent with the *Final Beeliar Regional Park Management Plan 2006* using the same indicators of wetland health where relevant, and complement the existing monitoring programs undertaken by the DoW (CALM, 2006).

The EPA has recommended condition 9 which requires the proponent to monitor the health and condition of wetlands and identify management measures to be undertaken in the event of significant adverse change in wetland health and/or quality.

Based on the above, the EPA has concluded that the residual impacts of the proposal during construction and operation can be managed to meet the EPA's objectives for this factor subject to the proponent's management measures.

Summary

Having particular regard to:

a) the proponent's proposed construction strategies to reduce water quality impacts including bridge construction, pile driving, spread footings and drainage and bioretention measures;

b) the preparation of an ASSMP and CEMP to manage ASS exposure and accidental discharge during road construction or road operation; and

c) the proposed implementation of the WMS for operation in accordance with the DoW's advice,

it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective for this factor provided conditions 7, 8 and 9 are imposed requiring the proponent to:

- not undertake dewatering at any stage of the proposal;
- prepare an ASSMP on advice from the DER to minimise impacts from construction on water quality;
- construct bioretention and infiltration basins consistent with the proponent's WMS;
- manage, monitor and demonstrate the effectiveness of the constructed basins through the preparation of a Drainage Management and Monitoring Plan; and
- monitor the environmental quality of the wetlands and implement management response if any significant adverse change in wetland quality is detected.

5.2 Hydrological processes

The EPA's environmental objective for this factor is *to maintain the hydrological regimes of groundwater and surface water so that existing and potential uses, including ecosystem maintenance, are protected.*

The area considered for the assessment of this factor is the wetlands on both sides of the proposal development envelope, between Bibra Drive and Progress Drive (Figure 2), and the groundwater system beneath the proposal.

As mentioned in Section 5.1, the proposal is located on the Jandakot Groundwater System. The regional flow of groundwater is in a westerly direction from the Jandakot Mound (east of Kwinana Freeway) and discharges in the near-shore marine environment of Cockburn Sound (Syrinx and Semeniuk, 2011).

Wetlands that are likely to be impacted by potential changes to the water balance from the proposal include Bibra and North lakes, and Horse Paddock, Roe and Melaleuca swamps. These wetlands have been described as through-flow lakes, meaning they are surface expressions of the groundwater of the Jandakot Mound. As such these wetlands respond to pressures which cause variations to the quantity of groundwater supply from the east. The water regimes of the Beeliar Wetlands respond to both natural processes such as rainfall and evaporation, and to modified land uses within the catchment areas (eg. urban and industrial development, and groundwater extraction) (CALM, 2006).

In the context of this environmental factor, the key environmental issues are considered to be the:

- alterations in groundwater regime and wetland water levels from groundwater abstraction during construction; and
- potential for the road structure to interrupt groundwater and surface flows, including the hydrological connections between wetlands.

Construction

As mentioned in Section 5.1, no dewatering is proposed for the construction or operation of the proposal. However, up to 140,000 kilolitres (kL) is proposed to be abstracted for the construction of the road and for dust suppression.

The DoW has advised the proponent and the EPA that bores should not be located within 1.5 km of Bibra and North lakes to avoid impacts to water levels. The proponent has subsequently incorporated this advice into their latest version of their WMS.

As there will be no dewatering for subsurface structures or groundwater abstraction within 1.5 km of the potentially affected wetlands, the EPA considers the risk to the superficial aquifer and the wetlands that rely on it to be low.

The EPA has recommended conditions 7-3 and 7-4 to ensure construction water is not sourced from groundwater bores within 1.5 km of North Lake, Bibra Lake and Roe Swamp, and that no dewatering is allowed during construction.

Should the proponent decide to obtain a water source from bores located outside of this 1.5 km radius it would require an abstraction licence from the DoW under the *Rights in Water and Irrigation Act 1914* (RIWI Act). The DoW has advised that the abstraction of up to 140,000 kL can be managed under the RIWI Act. This process would require the applicant to undertake baseline monitoring as well as monitoring during abstraction, to ensure there are no adverse impacts to ground water dependent ecosystems.

Operation

The potential impacts of the operation of the proposal are set out below in relation to surface and sub-surface hydrology.

<u>Surface water hydrology</u>

During significant rainfall events, there is likely to be a surface water connection between Horse Paddock Swamp and Bibra Lake. However, this is only expected to occur very rarely due to the raised embankment of the existing Hope Road. At the lowest topographic point for this section, the proponent proposes to construct a bridge of at least 70 m in length. The

precise dimensions of the bridge would be determined following further detailed design and site-specific flow investigations. This will also need to be detailed in the Infrastructure Plan required by recommended condition 6. Based on existing information, the EPA considers this to be adequate to maintain the infrequent north-south surface water flows that would occur during significant rainfall events.

The proponent also proposes to construct a bridge through the lowest portion of the Roe Swamp area. The Roe Swamp area consists of three connected sumplands – Lower Swamp, Melaleuca Swamp and Roe Swamp. Roe Swamp is subject to inundation in winter due to drainage from roads and residential areas discharging in the south-east corner of the swamp. During significant rainfall events and wet years surface water would flow from Roe Swamp in a north-westerly direction to Lower Swamp, and on some occasions eventually into North Lake.

The bridge at this sensitive portion of the road is proposed to be 120 m in length. At this length, the bridge would not only serve to maintain any infrequent surface water flows, but also maintain the ecological linkage in the eastern portion of this sumpland. The utility of this bridge to mitigate the fragmentation effects of the proposal is discussed in Section 5.4 of this report.

In summary, the EPA considers that north-south surface water flows for the portion of the proposal between Bibra Drive and Progress Drive can be maintained subject to the proponent constructing the two bridges and a series of culverts as proposed in the PER. The EPA therefore recommends that the minimum length of the bridges be specified in Table 2, Schedule 1 of Appendix 4 at 120 m over the Roe Swamp area and 70 m between Horse Paddock Swamp and Bibra Lake. As mentioned, the detailed design and specifications of these bridges would need to be detailed by the proponent in the Infrastructure Plan recommended by condition 6, prior to the commencement of construction.

Sub-surface hydrology

As mentioned previously, at a regional scale, the wetlands surrounding the proposal are fed by groundwater flows from the Jandakot groundwater mound, east of the Kwinana Freeway. Water levels in the wetlands are also influenced to some extent by drainage from surrounding roads and residential areas in the catchment.

At a local scale, groundwater flow paths and connections between wetlands are likely to be influenced by a number of factors including the stratigraphy of the area. Stratigraphy is the organisation of sediment and geological attributes beneath the surface.

One study commissioned by the proponent suggests that there are complex underlying stratigraphies of impervious and porous layers and perched water tables associated with wetlands in the North and Bibra Lakes area (Syrinx and Semeniuk, 2001). However, the relationship between the local stratigraphy

and shallow groundwater flows are not well understood and hence it is unclear whether there is a sub-surface connection between Bibra Lake and the wetlands to the north. It is noted that changes to the shallow stratigraphic layers that either perch or retard water infiltration are a potential threat to wetland vegetation communities that depend on these shallow layers for soil water.

As a result of public submissions, the proponent has further investigated the potential effect of the proposal on the shallow stratigraphic layers. One mechanism that was identified is the potential for the road embankment to compact the underlying soil/sediment layers. This compaction may alter the hydraulic conductivities and properties of these layers to the extent that it would impact on the groundwater flow regime in the area.

The most susceptible areas identified by the proponent are between Horse Paddock Swamp and Bibra Lake and through the Roe Swamp CCW area between Roe Swamp and Lower Swamp, where the embankment is near the water table.

The proponent calculated the likely reduction in soil porosity for various types of road embankment heights and concluded that the reduction in porosity and permeability of soils would be minor, and hence will not impact on groundwater flows between wetlands. The proponent has acknowledged however that this calculation has limitations because it does not include the in situ soil types and layers.

For the section of the road between Bibra Lake and Horse Paddock Swamp, the road embankment will be on a high topographic relief where Hope Road is currently situated. Hence the risk at this location is considered to be low.

For the section of the road through the Roe Swamp area the proponent's site specific investigations show that the weight of the road and embankments may alter the properties of the silty and muddy sediments likely to be present in the wetland. This would change the soil moisture regime near the embankments to the extent that vegetation health may be affected. It is unlikely to impact on perched layers through the Roe Swamp area.

The proponent advised that compaction may cause a localised indirect hydrological impact to vegetation (specifically groundwater-dependent ecosystems (GDEs)) and wetlands. The proponent considers that the impact is likely to be small, localised and in close proximity to the road (AECOM, 2013). The proponent has therefore identified a 10 m buffer where it expects the proposal to have indirect impacts ('zone of indirect impacts'). The zone has been spatially defined, and runs either side of the construction footprint between Bibra Drive and Progress Drive, a 1.4 km long section of the proposal, totalling 3.4 ha. Within the 'zone of indirect impacts', there are likely to be changes in vegetation condition and health due to changes in hydrology. The proponent has advised that its assertions are supported by observations from other roads adjacent to wetlands including Hope and Farrington roads, which show very little or no hydrological impact from compaction.

In addition, the proposed bridge through the Roe Swamp area will maintain the path of groundwater flow between Roe Swamp and North Lake.

Notwithstanding the localised indirect impacts of the proposal, the EPA notes the proposal will not interrupt the regional east-west groundwater flow which sustains the hydrological function of the wetlands. This view is supported by advice from the DoW.

The EPA considers that the proponent's 'zone of indirect impacts' is reasonable to account for any potential indirect impacts from the road construction on hydrological processes which may result in changes to water availability. This zone has been spatially defined in Figure 3. Outside this zone the EPA expects there will be no detectable impacts from the proposal on the health of vegetation communities.

The EPA has recommended condition 10 to ensure there are no ongoing detectible impacts from the proposal on vegetation communities outside the 'zone of indirect impacts' (Figure 3). Condition 10 also requires the proponent to establish baseline conditions, undertake monitoring and implement contingencies should changes in vegetation health and condition be detected outside the 'zone of indirect impacts'.

The direct significant residual impacts to wetlands are discussed in Sections 5.3 and 5.6.

Summary

Having particular regard to:

a) no groundwater abstraction being proposed within 1.5 km of North Lake, Bibra Lake and Roe Swamp, and the requirement for a licence from the DoW for abstraction beyond this distance;

b) the proponent's commitment not to undertake any dewatering at any stage of the proposal;

c) the proposed construction of two bridges at Roe Swamp and Horse Paddock Swamp/Bibra Lake which will maintain any infrequent surface water flows;

d) that the road alignment will not impact on regional east-west groundwater flows which maintains hydrological function of wetlands in the area;

e) the proponent's prediction that alterations to the groundwater flow regime would be minor and localised;

f) the proposed 'zone of indirect impacts' to account for small and localised changes to hydrology,

it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective for this factor provided Table 2, Schedule 1 of

Appendix 4, and conditions 7-2, 7-3, 10 and 12 are imposed requiring the proponent to:

- construct two bridges at Roe Swamp and Bibra Lake of 70 m and 120 m length respectively;
- not abstract groundwater during construction within 1.5 km of North Lake, Bibra Lake and Roe Swamp;
- not undertake dewatering at any stage of the proposal;
- monitor the quality of the wetlands and manage any significant adverse change in wetland quality;
- ensure that impacts on hydrological processes will not cause effects on vegetation immediately outside the ‘zone of indirect impacts’;
- establish baseline condition, undertake monitoring and implement contingencies should changes outside the ‘zone of indirect impacts’ to vegetation health and condition be detected; and
- offset the significant residual impacts of the proposal on 6.8 ha of wetlands.

Figure 2 - Wetlands surrounding the proposed extension

Figure 3 – EPA proposed 'zone of indirect impacts'

5.3 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*.

The area considered for the assessment of this factor is the native flora and vegetation within, and immediately outside the 167 ha development envelope shown in Figures 1a and 1b.

The EPA has previously advised in Bulletin 1088 (EPA, 2003) that the vegetation within this area is varied and complex, with the overall ecological condition considered to be reasonable. It is also considered to be regionally significant in relation to its structural complexity, floristic assemblages, gradations from wetland to upland as well as the ecological pattern it represents.

The proponent recognises the significant values of the vegetation, and has undergone extensive planning and design work to avoid and minimise impacts of the proposal in this factor. The proponent has demonstrated that it has attempted to avoid and minimise impacts by proposing the following measures:

- use of a minimum-width highway median to minimise the width of clearing footprint;
- maximised use of degraded vegetation areas;
- alignment of the project along the western section of Hope Road and the existing high tension power line corridor to minimise the clearing footprint;
- relocation of the original Bibra Drive interchange to Murdoch Drive in cleared government-owned land to reduce impacts to wetlands, vegetation and fauna;
- replacement of embankments and batters with retaining walls to minimise the footprint;
- inclusion of bridges over a portion of Roe Swamp and south-east of Horse Paddock Swamp;
- 'top-down' construction methods to build the bridge at Roe Swamp;
- reconfiguration of the Kwinana Freeway Interchange to retain areas previously set aside as environmental offsets for Roe Highway Stage 7; and
- bioretention basins to treat road run-off in already cleared areas, to be rehabilitated in the future.

None of the above measures were proposed by the proponent and considered by the EPA when it formulated its advice to the then Minister for Environment

in Bulletin 1088. Despite these avoidance and minimisation measures there will still be significant residual impacts to flora and vegetation.

The proposal will result in the clearing of 79 ha of native vegetation. During the response to submissions stage the proponent advised that it would need to clear 18.8 ha of native vegetation planted along embankments by the proponent as part of the previous proposal to extend Roe Highway to Kwinana Freeway. These stands of native revegetation were planted between five and 10 years ago. As these areas were not originally considered in the PER as 'remnant vegetation' it was not accounted for by the proponent in the clearing footprint. Accordingly, the total amount of clearing of native vegetation associated with this proposal is 97.8 ha (Figure 4). Following the completion of construction the proponent proposes to rehabilitate 38 ha of vegetation within the development envelope.

Flora

The proposal has the potential to impact on flora. No species of Declared Rare Flora or species listed under the EPBC Act were recorded within the project area. Concerns were raised in submissions about the timing of the flora surveys undertaken for the orchid species *Drakea elastica* which is listed as 'Endangered' under the EPBC Act and 'Critically Endangered' under the *Wildlife Conservation Act 1950* (WC Act), as no species were found within the project area. The DPaW has since advised that the clarification of the timing of the survey demonstrates that they were undertaken at the appropriate time of the year.

Five species of Priority Flora are found within the project area, as described in Table 2 below.

Table 2: Priority flora within the development envelope

Flora	Priority	% of individuals to be impacted	No. of individuals to be impacted
Dampiera triloba	1	75.8	5404
Cyathochaeta teretifolia	3	6.5	38
Jacksonia gracillima	3	7.5	15
Eryngium pinnatifidum subsp*. palustre*	3	25.4	16
Dodonaea hackettiana	4	0.5	1

All five species of Priority Flora found within the project area will be impacted by the proposal. The DPaW has advised that it is likely that *Dampiera triloba* has a greater distribution than originally thought. The loss of an estimated 75.8% of known individuals is likely to be an over-estimate, given the regional population has not been subject to intensive surveys, and the species may be more common than originally expected. The DPaW has further advised that upon review it is likely the species will change to a Priority 3 listing. For the other priority flora species, the DPaW has advised that either the species is widespread with nearby populations surveyed outside the development envelope, or the impacts will not increase the priority listing of the species.

The proponent also proposes to prepare a Flora, Vegetation and Fauna Management Plan (FVFMP) requiring priority flora species to be surveyed, mapped and marked in the development envelope. Populations outside of the footprint will be marked and protected, and propagation material will be obtained from impacted populations for rehabilitation as part of the proposed rehabilitation strategy. The proponent also proposes to undertake weed control as part of its CEMP. The EPA therefore notes there are opportunities to further minimise impacts to priority flora species once the proponent has undertaken detailed design and prepared their FVFMP.

In summary the EPA notes the residual impacts to priority flora as summarised in Table 2 and that the proposal will not impact the conservation status or the extent and distribution of those species.

Vegetation communities

As stated above, the proposal will result in the clearing of 97.8 ha of native vegetation. Vegetation within the project area is predominantly made up of *Banksia* woodland. Four vegetation complexes exist within the development envelope as mapped by Heddle *et al* (1980), none of which have below 10% of their pre-clearing extent remaining (Southmetro Connect, 2011). A total of 40 vegetation communities were identified and recorded during the 2009 spring survey (AECOM, 2011). None of these vegetation communities are considered to be equivalent to a Priority Ecological Community (PEC) or Threatened Ecological Community (TEC) under either State or Commonwealth listings (Southmetro Connect, 2011).

Seven of the vegetation communities were identified as being 'locally significant'. Of the seven locally significant species, only one is proposed to be completely removed from the development envelope - 'BAhS' (Low open forest of *Banksia attenuata* and *Banksia menziesii*). This vegetation community is completely surrounded by an existing ramp, and its removal is therefore unavoidable. Portions of the other locally significant communities will be retained within the development envelope.

The residual impact is considered to be the unavoidable impacts to seven locally significant vegetation communities.

Wetlands communities

As described in Section 5.1, the proposal development envelope intersects four wetlands (Figure 2) which include Horse Paddock Swamp, and Roe Swamp which are CCWs on the Swan Coastal Plains Geomorphic dataset. The proposal also intersects Bibra Lake, a multiple use wetland that is protected as an EPP wetland.

Surveys undertaken by the proponent has found that although Horse Paddock Swamp is classified as a CCW, it is mostly devoid of vegetation. The Bibra Lake areas mapped as an EPP are also degraded (Southmetro Connect,

2011). The proponent considers that these areas have limited value as a functional wetland given their degraded nature.

The EPA notes however that these areas still have hydrological function and would respond rapidly to wetland rehabilitation work. This is supported by the successful wetland revegetation work undertaken by local community groups in the Regional Park, including the works near Bibra Lake undertaken by volunteers through the Cockburn Wetlands Centre.

The Roe Swamp CCW on the other hand which consists of Melaleuca, Roe and Lower swamps, is still largely intact in terms of its vegetation communities and hydrology with some central pockets considered to be in very good to excellent condition.

The proposal will result in the clearing of 5.8 ha of CCW and 0.95 ha of EPP wetlands as described below in Table 3.

Table 3: Wetlands within the development envelope

Wetland	**Management Category/Protection**	**Total Area of Wetland (ha)**	**Area to be cleared/ developed (ha)**
Bibra Lake	Environmental Protection Swan Coastal Plain Lakes Policy Wetland	138	0.95
Horse Paddock Swamp	Conservation Category Wetland	3.2	0.2
Roe Swamp	Conservation Category Wetland	53.7	5.6

On the northern edge of Bibra Lake the proponent proposes to construct retaining walls (rather than embankments) to minimise impacts on wetland vegetation. Furthermore, the road will be located in an area which is has already had direct and indirect environmental impacts from the existing Hope Road embankment. The loss of a very small portion of Bibra Lake and Horse Paddock Swamp is considered to be an unavoidable residual impact.

The most significant direct impact on wetland communities is through the Roe Swamp CCW. This is because of the location and scale of the road (5.6 ha) leading to the severance of a wetland complex which supports intact and diverse vegetation communities, rated as very good to excellent condition.

Through this sensitive area, the proponent has identified an alignment which avoids the inundated section of Roe Swamp in the south-east corner. As previously described, to minimise clearing in this section, the proponent has:

- identified an alignment using a powerline corridor through the CCW which has already had some level of clearing and disturbance;

- proposed to construct a bridge of at least 120 m in length;
- proposed the use of 'top down' construction techniques which avoids the need for vehicles and machinery on either side of the bridge at Roe Swamp during construction; and
- relocated the Bibra Drive interchange to a location further east, on cleared land.

The EPA notes that if the highway interchange was kept to the area where it was designated in the MRS road reserve, it would not only have a significantly greater direct impact on the Roe Swamp CCW, but there would be little to no opportunity to maintain a level of north-south ecological connectivity.

The potential indirect impacts of the proposal on the above wetlands from the interruption of hydrological processes are discussed in Section 5.2 of this report.

The EPA notes that despite the best efforts by the proponent to minimise impacts, there is still the unavoidable loss of 6.8 ha of wetlands comprising 5.8 ha of CCWs, and 1 ha of EPP wetlands. This is considered to be a significant residual impact of the proposal, and hence would require an environmental offset. This is discussed in Section 5.6 of the report.

Conservation areas

The proposal construction and operation will result in the development of approximately 5.4 ha of the Beeliar Regional Park north of the MRS road reserve boundary and 7 ha of Bush Forever site 244 (Figure 5). These two areas overlap each other, however the Bush Forever area is greater as it also falls within the MRS Road Reserve, unlike the regional park boundary.

The EPA notes that with regards to Bush Forever site boundaries, it was acknowledged that they overlap with existing infrastructure requirements, such as road reserves (Government of Western Australia 2000). The EPA also notes that these areas of regional park and Bush Forever are proposed for development as a consequence of aligning the road outside the road reserve (for a small portion of the road) to utilise existing cleared areas (a power line easement) and minimise impacts to the Roe Swamp CCW.

The EPA notes that despite the best efforts by the proponent to minimise impacts on Beeliar Regional Park and Bush Forever site 244, there will be a loss of 5.4 ha and 7 ha respectively. This is considered to be a significant residual impact of the proposal, and hence would require an environmental offset. This is discussed in Section 5.6 of the report.

Indirect threats

The assessment of the residual impacts to flora, vegetation and wetlands is primarily determined by the footprint of the proposal (direct impacts). There will also be indirect impacts from threats such as edge effects, shading, dust

and changes in hydrological processes. However, these indirect impacts will be localised and although they may result in minor changes to the composition and health of vegetation communities they would not result in irreversible losses of native vegetation.

The proponent considers these indirect threats would be restricted to a 10 m buffer surrounding the development envelope. These threats would require ongoing management (e.g. weed control, culvert placement, vegetation condition surveys, etc) by the proponent to ensure impacts are contained within this buffer or the 'zone of indirect impacts'. This has been spatially defined in Figure 3. The EPA also notes that one of the key objectives of the Beeliar Regional Park Management Plan is to minimise further degradation to the quality of the wetlands and surrounding vegetation.

The EPA has therefore recommended condition 10 to ensure there are no ongoing detectible impacts from the proposal on vegetation communities outside the 'zone of indirect impacts', which also requires the proponent to establish baseline condition, undertake monitoring and implement contingencies should changes outside the 'zone of indirect impacts' be detected. The 'zone of indirect impacts' will be determined and submitted as per the requirements of condition 10. Condition 6 has also been recommended to require the proponent to submit an Infrastructure Plan detailing the alignment, dimensions and locations of the key proposal elements prior to construction to ensure the final road alignment and detailed design does not result in any additional clearing. Areas of native vegetation that will be retained in the development envelope will also need to be delineated in the Infrastructure Plan.

The EPA has recommended that the location and authorised extent of clearing of vegetation and development of wetlands is limited to the authorised extent as defined in Table 2 of Schedule 1, Appendix 4.

The EPA considers that the proponent has adequately demonstrated how it has avoided and minimised direct impacts to native vegetation within the constraints of the MRS road reserve. The proponent has been able to do this by:

- proposing construction techniques which avoid unnecessary clearing;
- planning and design measures including road width, alignment location and bridge requirements; and
- preparing a rehabilitation strategy for areas in the development envelope that are no longer required for ongoing operations.

However, there still remains a significant residual impact to the EPA's key environmental factor of flora and vegetation, and hence an environmental offset is necessary in order to counterbalance the impacts from this proposal.

The proponent has put forward an environmental offsets package to address the proposal's significant residual impacts. The quantum of the offset

proposals, objectives and their adequacy is set out in Section 5.6 of this report.

Summary

Having particular regard to:

a) the environmental values identified in EPA Report 1088;

b) no Declared Rare Flora or species listed under the EPBC Act being recorded within the project area;

c) the DPaW advice that impacts to Priority Flora would be minimal and either a viable population will remain, or the impacts are not of conservation concern;

d) no vegetation communities are considered to be equivalent to a PEC or TEC;

e) the proponent's commitment to avoid direct impacts to vegetation and Priority Flora where possible through the FVFMP, CEMP and rehabilitation strategy;

f) the proposal alignment and design measures to minimise potential impacts on vegetation communities; and

g) the significant residual clearing of 6.8 ha wetlands, 97.8 ha of native vegetation, 5.4 ha of Beeliar Regional Park and 7 ha of Bush Forever site 244,

it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective for this factor provided Table 2 of Schedule 1, Appendix 4 and conditions 6, 10 and 12 are imposed requiring the proponent to:

- limit clearing to 97.8 ha of native vegetation and 0.95 ha of EPP lakes;
- delineate areas of native vegetation to be retained in the Infrastructure Plan;
- limit impacts to vegetation condition and health to the 'zone of indirect impacts';
- demonstrate that there will be no detectable impacts to vegetation condition and health outside of the 'zone of indirect impacts'; and
- offset the significant residual impacts of the proposal on the environmental factor of vegetation and flora.

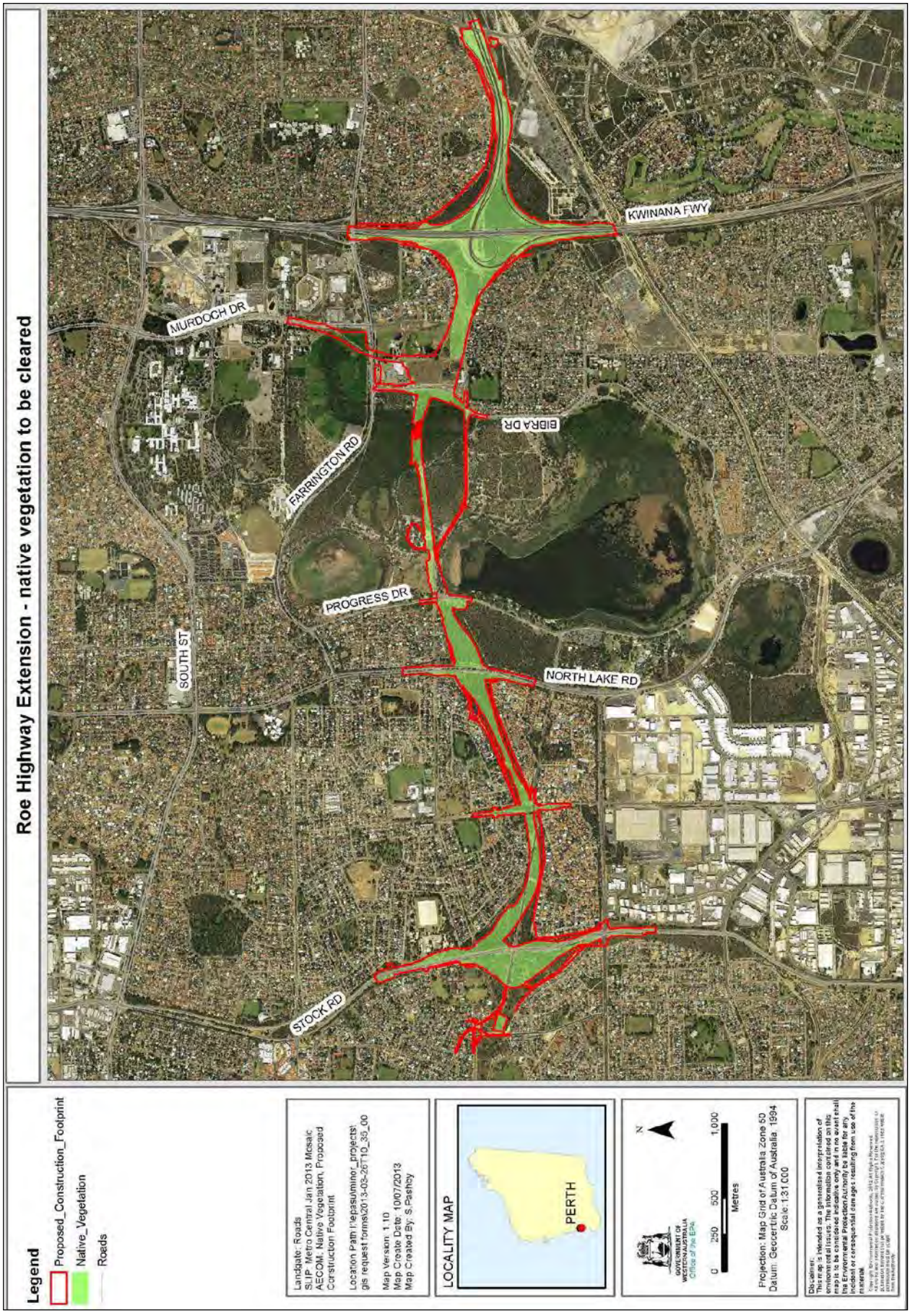

Figure 4 – Native vegetation to be cleared

5.4 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.*

The area considered for the assessment of this factor is the fauna species and fauna habitat present within the 167 ha development envelope.

Vertebrate surveys recorded 120 native species comprising eight amphibians, 83 birds, eight mammals and 21 reptiles (Southmetro Connect, 2011). A total of 244 native vertebrate fauna species are expected to occur in the project area. The area contains both upland and wetland habitat including foraging habitat and potential breeding habitat for Carnaby's Cockatoo (*Calyptorhynchus latirostris*) and the Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) which are both listed species under the EPBC Act and the WC Act. The area also contains habitat for three Priority Fauna species; the Southern Brown Bandicoot (*Isoodon obesulus fusciventer*), the Perth Lined Lerista (*Lerista lineata*) and the Graceful Sun Moth (*Synemon gratiosa*).

Migratory bird species have been recorded from the Beeliar wetlands, including species listed under the Japan-Australia (JAMBA), China-Australia (CAMBA) and Republic of Korea Australia (ROKAMBA) Migratory Bird Agreements.

Seven short range endemic (SRE) species, presumed to be limited to the Perth Metropolitan Area, were recorded in the project area. This also includes one unidentified sucking millipede.

The EPA has previously recognised (in Bulletin 1088 (EPA, 2003)) the importance of the area in helping to prevent fauna fragmentation as the area is large enough to maintain and support a wide array of fauna in a variety of habitats due to the different interacting vegetation and soil types, as well as the wide range of wetland and dryland habitats. The area is identified as being part of several ecological linkages including the eastern chain of the Beeliar Wetlands and the area containing North Lake and Bibra Lake to the western side of Beeliar Regional Park.

The proposal will result in the disturbance of 112 ha of fauna habitat, which the EPA considers is significant in the Perth metropolitan area. The proponent recognises the significance of this impact to habitat and linkages, and has attempted to avoid and mitigate impacts through design measures such as road width, alignment location and bridge requirements, preparation of a FVFMP to manage impacts to fauna, and proposed fauna underpasses to reduce fragmentation.

Despite these avoidance and mitigation measure there will still be residual impacts to terrestrial fauna. This is further discussed below.

State and Commonwealth listed fauna species

As stated above, the development envelope contains species listed for protection under both Commonwealth and State legislation, and as 'Priority' species by the DPaW.

Table 4 summarises the impacts to the significant fauna species habitat within the project area.

Table 4: Summary of impacts to significant fauna species

Species	**Conservation Status**	**Habitat loss within the project area**
Carnaby's Cockatoo	*Endangered* under EPBC Act and Schedule 1 under WC Act	78 ha of foraging habitat to be cleared.
Forest Red-tailed Cockatoo	*Vulnerable* under EPBC Act and Schedule 1 under WC Act	73 ha of foraging habitat to be cleared.
Graceful Sun Moth	Priority 4	5.6 ha habitat cleared.
Southern Brown Bandicoot	Priority 5	73 ha habitat cleared.
Rainbow Bee Eater Glossy Ibis Eastern Great Egret	*Migratory* under EPBC Act	90 ha habitat loss for Rainbow Bee Eater.
Perth Lined Lerista	Priority 3	91 ha habitat loss.

Vegetation clearing will result in a loss of approximately 78 ha (44 per cent) and 73 ha (45 per cent) of the available foraging habitat within the project area for Carnaby's Black Cockatoo and the Forest Red-tailed Black Cockatoo respectively.

Carnaby's and Forest Red-tailed Black Cockatoos are not known to nest within the project area or project region, nor are there known cockatoo roost sites within the project area. However, vegetation clearing will cause the loss of significant trees with existing hollows suitable for potential future nesting, and other trees of suitable size that are capable of developing hollows in time. Approximately 249 significant trees (41 per cent) will be affected by the proposed project.

Habitat loss and fragmentation pose the most significant risks to the Southern Brown Bandicoot from the proposed project. Vegetation clearing will result in a loss of approximately 72 ha (45 per cent) of available Southern Brown Bandicoot habitat. On a regional scale, the area of proposed disturbance represents approximately 0.7 per cent of suitable habitat type. Fragmentation may isolate interbreeding populations. Preliminary results from surveys suggest that individuals within the development envelope have a small home range, possibly less than one hectare. Movement between sub-populations within the study area appears limited; therefore, impacts of the proposed project are likely to be highly localised.

Up to 5.6 ha of Graceful Sun Moth (GSM) habitat will be cleared. The proponent considers that the viability of the existing population is uncertain given there is only one record of a population surviving in a *Banksia* woodland where the habitat supporting the population is less than 10 ha (Southmetro Connect, 2013). However the GSM is no longer listed under the EPBC Act as it is more broadly distributed on the Swan Coastal Plain than first thought.

The proponent considers that impacts to the Perth Lined Lerista (skink) are minimal given the habitat loss forms only 1.1 per cent of suitable habitat within a 15 km radius (Southmetro Connect, 2013). The EPA concurs that impacts would be minimal.

Migratory and wetland bird species

Wetland and migratory bird studies found that 'Conservation Significance 1' (CS1) species (species that are protected under State or Commonwealth legislation of national or international significance) are generally uncommon in the wetlands around the project area. Although Bibra Lake supports a high number of migratory shorebird species, the number of individuals present is usually very low. Generally, the scale of impact on conservation significant species is thought to be negligible or low for a species if it only occurs as an occasional vagrant and the habitat present at the wetlands is not known to be important for that species (Western Wildlife, 2010).

The proponent does not consider that potential impacts of noise, vibration, odour, pollution and light spill on fauna from the proposal are significant (Southmetro Connect, 2013). Specifically with regards to noise impacts on birds, no evidence of a relationship between road traffic noise and wetland birds could be found at any of the wetlands in the study area.

Regarding impacts to the Rainbow Bee Eater, the EPA notes that the habitat within the development envelope is not considered of regional significance, given the lack of specific habitat preference by the species and its widespread distribution throughout mainland Australia. The EPA also notes that the Glossy Ibis and the Eastern Great Egret will experience little to no habitat loss within the development area, but may be impacted by road operation activity.

The EPA considers that impacts on wetland and migratory birds from the construction and operation of the proposal are likely to be minor at the regional scale.

Short range endemic species

Regarding SRE species, the EPA has been advised that four of the seven invertebrate species have distributions listed on a range of sites across the Swan Coastal Plain, and one species is recorded in Jarrah forest outside the coastal plain at Jarrahdale and John Forrest National Park. The EPA notes that the habitat of the potential SRE (unidentified millipede) is not restricted to the project area. Using the wider distribution of this habitat and the wider

distribution of other invertebrate species as surrogates, it would be reasonable to assume that these species would have a wider distribution outside the project area. The EPA considers the impacts of the proposal on SREs are unlikely to be significant at the species level.

Management and residual impacts

As discussed in previous sections above, the proposal alignment and design are intended by the proponent to minimise impacts to terrestrial fauna. In doing so the proponent has tried to avoid Carnaby's Black Cockatoos potential nesting sites as much as possible and retain minimum widths of existing vegetation to maintain ecological linkages in key areas of the proposal.

The EPA notes that the proponent also considers that the two bridges and installation of fauna underpasses will maintain fauna linkages. The proponent also proposes to prepare a FVFMP which will also address:

- underpasses for habitat connectivity;
- trapping and translocation of the Southern Brown Bandicoot;
- vehicle strike (not using black cockatoo foraging or nesting species for revegetation within 10 m of the roadside); and
- feral pest control.

To limit the loss of fauna habitat the EPA has recommended that the location and authorised extent of the proposal be limited to the 167 ha development envelope, and clearing limited to 97.8 ha as defined in Table 2 of Schedule 1, Appendix 4.

The EPA notes that the terrestrial fauna values in the area are the excellent quality banksia woodland to the east, the north-south linkages between the wetland habitats and the east-west linkages between the dry upland habitats which connect three major systems; the Bassendean Dunes, Spearwood Dunes and the Wetland Complex. The area is exceedingly rich in species assemblages and contains conservation significant fauna species and vegetation identified in Bush Forever. The EPA considers that while it is unlikely that the proposal will directly impact on the conservation status of individual species, it will probably indirectly impact on rich and diverse assemblages.

The EPA considers that this impact will be through the fragmentation of the existing north-south ecological linkage through the eastern chain of the Beeliar Wetlands. While the EPA has specified in Table 2 of Schedule 1, Appendix 4 that the bridge at Roe Swamp shall be a minimum of 120 m, the EPA considers that fragmentation impacts to fauna can be reduced through increasing the span of the bridge. The EPA acknowledges that the proponent has attempted to provide justification for the bridge length (Southmetro Connect, 2011 and 2013). However, as proposed, the bridge only mitigates

fauna fragmentation in the eastern part of the wetland complex. Fauna occupying the area to the west of the proposed bridge in slightly more elevated habitats (because of their preference for drier habitats) will not move to more saturated areas to enable them to move in a north-south direction under the bridge. Accordingly, while fauna underpasses will aid in mitigating this impact, consideration should be given to extending the span of the proposed bridge further west at Roe Swamp. The EPA understands that this position would also be supported by the DPaW.

The EPA also considers that the frequency, spacing, location and design of fauna underpasses will be critical in reducing fragmentation impacts to fauna. Fauna underpasses should be provided at appropriate intervals to ensure fauna use them, and that the underpasses do not become funnels for exposure to predation on either side. The EPA would not consider it unreasonable to provide underpasses at 30 m intervals between the two proposed bridges. The underpasses should also be designed based on the most contemporary information available, such as the review undertaken by Harris and Bamford (2011).

The EPA has therefore recommended condition 11 to ensure that the proposal is implemented to facilitate movement of fauna within Beeliar Regional Park and that impacts of fragmentation of the area are minimised. The proponent will be required to prepare a Fauna Management Plan on advice from the DPaW, which shall:

- provide the location and frequency of underpasses;
- detail the size, shape and furniture within the underpasses;
- detail ongoing inspection and maintenance programs; and
- detail visual barriers to be installed to reduce the risk of vehicle strike causing bird deaths.

Having taken all reasonable and practical measures to avoid and mitigate the potential impacts, there still remains a significant residual impact to the EPA's key environmental factor of terrestrial fauna through habitat fragmentation and loss of Black Cockatoo foraging habitat, and hence an environmental offset is necessary.

The proponent has put forward an environmental offsets package to address the proposal's significant residual impacts. The quantum of the offset proposals, objectives and their adequacy is set out in Section 5.6 of this report.

Summary

Having particular regard to:

a) the proponent minimising potential impacts to fauna through the proposed construction of the bridges and fauna underpasses to allow habitat connectivity and reduce fragmentation;

b) the proponent's commitment to prepare a FVFMP which addresses translocation of the Bandicoot, Black Cockatoo vehicle strike and feral pest control;

c) the conclusions of the study on wetland and migratory birds that the impacts of the proposal are not likely to be significant;

d) the habitat of the potential SRE (unidentified millipede) not restricted to the project area;

e) the population of GSM within the proposal area is unlikely to persist in the longer term,

it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective for this factor provided conditions 11 and 12 are imposed requiring the proponent to:

- prepare a Fauna Management Plan to demonstrate that the proposal will be implemented to facilitate movement of fauna and minimise impacts as a result of fragmentation through appropriate underpass spacing, location and design, and the use of visual barriers to prevent bird deaths; and
- offset the significant residual impacts to Black Cockatoo habitat.

5.5 Amenity (noise)

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

The proposal will be located in a residential environment and will result in noise amenity impacts from construction and road operation on surrounding residents.

Noise management in Western Australia is implemented through the *Environmental Protection (Noise) Regulations 1997* which operate under the EP Act. This includes the noise generated from the construction of new roads (WAPC, 2009). State Planning Policy 5.4 – *Road and Rail Transport Noise and Freight considerations in Land Use Planning* (WAPC, 2009) provides for the management of the impacts of transport noise for new major road projects in the vicinity of existing or future noise-sensitive land uses.

State Planning Policy 5.4 specifies outdoor noise criteria that apply to portions of the proposal which will be newly developed (Table 5). Noise criteria are not

applicable to the redevelopment of existing roads such as Stock Road. Instead, practicable noise management and mitigation measures should be considered having regard to the existing transport noise, the likely changes in noise emissions and the scale of works for noise amelioration.

Table 5: Outdoor noise criteria

Time of day	Noise Target	Noise Limit
Day (6 am – 10 pm)	$L_{Aeq(Day)}$ = 55dB(A)	$L_{Aeq(Day)}$ = 60dB(A)
Night (10 pm – 6 am)	$L_{Aeq(Night)}$ = 50dB(A)	$L_{Aeq(Night)}$ = 55dB(A)

The proponent's noise modelling shows that the average noise exposure across all receivers increases as a result of the implementation of the proposal without any noise control measures in place. With the implementation of noise control measures, the number of noise receivers exceeding both the target and the limit decreases. The proponent's modelling indicates five receivers will experience noise above the noise limit. These receivers however, are located adjacent to existing roads and are either out of the scope of the proposal, or the noise levels are predicted to decrease as a result of the proposal (AECOM, 2011).

A draft Noise Management Plan (NMP) has been prepared and reviewed by the Noise Regulation Branch of the DER. Following a peer review of the noise modelling, the NMP proposes mitigation measures to reduce the impacts of transport noise on noise-sensitive land-uses. The NMP proposes to cap noise barrier heights to 5 m within the road reserve and 4.4 m along residential boundaries. The barriers with these height caps may not be able to reduce the traffic noise to meet the noise targets set out in Table 5 at some sections, although it can meet the noise limits for all newly developed sections of the proposal. In order to meet the target noise levels, walls in excess of 6.2 m would be required. The MRWA considers walls at this height to be impracticable and would affect residential amenity. The DER (Noise Branch) has advised that this outcome and the draft NMP would be acceptable. The draft NMP was finalised on the 11 July 2012.

The EPA notes that, consistent with the NMP, the proponent will undertake further stakeholder consultation to determine the height, extent and materials used for noise wall construction.

In addition to noise barriers, the proponent has also proposed to use Open Graded Asphalt (OGA) for majority of the alignment, which is currently the best performing road surface for noise attenuation. A Construction Noise and Vibration Management Plan (CNVMP) is also proposed to be prepared in accordance with the DER and local government advice which will:

- minimise the effects of noise on the occupants of adjacent properties by the use of silenced plant or by operating plant as far away as practicable from those properties;
- limit working hours on those construction activities which generate significant noise (piling); and

- design and construct noise mitigation structures to satisfy the requirements of the *Environmental Protection (Noise) Regulations 1997*.

This plan will need to be prepared prior to construction.

The EPA understands that the proponent proposes to monitor the traffic noise immediately post-construction and then annually for three years. The monitoring will determine the accuracy of the predicted noise emissions and the adequacy of noise mitigation. If monitoring indicates that current noise mitigation is not sufficient the proponent will consider upgrading the noise barriers adjacent to the affected areas.

The EPA notes that noise and vibrations associated with construction activities such as piling can be managed under the *Environmental Protection (Noise) Regulations 1997* and the development of the CNVMP*.*

To limit noise impacts the EPA has recommended that the height of the noise walls are finalised prior to construction and included in the Infrastructure Plan as required by condition 6-2.

Summary

Having particular regard to:

a) the DER advice that the prepared NMP specifying notional noise wall heights is acceptable; and

b) the proposed CNVMP to address construction noise,

it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective for this factor provided the proponent:

- implements the NMP mitigation and management measures;
- consults with stakeholders on the height, extent and materials used for noise wall construction; and
- submits the final noise wall heights in the Infrastructure Plan as required by condition 6-2(2).

5.6 Offsets

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

After all avoidance and minimisation actions have occurred, the following significant residual impacts remain:

- Clearing of:
  - 97.8 ha of remnant native vegetation;
  - 78 ha of foraging habitat for Carnaby's Cockatoo;
  - 73 ha of foraging habitat for Red-tailed Black Cockatoo;
  - 2.5 ha of potential Black Cockatoo nesting habitat;
  - 5.4 ha of Beeliar Regional Park;
  - 7 ha of Bush Forever site 244;
- Impacts to:
  - 6.8 ha of wetlands, including CCWs.
- Fragmentation of:
  - fauna habitat;
  - assemblages for priority fauna;
  - Swan Coastal Plain significant bird species habitat;
  - migratory birds and significant wetland bird species habitat.

CCWs, threatened fauna, priority fauna and conservation areas are all critical assets in accordance with Position Statement 9 *Environmental Offsets*. Impacts to critical assets should be avoided and minimised as far as possible. The residual impacts are considered to be significant due to the importance of these assets.

Terrestrial fauna

Implementation of the proposal will result in clearing of up to 78 ha of foraging habitat for Carnaby's Cockatoo, 73 ha of foraging habitat for Red-tailed Black Cockatoo, and 2.5 ha of potential nesting habitat for both species.

The proponent proposes an offset to these significant residual impacts through land acquisition and management, which includes foraging and breeding habitat for both species.

Recent assessments by the EPA with regard to Carnaby's Cockatoo foraging habitat have recommended a 3:1 offset ratio of habitat, in the same condition or better than the area that is being cleared, as proportionate and adequate. Applying the same ratio for this proposal would require the acquisition and management of 234 ha of foraging habitat and 7.5 ha of breeding habitat.

During the assessment process, the proponent had identified a parcel of land that would satisfy these requirements. The proponent had undertaken measures to assess the environmental values of this land. However, in mid-2013, due to circumstances beyond its control, this land is likely no longer able to be used as an offset for this proposal. As such, the EPA has recommended conditions 12-2 to 12-5 that will allow the proponent to find an alternative offset site to acquire, which must contain a number of environmental values. Prior to construction, the proponent will be required to prepare and submit a Land Acquisition Management Plan for the approval of the CEO of the OEPA. This will ensure that any land proposed for acquisition and management is considered appropriate to be used as an offset for the impacts of this proposal. The recommended conditions also lock in key requirements of this offset including:

- land acquired must contain at least 234 ha of Carnaby's Cockatoo and 219 ha of Red-tailed Black Cockatoo foraging habitat;
- individual land parcels acquired must be a minimum of 100 ha in size;
- land acquired must contain at least 7.5 ha of Carnaby's Cockatoo and Red-tailed Black Cockatoo potential breeding habitat; and
- a requirement for the proponent to detail arrangements and funding for management on advice from DPaW.

The EPA has not recommended a condition on the exact funding arrangements with the DPaW as this requires a site to be identified. However, the EPA expects that the contribution of funding for management of the land acquired will include the upfront costs of establishing a conservation area, plus a proportion of the ongoing management costs for the first twenty years. This is similar to previous areas of land ceded to the DPaW as an offset.

As a contingency measure, should the proponent not be able to acquire land at the same or better quality that satisfies the CEO of the OEPA, the EPA's recommended conditions also allow for degraded land to be acquired and rehabilitated. The EPA notes that there is value in acquiring slightly degraded land and rehabilitating it to improve the value of the habitat, thereby effectively creating more good quality habitat for the species being impacted. However, as there is a greater risk in being able to effectively rehabilitate land, the EPA would require that the ratio of land required should be increased if this is proposed.

Should the proponent acquire land that is slightly degraded, the EPA's recommended condition 12-4(4) requires the proponent to prepare a Rehabilitation Plan on advice from the DPaW.

Wetlands (Flora and vegetation)

Implementation of the proposal will result in residual impacts to 6.8 ha of wetlands. The wetlands impacted include some listed under the EPP and

some of conservation category. CCWs are the highest value wetlands and these particular wetlands being impacted form part of the Beeliar contiguous chain of wetlands, an important north-south migration path for birds.

Surveys undertaken by the proponent have found that although Horse Paddock Swamp is classified as a CCW it is mostly devoid of vegetation. The Bibra Lake areas mapped as an EPP are also degraded (Southmetro Connect, 2011). The proponent considers that these areas have limited value as a functional wetland given their degraded nature.

The EPA notes however that these areas still have hydrological function and would respond rapidly to wetland rehabilitation work. This is supported by the successful wetland revegetation work undertaken by local community groups in the Regional Park, including the works near Bibra Lake undertaken by volunteers through the Cockburn Wetlands Education Centre. The EPA considers that any rehabilitation works undertaken within the Beeliar Regional Park should be consistent with the rehabilitation strategies outlined in the Beeliar Regional Park Management Plan (CALM, 2006).

The proponent proposes to undertake restoration of 8.4 ha of Horse Paddock Swamp and weed control over 5 ha of North Lake (Figure 2) over a period of five years. Both are CCWs and are protected under the EPP. The EPA notes that this offset will occur in situ adjacent to the proposal and considers this will also assist in addressing fragmentation caused by the proposal by improving the quality of habitat available around the proposal site. A Wetland Restoration Plan will be developed and will outline the specific details of this offset including monitoring and reporting requirements as well as success criteria.

The proponent also proposes to acquire land which includes a CCW, and the EPA recommends a minimum of 7 ha of wetland area be acquired. This will result in a 3:1 offset ratio for impacts to wetlands when also taking into account the wetland restoration requirements for Horse Paddock Swamp (8.4 ha) and North Lake (5 ha), totalling 20.4 ha of wetland area. The EPA expects that a suitable buffer is also acquired to ensure the integrity of the wetland. In the event that the wetland buffer contains Carnaby's and Red-tailed Black Cockatoo habitat, the EPA considers that this offset could be combined with the Black Cockatoo habitat land acquisition (i.e. the area of both wetland and Carnaby's and Red-tailed Black Cockatoo habitat could be counted towards the requirements of both offsets).

The EPA is aware that techniques for wetland rehabilitation have been progressively developed by local environmental community groups such as the Wetlands Conservation Society and the Cockburn Wetlands Education Centre. Accordingly, to assist in ensuring that reasonable wetland revegetation expectations are met, the EPA recommends that the proponent prepare its Wetlands Restoration Plan, detailing restoration and management measures and objectives and a rehabilitation schedule and the *Typha Orientalis* control program to include a community consultation and involvement component. Groups that should be involved include the

Wetlands Conservation Society, the Cockburn Wetlands Education Centre and Save Beeliar Wetlands.

The EPA has recommended conditions 12-2 to 12-5 which requires the proponent to:

- prepare, submit and implement a Land Acquisition Management Plan prior to construction;
- identify the land to be acquired and its values which include at least 7 ha of CCW areas and an appropriate buffer.

The EPA has also recommended conditions 12-6 to 12-9 which requires the proponent to prepare and submit a wetland restoration plan, including monitoring and reporting criteria and completion criteria, prior to construction for the areas of rehabilitation in Horse Paddock Swamp and North Lake.

Conservation areas (Flora and vegetation)

Implementation of the proposal will result in the loss of 7 ha of Bush Forever site 244, and the resumption and loss of 5.4 ha of Beeliar Regional Park (Figure 5). The Bush Forever site boundary includes the land which had already been set aside as road reserve. *Bush Forever – Volume 1* (Government of Western Australia, 2000) acknowledges that some sites overlap with existing regional infrastructure requirements. The Regional Park boundaries exclude the Roe Highway road reserve. As such, the impact occurs where the proposal deviates from the original road reserve. The changes to the road layout have occurred to minimise the impact of the proposal on the environment, particularly wetlands.

The proponent proposes to offset these impacts by ceding 14.5 ha of unused road reserve alongside the proposal into Beeliar Regional Park, which will result in a net increase of around 9 ha in the regional park. The intention is for the area to be incorporated into the conservation estate. The area will fall within the Conservation and Protection Zone of the Regional Park. In addition to this, the proponent proposes an Arum Lily Control Program over this area. This program would occur for three years, prior to transferring the land to the conservation estate.

The EPA notes that the Bush Forever Policy has a 2:1 offset ratio for areas of high value. Therefore, 14.5 ha is approximately twice the area being impacted. While this offset area is not adding any additional land to the Bush Forever site, it is increasing the level of protection of the site as well as undertaking some enhancement work to the existing site.

The EPA has recommended condition 12-10 which requires the proponent to transfer 14.5 ha of land to the DPaW for inclusion in the Beeliar Regional Park within 12 months of completion of the proposal.

The EPA has also recommended condition 12-11 to 12-13 which requires the proponent to prepare and submit an Arum Lily Control Program prior to construction, which includes monitoring, reporting and completion criteria. The control program is commence implementation within 12 months of completion of construction.

Fragmentation (Terrestrial fauna and Flora and vegetation)

The EPA also considers that significant residual impacts remain with regard to the fragmentation of native vegetation and fauna habitat. Some of the fragmentation impacts are addressed through the previously mentioned offsets, particularly the offsets undertaken adjacent to the proposal site. The land acquisition offset proposal identifies two other values that need to be part of the land acquired:

- remnant native vegetation similar or better condition than the vegetation associations being impacted by the proposal; and
- an assemblage of fauna and flora species similar to those being impacted.

To further address fragmentation issues, the proponent also proposes to undertake a *Typha orientalis* Control Program at Thomsons Lake, which forms part of the Beeliar Regional Park. Both the Beeliar Regional Park Management Plan, and the Lake Thomson Nature Reserve Management Plan, identify *Typha orientalis* as a great threat to native vegetation in the reserve. The EPA considers that the proposed offset, which aligns with these management plans will address fragmentation by improving the quality of habitat available around the proposal site. The EPA also notes in considering the effectiveness of *Typha* control in reducing fragmentation, that the control of *Typha* should be undertaken in conjunction with planting of native wetland flora species, and not removed all at once but rather in a staged approach. There should also be sufficient growth time of this replacement flora, to allow fauna to utilise it before the additional *Typha* areas are removed and replanted, which will ensure the maintenance of mature habitat for wetland fauna.

Thomsons Lake is a Ramsar listed wetland, which supports 21 JAMBA and CAMBA migratory species. The EPA advises that this offset program may contribute to any offsets required under the EPBC Act.

The EPA has recommended condition 12-14 to 12-16 which requires the proponent to prepare, submit and implement a *Typha orientalis* Control Program at Thomsons Lake prior to construction, which includes monitoring, reporting and completion criteria.

Summary

Having particular regard to the significant impacts to:

(a) threatened fauna and its habitat;

(b) Conservation Category Wetlands;

(c) remnant vegetation clearing and fragmentation;

(d) conservation areas; and

(e) Swan Coastal Plain significant bird species habitat, migratory birds and significant wetland bird species habitat,

it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective for this factor provided condition 12 is imposed requiring the proponent to:

- prepare, submit and implement a Land Acquisition Management Plan to identify the land to be acquired, and detail arrangements and funding for management on advice from DPaW. The acquired land values must include:
  - at least 234 ha of *Calyptorhynchus latirostris* (Carnaby's Cockatoo) and *Calyptorhynchus banksii naso* (Red-tailed Black Cockatoo) foraging habitat;
  - at least 7.5 ha of *Calyptorhynchus latirostris* (Carnaby's Cockatoo) and *Calyptorhynchus banksii naso* (Red-tailed Black Cockatoo) potential breeding habitat;
  - at least 7 ha of CCW areas and an appropriate buffer;
  - remnant native vegetation similar or better than the vegetation association being impacted by the proposal; and
  - an assemblage of fauna and flora species similar to those being impacted.
- rehabilitate any acquired land that is degraded in accordance with an Offset Rehabilitation Plan;
- ensure that any degraded land chosen for rehabilitation satisfies the requirements of the CEO;
- transfer 14.5 ha of land to the DPaW within 12 months of completion of the proposal;
- prepare, submit and implement an Arum Lily Control Program over the 14.5 ha transferred to the DPaW; and
- prepare, submit and implement a *Typha orientalis* Control Program at Thomsons Lake prior to construction, which includes monitoring, reporting and completion criteria.

5.7 Environmental principles

In preparing this report and recommendations, the EPA has had regard for the object and principles contained in s4A of the EP Act. Appendix 3 contains a summary of the EPA's consideration of the principles.

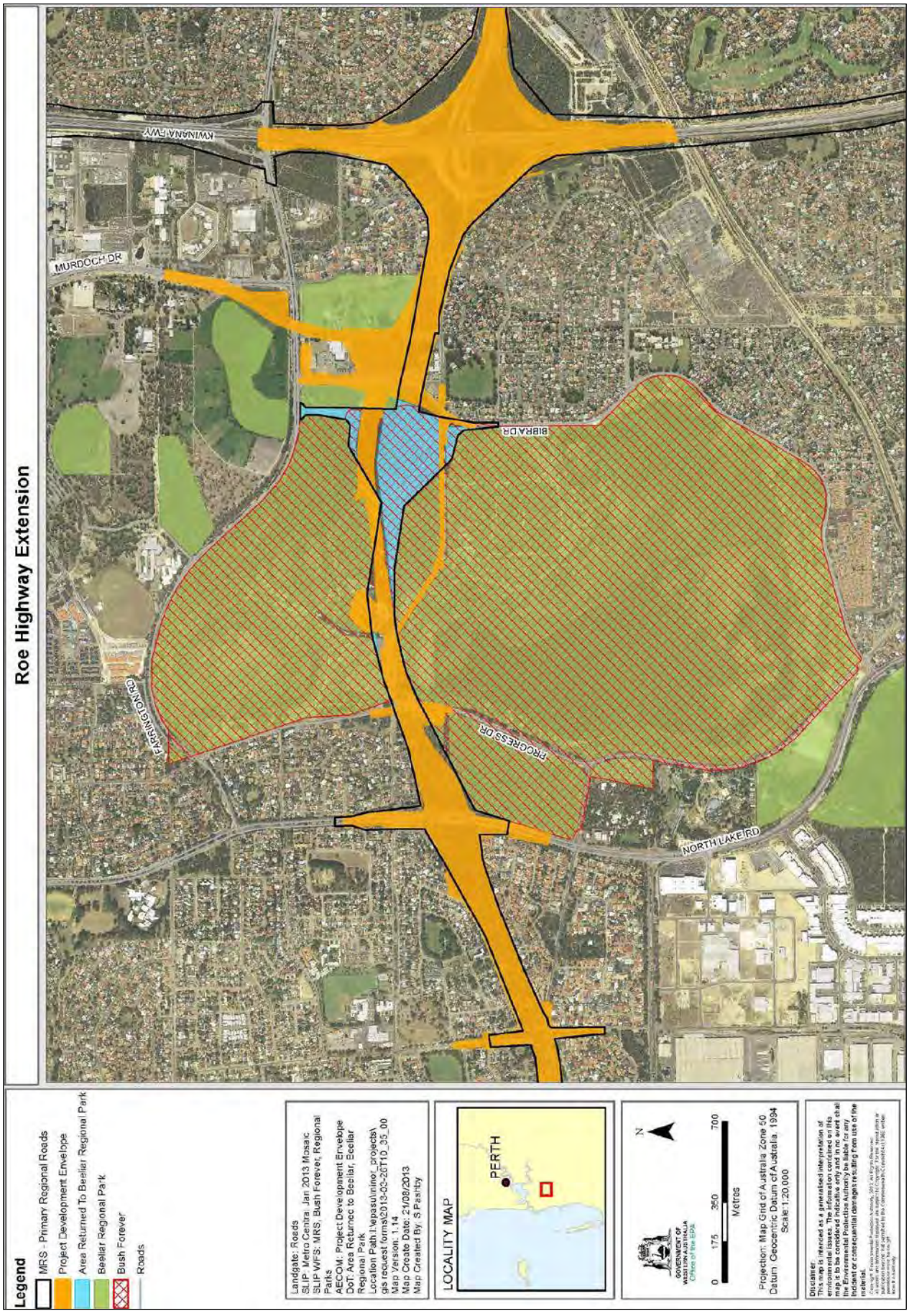

Figure 5 – Indicative areas to be returned to Beeliar Regional Park

6. Matters of National Environmental Significance

This proposal was determined by the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) as likely to have a significant impact on threatened species and communities listed under the EPBC Act (EPBC2009/5032); in particular the Endangered Carnaby's Cockatoo (*Calyptorhynchus latirostris*), the Vulnerable Forest Red-tailed Cockatoo (*Calyptorhynchus banksii naso*) and migratory bird species.

This proposal is being assessed by way of an accredited process with the EPA under a bilateral agreement made under section 47 of the EPBC Act. The bilateral agreement allows the Commonwealth Government Minister for Environment to rely on the PER process of the State Government of WA in assessing this action under the EPBC Act.

The assessment report on the proposed action prepared by the EPA and provided to the WA Minister for Environment is forwarded to the Commonwealth Minister for Environment who will then make a decision as to whether or not the proposal should be approved under the EPBC Act. This is separate from any WA approval that may be required.

Surveys and investigations undertaken for the PER assessment identified several species protected under the EPBC Act as being present, or having the potential to be present, within the development envelope.

Species identified as being present within the development envelope are:

- Carnaby's Cockatoo (*Calyptorhynchus latirostris*) - Endangered
- Forest Red-tailed Cockatoo (*Calyptorhynchus banksii naso*) – Vulnerable; and
- Rainbow Bee Eater (*Merops ornatus*) – Migratory.

Having regard to the Endangered Carnaby's Cockatoo and the Vulnerable Forest Red-tailed Cockatoo, both species are endemic to the south-west of Western Australia. These species require three key habitat types; nesting, foraging and roosting. As noted in Section 5.4, the main threats to these cockatoos are the loss and fragmentation of habitat, as a result of clearing. Both species were recorded within the development envelope, with foraging records collected. No nesting or roosting sites were recorded within the project area for either cockatoo, however there is a loss of 2.5 ha of potential nesting habitat for both species within the development envelope.

The Rainbow Bee Eater, listed as Migratory, has a widespread distribution throughout mainland Australia and occurs in a range of habitat types. The species was recorded within the project area nesting in open sandy tracks. Clearing as part of the proposal will result in loss of potentially suitable habitat for the species.

In addition to the above, the proposal area contains suitable habitat for other migratory bird species such as the Glossy Ibis and Eastern Great Egret (addressed in Section 5.4), and the Endangered Glossy-leafed Hammer Orchid (*Drakaea elastica*) (addressed in Section 5.3).

Impact from the proposal on EPBC Act listed species is not expected to result in an unacceptable or unsustainable impact on the conservation status of listed species. There are, however, significant residual impacts in relation to the cumulative impacts of clearing of native vegetation.

The EPA has recommended to the WA Minister for Environment that the location and authorised extent of vegetation clearing be limited to a total disturbance area of 97.8 ha of vegetation within the development envelope, and impacts on vegetation from road construction and operation be limited to the 'zone of indirect impacts'.

It should be noted the EPA has also recommended condition 12 for offsets, in the form of land acquisition and habitat improvement activities, to mitigate the significant residual impacts on Carnaby's Cockatoo and Forest Red-tailed Cockatoo foraging habitat, and wetlands.

7. Conditions

Section 44 of the EP Act requires the EPA to report to the Minister for Environment on the key environmental factors relevant to the proposal and on the conditions and procedures to which the proposal should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit.

7.1 Recommended 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 MRWA to extend Roe Highway approximately five kilometres from its current terminus at the Kwinana Freeway in Jandakot to Stock Road in Coolbellup, is approved for implementation.

These conditions are presented in Appendix 4. Matters addressed in the conditions include the following:

a) ensuring the final road alignment and detailed design does not result in any additional impacts through requiring the proponent to submit an 'Infrastructure Plan' detailing the alignment, dimensions and locations of the key proposal elements prior to construction (condition 6);

b) requiring the Roe Swamp bridge to be constructed using 'top down' construction methods, not allowing the abstraction of groundwater for construction within 1.5 km of North Lake, Bibra Lake and Roe Swamp, and not allowing dewatering at any stage of the proposal (condition 7);

c) minimising the impacts to hydrological processes and groundwater quality from the ongoing operation of the proposal through requiring the

preparation and implementation of a Drainage Management and Monitoring Plan (condition 8);

d) minimising impacts to wetland quality associated with the implementation of the proposal through requiring the preparation and implementation of a Wetlands Monitoring and Management Plan (condition 9);

e) ensuring the ongoing implementation of the proposal does not cause any detectible adverse effects on flora and vegetation communities immediately outside of the 'zone of indirect impacts', through the preparation and implementation of a Flora and Vegetation Monitoring and Management Plan (condition 10);

f) ensuring that the proposal is designed, constructed and maintained to facilitate movement of fauna within Beeliar Regional Park and minimising impacts as a result of fragmentation through the preparation and implementation of a Fauna Management Plan (condition 11); and

g) requiring the proponent to offset significant residual impacts to fauna, vegetation and wetlands (condition 12).

7.2 Consultation

In developing these conditions, the EPA consulted with the proponent and the SEWPaC, the Conservation Commission of Western Australia, the DPaW, the Department of Planning and the DoW in respect of matters of fact and matters of technical or implementation significance. Minor changes, which did not change the intent or scope, were made to conditions 7, 8, 11 and 12.

8. Other advice

The area surrounding North Lake and Bibra Lake currently supports recreational activities including cycling, walking, exercising, picnicking and educational pursuits for school and university students. Currently, the Cockburn Wetlands Education Centre is located within the Beeliar Regional Park and is used by a number of groups such as the Bibra Lake Scouts, the Wetlands Conservation Society, and the Native ARC.

The EPA acknowledges the importance of these organisations as vital community assets in connecting and re-connecting the community with nature, and the education of future generations. For example, the members of the Wetlands Conservation Society began revegetation work around North Lake 30 years ago and this continues today. As a result the group has an intimate knowledge of the area in both a biological and a social context.

Although there would be no direct impacts from the proposal on the use of these assets *per se*, there are likely to be indirect impacts on the amenity, recreational and educational values that the area currently provides. The EPA

considers that the organisation's role in wetland restoration and fauna rehabilitation would help ameliorate some of the potential 'social surroundings' impacts.

The EPA therefore recommends that the proponent examine all opportunities to facilitate and increase community involvement and participation in wetland restoration works, not only in relation to the environmental offset projects but in the Beeliar Regional Park more broadly.

9. Recommendations

The EPA submits the following recommendations to the Minister for Environment. That the Minister:

1. notes that the proposal assessed is to extend Roe Highway approximately five kilometres from its current terminus at the Kwinana Freeway in Jandakot to Stock Road in Coolbellup;
2. considers the report on the key environmental factors and principles as set out in Section 5;
3. notes the proponent's application of the avoidance and minimisation principles and the extent to which it has mitigated potential impacts on environmental values identified by the EPA in Report 1088 and the key environmental factors identified in this report;
4. notes that the EPA has concluded that the proposal can be managed to meet the EPA's objectives, provided there is satisfactory implementation by the proponent of the recommended conditions set out in Appendix 4 and summarised in Section 7;
5. imposes the conditions and procedures recommended in Appendix 4 of this report; and
6. notes the EPA's other advice presented in Section 8 in relation to impacts to social surroundings.

Appendix 1

List of submitters

The following organisations and individuals provided individual submissions on the proposal. In addition, approximately 2830 proforma submissions were received.

Organisations:

Beeliar Regional Park Community Advisory Committee
City of Cockburn
City of Fremantle
City of Melville
Cockburn Wetlands Education Centre Inc.
Concerned Citizens for Good Governance Inc.
Concerned Parents of Blue Gum Montessori School
Conservation Council of Western Australia
Coolbellup Community Association Inc.
Department of Environment and Conservation
Department of Indigenous Affairs
Department of Planning
Department of Sustainability, Environment, Water, Population and Community
Department of Water
Friends of Forrestdale
Friends of Shenton Bushland Inc.
Friends of the Cockburn Wetlands Education Centre Inc.
Murdoch University
North Lake Residents Association Inc.
Pre-Primary/Kindy class - Kerry Street Community School
Save Beeliar Wetlands coalition
South West Group
the Fremantle Society
The Perth Waldorf School
Urban Bushland Council
Western Australian Naturalists' Club (Inc)
Wetlands Conservation Society
Wildflower Society of WA (Inc)
WWF - Australia

Individuals:

Aaron Hughes
Abby Kate Wilson
Adelheid Stelter
Adrian Forrest
Afrovite Nicholson
Aida DeCeglie
Alan Hall
Alex Cullen
Alia Leadabrand
Aliah Rudnicki
Alison Dorn
Amanda Forrest
Amelia Bell
Andrea Callaghan
Andrew Harris
Andrew McCreery
Andrew Walton
Angela Rasmussen
Angie Smashnuk
Angus Paterson
Anita
Annabelle Newbury
Anne Daniels
Anne Myres
Annette Bignell
Anton Guarino
Antonio Mazzella
Antony Taggart
Anwyn Callaway
Archer Valentine
Arthur Christy
Asher & Josiah Cox-Cullen
Barbara Swingler
Barry Lang
Ben Crappsley
Ben Periz
Ben Sheridan
Beth Schultz
Bill Bruford
Bonnie Crowe
Brad Capes
Brett Scourse
Brian Martin
Brigita Ferencak
Britta Mathews
Bronwen Bowskill
Bryce Cairns
Bryony Wilkinson

Buddy Collinson
C Richards
C Thomson
C F Wood
Carmel Coyne
Carol Richards
Carole De Barre
Caron Fletcher
Cath Thompson
Catherine Coomer
Cathi, Robert & Lily Olivieri
Cemile Cevik
Chantal Caruso
Chantelle Brown
Charles Maus
Charlie Valentine
Chris Beaton
Chris James
Chris Laven
Claire Dallas
Clare Courtauld
Claudia Mahen
Cobie Spencer
Coco Hanly
D Doak
D Hesler
Dalton Moffett
Damien Warren
Darren Hutchens
Darryl James
David Musca
David Pettersson
David Pietersen
Dayle Lancaster
Debbie McDonald
Debra Thornton
Dee Park
Denise Pietersen
Dennis & Kathleen Platts
Denyse MacNish
Desley Hooper
Diana Corbyn
Diana Oliver
Dianne Wheatley
Dité Symes
Domenico Di Lallo
Don Doherty
Donna Boyd
Donna Deland
Doreen Derwent
Dr Felicity McGeorge
Dr Gordon Mac Nish
Dr Jan Currie
Dr Kylie Chan
Dr Liana Joy Christensen
Dr M W Hennessy JP
Dr Mike Nahan MLA
Dr Paul Snider
Dr Tom Wilson
Dr W J Penhale
Ebony Munro
Eddie Smith
Elaine Christy
Elizabeth Bett
Elizabeth Edwards
Elsa Cheah
Eman Fath-El-Bab
Emelie
Emily Klopp
Emma Flittner
Euan
Evan Thompson
Evie Burke
F Rubinich
Fern McInerney
Finlay family
Finn Murphy
Fiona Keogh
Frances Cain
Frank Shinall
Frank Wladyka
Gail Cowie
Geoff Corrick
Geoff Gleadell
Gilda Davies
Gillian Pitt
Gina & Tony Cacho
Gina Capes
Glen Lucas
Glenn Bell
Gordon Hansom
Gordon Lee
Graeme Baudain
Grant Fuller
Grant Megan
Grant Wheatley
Guil Pettersson
Gwen Brandon
H Buykx
Hayley Burnett
Hazel Lang
Heather Atwell
Heidi Hardisty
Helen Cunningham
Helen Gleadell
Helen Peerless
Helen Trengrove
Helen Waldeck
Hennie & Leon du Toit
Hon L MacLaren MLC
Ian Viapree
Ilsa Bennion
Imogen Valentine
Indigo
Ivan Tomich
J Sherington
J Wilkinson
Jack Paterson
Jack Periz
Jacob Kilcoyne-Betts
Jacob Marsh
Jade Thompson
James Eustace
James Flowers
James Hooper
Jane Pettersson
Jane Sutherland
Janet Blagg
Janice Cunningham
Jayden Bestel
Jean Anderton
Jean Laing
Jeff Smith
Jennifer Newman
Jenny Miles
Jenny Sullivan
Jesse Lee
Jesse Williamson

Jessica Whitaker
Jim Valentine
Joanne Lunay
Jocelyn Milward
Joe Porter
Joel Cornwell
John & Margaret Dewar
John Dakin
John McKay Thomson
John Sewell
Joseph John Grealy
Joseph Whitworth Mitchell
Joshua Valentine
Jozina de Ruiter
Julia Denton-Barker
Julia Skinner
Julian Fletcher
Julian Wald
Julie Ginbey
Julie Smith
Julie Valentine
Julie Willmott
Kai Dunn
Kai Thompson
Kai Wuthenow
Kalen Wladyka
Kalia Russell
Karen Yau
Kate Valetine
Kelly De Bretton
Kelly McCarthy
Ken Derwent
Kenneth Young
Kerry Taylor
Kevin Kehn
Kim O'Neil
Konaquin Bickmore
Kyro
L Sylvester
L Y Hamilton
Lakrani Stevens
Larissa Trost
Lauren Snell
Leo Periz
Leonie Stubbs
Leslie James Shuttleworth
Lia McKnight
Liam
Lily Miah
Lily Pietersen
Linda Coventry
Linda du Boulay
Linda Metz
Loraine Gohrt
Louis
Louise Moran
Louise Stewart
Lucas
Lucy Milicevic
Lula Robertson
Lulu
Lydia Roberts
Lynette Buss
Lynn McSevich
M Phillips
M Secombe
Magnus Hooper
Maisie Vaughan
Malcolm King
Mandy & Lily Wilson
Marcus Van Dalen
Marg & Phil Scott
Margaret Atkinson
Margaret Owen
Marilyn Honeybun
Marisa Laven
Marisa Rozells
Marita Trost
Mark Cox
Mark Goulding
Martin White
Mary Dixon
Mary Peck
Mary Young
Mary Jane Powers
M & M Goulding
Matt Munro
Matthew Williams
Maureen Ellis
Max
Maxine Cross
McDonald
Megan Crotty
Megan Jaceglav
Meisha Davidson
Melinda Stephen
Melissa Beeck
Merrilyn Dorn
Michael
Michael Butler
Michael Canci
Michael Hobson
Michelle Grubinic
Michelle Vaughan
Mike Haynes
Mikolaj Beliniak
Mitch & Sue-An Little
N Holmes
Nadia Danti
Nan & Andrew Meredith
Nandi Chinna
Natalie Williamson
Natha Middlemas
Navaz Dakin
Needham family
Neil Goldsborough
Neil Panhale
Neil Postma
Neo
Nicholas Gribble
Nicola Wladyka
Nicole Dakin
Nicole Hodgson
Niki Bigneli
Nina D
Noel McClumpha
Noelle Dawson
Nousha Sas
Olivier de Froberville
Pam Nairn
Paris Mahon
Pat Hansom
Pat Watt
Patricia Smith
Paul Kirby
Payne family
Penny Newcombe
Peta Bowden

Pete Stone
Peter Mioduszewski
Pharyn Stroh
Phil Foord
Phoenix Munro
Poppy Smith
Poppy Valentine
R C Adkins
R Cotterell
R Cunningham
R Sparkes
Rachael Louttit
Rachel Calderbank
Rachel Heather Roe
Renae Williams
Rex Sallur
Ric Gleadell
Rick Alvey
Robert Day
Robyn Pickering
Ron Dorn
Ron Smith
Rory Maus
Rosemary Van
Rosie Tomich
Ruth Balding
S & M Telford
S Embrey
S Martin
Sahil Mawani
Sallyanne Cousans
Sam Periz
Sam Wells
Samantha Hille
Samantha Ogg
Sandy Hopkins
Sarah Jacobs
Saskia Trost
Scarlet Higgs
Sean McFeat
Senator Scott Ludlam
Serene Mather-Fletcher
Shamara de Tissera
Shari-Kate Goodey
Sharon Meredith
Shirley Alix Avion
Shoshana Dyson
Simon Bowskill
Sonia Shima
Stacey Turner
Stephanie Jennings
Stephanie Kleinhenz
Stephen De Gruchy
Stephen Kern
Stephen Wladyka
Sue-Ella Pacan
Susan Ferguson
Susie Cook
Syed Hussain
T Atkinson
T Valles
Tania Williams
Tanja Hake
Teresa Richards
Tessa Canci
Tessa Rieban
Tim McCabe
Tony Eustace
Tracey Alvey
Trevor Mahon
Troy Ellis
Ugo De Marchi
Val Tomlin
Valma Lucy Oliver
Vivian Hussain
Wade Farmer
Wendy Dugmore
Wendy Hodgkinson
Willow Armitstead
Winter family
Xan Lee Innes
Xavier
Yoshitaka Sayusa
Y & G Thompson
Yvonne Warren
Zac
Zoe Inman

Appendix 2

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Appendix 3

Summary of identification of key environmental factors and principles

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
BIOPHYSICAL			
Inland Waters Environmental Quality	• The proposal requires the clearing and filling of: - 5.8 hectares (ha) of Conservation Category Wetlands (CCW); and - 0.95 ha of Environmental Protection Policy (EPP) Wetland. • Potential for contamination of wetlands and groundwater through road runoff and contaminants.	<u>Public and non-government organisations</u> • 80% of wetlands on the Swan Coastal Plain have already been cleared, degraded or filled since European settlement. • A buffer of 200 m is necessary to protect the wetlands from impacts of development, but the PER allows for a maximum of 50 m and also allows construction inside the buffer and onto wetland boundaries. This doesn't provide sufficient protection for the wetlands and these impacts needs greater consideration. • Management of stormwater and the impacts on the wetlands is unclear. • The project is not consistent with environmental policies – Swan Coastal Plain Lakes EPP. • Water quality data shows the pH of North Lake is decreasing, further drying may result in acidification. <u>Department of Environment and Conservation</u> • The wetland system has not been afforded an appropriate buffer. • Insufficient justification provided for not extending the bridge over the entirety of Roe Swamp. • Concerns of impacts to water quality. • Baseline water quality and/or sediment data is required for Roe Swamp. • A contingency plan is required in the event of a spill from	Considered to be a key environmental factor and is discussed in Section 5.1

		vehicles occurring. • Limited information on the mechanics and functioning of the infiltration basins. • Wash-down and maintenance areas should be relocated away from wetlands and their buffers. • Recommends ongoing monitoring, reporting and contingency action plans to ensure the objectives of maintaining existing wetland ecological functions and environmental values are achieved. <u>Department of Water</u> • No investigation into the nutrient inputs into Frog Swamp and North Lake from Murdoch Drain. • Concerns stormwater discharging into Bibra and North lakes from the development will contribute to elements (including aluminum) and total petroleum hydrocarbons in lake waters and put the wetland at risk of acid toxicity. These impacts should be managed and mitigated to ensure the development doesn't contribute to poor water quality. • There is insufficient water chemistry information to enable informed assessment of impacts. <u>City of Cockburn</u> • Expressed concern of long-term degradation of the wetland environment caused by additional fragmentation will result in the loss of endangered and vulnerable species and weed incursion. • Bioretention basins should be linear and located within the currently cleared Hope Road alignment rather than clearing additional areas.	

Hydrological Processes	• Construction of the proposal will result in localised alterations in groundwater distribution and surface water drainage patterns. • Further drawdown on groundwater levels due to abstraction. • Impacts to Groundwater Dependent Ecosystem (GDE) species due to altered hydrology. • Alteration in groundwater distribution (mounding) in response to altered water availability	<u>Public and non-government organisations</u> • Insufficient consideration of the impacts to the disruption of hydrology and ecological linkages between the wetlands. • Roe Swamp is the only sumpland in the area which is intact hydrologically and ecologically. • Insufficient data collected to establish baselines. <u>Department of Environment and Conservation</u> • Avoid or minimise dewatering during construction to prevent further soil acidification and degradation of groundwater quality. • Modelling does not investigate local impacts on wetlands from the filling and relocating of Murdoch Drain. • Concern the proposal will impede groundwater flow and disrupt the hydrology of Roe Swamp and North Lake. • The compaction and loss of porosity is not discussed in terms of its effect on water flow and direction. • The PER states apertures in the road will aid shallow sub-surface and sheet flow movement during natural flows. However, apertures do not mimic natural sheet flow instead they funnel water through pipe flow. No discussion on frequency of the flow, flow rates and volumes. No discussion or modelling on impacts from altered flow such as erosion, stirring of sediments and increase in contaminants. Triggers for actions and mitigation measures also not provided. • Bioretention and infiltration basins and directing stormwater away from wetlands are not management and mitigation measures for alteration in groundwater distribution. Impact of vegetation removal on hydrological processes has not	The proponent will not be undertaking any dewatering operations during construction. Considered to be a key environmental factor and is discussed in Section 5.2.

		been accounted for. Modelling of local groundwater systems should include the predicted changes in groundwater levels due to altered water availability and the predicted changes in local groundwater flows due to the construction of bioretention and infiltration basins. • The impacts of directing rainfall events away from Bibra Lake and Horse Paddock Swamp should have been discussed. • Stormwater infiltration and bioretention basins should be located outside wetland buffers. • Expressed concern that mounding of groundwater under the retention basins has the potential to change wetland water regimes and hydrological processes. • Potential impacts and changes to natural predevelopment wetland water regimes should be quantified and areas likely to have altered water regimes post development need to be identified, particularly where wetland classifications may change i.e. from a sumpland to a dampland. <u>Department of Water</u> • Recent Department of Water (DoW) groundwater and lake water chemistry data was not used to determine if groundwater flow is impeded. • Discussion of groundwater use does not include current licensed abstraction. • The proposal is located in the Cockburn Groundwater Area, reference to the Cockburn Groundwater Area Water Management Plan and its objectives have not been discussed in the PER. • Discussions of the superficial aquifer make reference to the	

		thickness of the Jandakot Mound, but should be relevant to the location of the proposal. • The DoW is bound by Ministerial conditions to protect the ecological values of Bibra and North lakes. The proposal must not affect the DoW's ability to meet Ministerial criteria. • Modifications to Murdoch Drain and the impacts to water levels at North Lake have not been investigated. • Modelling should be used to determine level of drawdown from dewatering activities. • Impacts from groundwater abstraction not modelled or discussed. • Parameters presented in the MIKE SHE Surface and Groundwater Modelling are adequate. • The DoW does not support the use of the MUSIC Modelling for the assessment of drainage designs in the high groundwater sandy soil conditions of the Swan Coastal Plain. • Drainage design inconsistent with the DoW's current approach for best practice stormwater management.	
Flora and vegetation	• Proposed clearing of up to 97.8 ha of remnant vegetation. Including the clearing of 6 species of Priority Flora. • Loss of up to 7 ha of Bush Forever site 244.	<u>Public and non-government organisations</u> • Expressed concerns regarding the loss of vegetation communities, particularly given the extent remaining. • Expressed concerns on the impacts to priority flora. • Expressed concerns on the impacts to fungi. • Concern regarding impacts of shading and rain shadowing from the bridge structure. • Unacceptable for a 75% loss of the priority flora population *Dampiera triloba* (P1).	Considered to be a key environmental factor and is discussed in Section 5.3.

	• Increased threat of spreading Dieback. • Increased threat of introducing and spreading weeds. • Shading causing plant deaths or change in vegetation communities.	• Concern with increased fragmentation. • The proposal will impact portions of vegetation complexes where less than 10% of the complex remains in the Bush Forever study area. • Vegetation surveys didn't consider the impacts of a dry rainfall year. <u>Department of Environment and Conservation</u> • Survey times did not correspond with the optimal time for surveying *Drakea elastica*. • Impacts to *Lepidosperma* and *Caesia* species need investigating. • Assessment of vegetation condition requires review based on inconsistencies in the photographic evidence provided. The vegetation conditions appear to be significantly under-estimated with a greater proportion potentially being in Very Good to Excellent condition. • Vegetation impacted by shading or "Conceptual Effects Model" is not included in the area of impact on vegetation. • Proponent needs to ensure that off-site impacts to Priority Flora species are minimised. <u>Department of Planning</u> • Proposal should be compliant with the *State Planning Policy 2.8 Bushland Policy for the Perth Metropolitan Region*. <u>City of Cockburn</u> • The loss of vegetation communities is not supported as they are below the 30% threshold of pre-European extent. • Weed control needs to be developed to prevent weed incursion. • Expressed concerns the proposal will result in greater	

		fragmentation of the bushland increasing degradation. • Believes adequate ongoing funding should be made available for maintenance of bushland within the road reserve. <u>City of Melville</u> • A Disease and Pathogen Management Plan needs to be developed to prevent the introduction or spread of diseases or pathogens, specifically dieback. <u>Department of Sustainability, Environment, Water, Population and Communities</u> • Although not found within the development footprint SEWPaC considers the potential for extant listed threatened orchids, specifically the Grand Spider-orchid or King Spider-orchid and the Glossy-leaved Hammer orchid. • Surveys for the Glossy-leaved Hammer orchid (*Drakaea elastic*) may not have been undertaken at the optimum time for detecting the species. Further studies may be required prior to construction. • SEWPaC echoes concerns of the DEC and the classification of vegetation condition ratings.	
Terrestrial Fauna	• Disturbance to 112 ha of fauna habitat, which includes: - 78 ha of Carnaby's Cockatoo's foraging habitat; - 73 ha of Forest	<u>Public and non-government organisations</u> • Expressed concerns on the impacts to threatened fauna species. • Expressed concerns on the impacts to 7 migratory bird species resulting in Australia potentially breaching its international treaty obligations under the JAMBA, CAMBA and ROKAMBA if the proposal is constructed. • The proposal will result in habitat destruction, noise,	Considered to be a key environmental factor and is discussed in Section 5.4.

	Red-tailed Black Cockatoo habitat; - 5.6 ha of Graceful Sun Moth (GSM) habitat; - 73 ha of Southern Brown Bandicoot habitat; - 90 ha of Rainbow Bee- Eater, Glossy Ibis and Eastern Great Egret habitat; - 91 ha of Perth Lined Lerista habitat; and - Loss of habitat for an unidentified sucking millipede *Siphonotidae*. • Impacts to migratory shorebirds. • Increased vehicle movement may result in increased fauna injury and mortality. • Increased vehicle movement will result in increased noise	vibration, odour, pollution and light spill and loss of ecological linkages which will impact on fauna. • Biodiversity and ecological integrity should encompass the preservation of habitat as integral to the survival of species, particularly endangered species within the wetlands region. • Incomplete assessment of Troglofauna and their habitat. • Believes the construction of the highway will impede wildlife movement between North and Bibra lakes. • Expressed concerns about the stability of the Quacking Frog population post construction. • *Egernia luctuosa* is frequently observed throughout Bibra Lake, but was not reported in the PER. • Clearing of 78 ha of foraging habitat and 249 potential nesting trees is not compliant with the DEC's Carnaby's Black Cockatoo Recovery Plan. • PER does not address cumulative impacts of loss of fauna habitat across the Swan Coastal Plain, in particular for Carnaby's cockatoo habitat. • Expressed concern about the impacts of noise on fauna which may impact breeding success and survival. <u>Department of Environment and Conservation</u> • Believes further work including a survey of foraging and roosting sites and breeding trees within a 6 km radius of known Carnaby's and Forest Red-tailed Black cockatoos should be undertaken to determine the significance of this area to these cockatoo species. • Concerns that rehabilitation along roadsides with plant species suitable for Carnaby's cockatoo is likely to result in vehicle strikes.	

	and vibrations which may impact on fauna behaviour. • Decreased rate of movement between wetlands for ground dwelling animals.	• Unidentified sucking millipede found and requires further investigation. • Impacts of habitat fragmentation should be minimised by maintaining patches of remnant vegetation in contiguous areas that are as large, intact and connected as possible. • Potential presence of *Throscodectes xiphos* requires further investigation. • Survey of Southern brown bandicoot conducted in 2010 (second driest winter and one of the driest years), taking into account these conditions a much larger population may exist. A research and management strategy including feasibility of translocating Southern brown bandicoot should be developed. • Impacts to the GSM are likely to be significant as there are no extant and viable populations left within the region and the population within the proposal area is likely to be lost. • Innovative lighting solutions should be designed to minimise light pollution and the effects on the fauna. <u>City of Cockburn</u> • Fencing should be erected parallel to the road to prevent fauna crossing and directing them to the underpasses. • Proposal should limit impacts of light spill on surrounding bushlands. <u>Department of Sustainability, Environment, Water, Population and Communities</u> • Key matters of national environmental significance for this proposal as per the EPBC Act and are listed threatened are: Carnaby's Black Cockatoo; Forest Red-tailed Black Cockatoo; and Graceful Sun Moth; and listed threatened	

		migratory species such as: Rainbow Bee-eater; Great Egret or White Egret; Cattle Egret; Black-tailed Godwit; Common Greenshank; and White-bellied Sea-eagle. • Concerns with the loss of suitable hollows for the Forest Red-tailed Black Cockatoo as these birds are known to breed within the Perth metropolitan area. • Important to maintain movement corridors and linkages. • Preferable if a suitable bird expert is on site during construction to ensure no Rainbow Bee-eater birds are injured.	
POLLUTION			
Air Quality	• Construction and operation of the proposal has the potential to produce dust and odour which may impact on human health, amenity and vegetation.	<u>Public and non-government organisations</u> • Reduced air quality from increased traffic and dust generated from earthworks will impact residents and students in the surrounding schools. • Proposal will not reduce greenhouse gas emissions due to greater transport efficiency. It is well document that new roads generate more traffic and in turn become congested. • NO_2 exposure levels may affect flora and fauna in the area. • Prior to construction the proponent should provide a Dust Management Plan to the City of Cockburn's Health Services for approval, which must comply with the City's Moratorium on Bulk Earthworks.	A Dust Management Plan will be developed prior to construction, outlining mitigation measures for controlling dust. Modelling shows predicted concentrations of CO, NO_2, PM_{10} and 5 air toxics are below National Environment Protection Measure (NEPM) ambient air criteria. While the modelling predicted

			exceedances of the NEPM criteria for $PM_{2.5}$, this exceedance is considered minor in context of the existing background levels of $PM_{2.5.}$ Not considered to be a key environmental factor. Factor does not require further EPA evaluation.
Terrestrial Environmental Quality (Acid Sulfate Soils and Contaminated sites)	• The proposal may disturb Acid Sulfate Soils (ASS).	<u>Public and non-government organisations</u> • Believes the disturbance of ASS could lead to the acidification of the groundwater and lakes, resulting in loss of biodiversity. <u>Department of Environment and Conservation</u> • Investigations show that ASS occurs in the proposal area and that shallow groundwater in the area has undergone partial acidification and has elevated levels of metals. Dewatering could exacerbate groundwater water quality issues and it is recommended that the proponent prepare a Dewatering Management Plan, or avoid or minimise dewatering activities.	The proponent will not be undertaking any dewatering operations during construction. Detailed study of potential high risk ASS areas will be undertaken prior to disturbance as part of an ASS Management Plan (ASSMP) and Construction Environmental

		<u>Department of Water</u> • Concern that excavation of wetland sediments to the east of North Lake could disturb ASS and have flow on effects to the lake's ecosystems, contributing to the acidification process. <u>City of Melville</u> • Permission should be sought from the Department of Aboriginal Affairs to conduct testing of the ASS risk.	Management Plan (CEMP) which will be prepared prior to construction. ASS will be managed according to the guidelines issued by the DER. ASS is also addressed under Section 5.1 Inland Waters Environmental Quality. Not considered to be a key environmental factor. Factor does not require further EPA evaluation.
OTHER			
Amenity (Noise)	• Noise and vibration impacts from construction and operation of the proposal.	<u>Public and non-government organisations</u> • Several limitations with the acoustic assessment report were raised. • Expressed concern regarding the impact of construction noise and ongoing vehicle noise on local residents. • The peer review undertaken for the noise modelling report should be reviewed.	Considered to be a key environmental factor and is discussed in Section 5.5.

		<u>City of Cockburn</u> • The proposal needs to demonstrate compliance with the *Environmental Protection (Noise) Regulations 1997.* • A Noise Management Plan should be provided to City of Cockburn's Health Services.	
Amenity (Other)	• Physical presence of the proposal will alter the landscape and impact on the visual amenity of the area.	<u>Department of Environment and Conservation</u> • DEC is willing to provide advice/assistance for bridge design options to reduce the visual amenity of the bridges over wetlands. <u>Public and non-government organisations</u> • Believes the highway through the middle of the reserve would result in visual and landscape values being lost. • The wetlands are an important node for the community and offers extensive social, recreational, educational and tourist benefits. • Believes noise barriers will have a significant impact on visual amenity.	The proponent is proposing to retain a 20 m native vegetation corridor between North Lake and Stock Road which will block or filter most views of the project. Not considered to be a key environmental factor. Factor does not require further EPA evaluation.
Heritage	• Potential impact on Aboriginal heritage sites and European heritage values.	<u>Public and non-government organisations</u> • The area has significant cultural and natural heritage values for Aboriginal people which will be adversely impacted. These values include significant spiritual values, story lines and where stories say that first contact with European settlers occurred.	The proponent has consulted with Nyungar representatives and local groups throughout the

		• The area is still used for spiritual practices and education of children. • The Waugal inhabits North and Bibra Lakes (and many other water bodies) and maintains the water flow. • Thorough consultation with the correct Aboriginal people has not been conducted. All communications with representative families show they oppose the proposal but are unable to speak up due to customary laws. • Believes there would be a case under the Commonwealth *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* to apply for the Commonwealth Minister for Aboriginal Affairs for a declaration prohibiting activities that impact on Aboriginal sites. • Bibra and North lakes have been listed on the interim National Estate of the Australian Heritage Commission because of the environmental and heritage significance. <u>City of Cockburn</u> • Norfolk pines should be retained for heritage value. <u>Department of Aboriginal Affairs</u> • The proposal will require the consent of the Minister for Aboriginal Affairs under s18 of the *Aboriginal Heritage Act 1972.* • Confirmed two Aboriginal heritage sites exist on the land DIA 3709 North Lake and Bibra Lake and DIA 4107 Bibra Lake North. The Department considers these two sites unique in the Perth Metropolitan Area. • Advised potential impacts to the Aboriginal heritage values of DIA3709 and DIA4107 can be managed under the *Aboriginal Heritage Act 1972.*	process. The proponent has submitted an application under section 18 of the *Aboriginal Heritage Act 1972* (AH Act) to impact sites DIA 3709 and DIA 4107. The Department of Aboriginal Affairs has considered this application and has advised that the potential impacts to heritage values can be managed under the AH Act. The Minister for Aboriginal Affairs is considered a Decision Making Authority for this proposal due to the presence of sites of Aboriginal Heritage (Appendix 4).

			Not considered to be a key environmental factor. Factor does not require further EPA evaluation.
Human Health	• Potential impacts on human health.	<u>Public and non-government organisations</u> • Concerns with impacts to surrounding school students from noise, dust, vibrations and odour. • Concerns with mosquito management. • Believes outdoor recreational activities will be affected by the vehicle emissions and reduce options for healthy recreational activities. • PER does not address public safety concerns with regards to increased traffic resulting in more traffic accidents, injury and deaths.	This is not an environmental impact to be considered by the EPA. Not considered to be a key environmental factor. Factor does not require further EPA evaluation.
Offsets	• Significant residual impact from clearing 97.8 ha of remnant vegetation, 0.95 ha of EPP Wetland and 5.8 ha of CCW. • Vegetation habitat supports Carnaby's and Red- tailed Black	<u>Public and non-government organisations</u> • Offsets proposed in the PER inadequate and do not represent net environmental gain. • Offsets should be finalised and purchased prior to project approval. • Offsets for Roe 7 should not be claimed for this proposal. • Concerns with proponent's ability to adequately revegetate an area. • Funding for offsets is not enough to allow conservation in	Considered to be a key environmental factor and is discussed in Section 5.6.

	Cockatoos nesting and foraging habitat.	the long term. • No offset offered to local residents for loss of recreational amenity in the area. • Without offsets, proposal would be unacceptable, government policies provide that offsets are not intended to make proposals with unacceptable impacts become acceptable. Offsets are too distant or take too long to reach maturity to mitigate the loss of biodiversity. • The proponent should be required to monitor the offsets against performance objectives and implement contingencies if they are not met. A funding package should be provided to support this. • Offset 1 – Lowlands in Mundijong. This area already has a level of protection and should not be a priority for use as an offset. To offset the removal of 249 cockatoo nesting trees at a ratio of 10:1, the area will require actual nesting trees to be identified and found suitable. • Offset 2 – Horse Paddock Swamp was already intended to be revegetated by the community. Provision of $100,000 is not enough and would only rehabilitate 0.7 ha which does not equate to the 2:1 ratio. • Offset 3 – not considered an offset as it offers no additional habitat. • Offset 4 – pointless to provide research into a species where the proposal is likely to destroy an entire population (GSM). Translocation of GSM is highly problematic. <u>Department of Environment and Conservation</u> • Offset acquisition should be restated as at least 468 ha of Carnaby's cockatoo foraging habitat, inclusive of, or in	

		addition to, 25 ha of nesting habitat, plus additional areas of suitable wetlands. • Assumptions in PER that Carnaby's cockatoo foraging habitat and nesting habitat will co-occur may not be valid for all areas. Land acquisition should accommodate both these habitats. • Suitable habitat or restoration sites within 6 km of the development site should be investigated and incorporated into offsets. • Funding should be made available for basic works to establish reserve infrastructure and for initial management. <u>City of Cockburn</u> • Environmental offset package proposed will not result in a net environmental benefit. • Offset areas should be in close proximity to the environmental loss wherever practical or within the Cockburn area. • Offset 2 should be reassessed to confirm it achieves the 2:1 offset ratio. • Offsets should not be developed to fund management of Ramsar sites, these should already be funded by State and Federal governments. <u>City of Melville</u> • Wetlands within Beeliar Regional Park contained within the City of Melville should also be rehabilitated. • Offset 4 (GSM) – better practice to establish management techniques prior to clearing to better managed populations once construction commences. This is also relevant to offset 5.	

		<u>Department of Sustainability, Environment, Water, Population and Communities</u> • Proposed offset package requires further work. • Proposals should demonstrate they protect or rehabilitate more habitat than they clear and any proposed offset areas, including those revegetated or rehabilitated, must be able to be permanently protected from future clearing. • Supports funding being made available to management authorities.	

PRINCIPLES		
Principle	**Relevant Yes/No**	**If yes, 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.*		
	Yes	In considering this principle, the EPA notes that vegetation and flora, fauna habitat, wetland values and noise amenities would be impacted by the proposal. The EPA is satisfied there is an understanding of the environmental factors potentially impacted by the proposal. The recommended conditions of approval address the uncertainty with regard to predictions by defining limits, monitoring and management, to ensure the proposal is implemented as proposed. Offsets to black cockatoo habitat and wetlands, have regard for the regional cumulative impacts. The offset packages consist of land acquisition and habitat improvement. The EPA has recommended the offset program as a condition of the proposal being approved for implementation.
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.*		
	Yes	In considering this principle, the EPA notes that the proposal would result in the direct loss of up to 97.8 ha of vegetation and 6.8 ha of wetlands. Potential impacts to vegetation and flora, terrestrial fauna, inland waters

		environmental quality and hydrological processes are considered key environmental factors and are discussed in this report and conditions have been recommended to ensure minimal impact.
3. The principle of the conservation of biological diversity and ecological integrity *Conservation of biological diversity and ecological integrity should be a fundamental consideration.*		
	Yes	In considering this principle, the EPA notes that the proposal would impact an area of high environmental values; vegetation, flora, fauna habitat and wetlands. The proposal would result in impacts on priority flora species, threatened fauna species and wetland values. These impacts have the potential to affect biological diversity/integrity. Vegetation and flora, terrestrial fauna, inland waters environmental quality and hydrological processes are key environmental factors discussed in this report.
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.* *(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 maximize benefits and/or minimize costs to develop their own solution and responses to environmental problems.*		
	Yes	In considering this principle, the EPA notes that rehabilitation and residual impact management will be a financial cost and will be the responsibility of the proponent.

5. The principle of waste minimisation *All reasonable and practicable measures should be taken to minimize the generation of waste and its discharge into the environment.*		
	Yes	In considering this principle, the EPA notes that the water quality of the wetlands may be impacted through the discharge of water of a lower quality. Inland waters environmental quality is a key environmental factor of this report and appropriate conditions have been recommended.

Appendix 4

Identified Decision-making Authorities
and
Recommended Environmental Conditions

Identified Decision-making Authorities

Section 44(2) of the 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) of the EP Act requires the Minister for Environment to consult with other decision-making authorities that are Ministers, or if any of the decision-making authorities are not another Minister, then to consult with other decision-making authorities, and if possible, agree on whether or not the proposal may be implement, and if so, to what conditions and procedures, if any, that implementation should be subject.

For the purposes of section 45(1), the following decision-making authorities have been identified:

Decision-making Authority	Approval
1. Minister for Environment	Taking of flora/fauna in Crown Land protected under the *Wildlife Conservation Act 1950*
2. Minister for Transport	Approval for work on roads under the *Main Roads Act 1930*
3. Minister for Lands	Transfer of Crown Land under the *Land Administration Act 1997*
4. Minister for Aboriginal Affairs	Consent to disturb sites under the *Aboriginal Heritage Act 1972*
5. Minister for Planning	Scheme amendments to be initiated under the *Planning and Development Act 2005*
6. Minister for Water	Groundwater licence approval required under the *Rights in Water and Irrigation Act 1914*

Note: In this instance, agreement is required with DMAs 1 to 6 as these DMAs are Ministers.

Statement No. XXX

RECOMMENDED ENVIRONMENTAL CONDITIONS

STATEMENT THAT A PROPOSAL MAY BE IMPLEMENTED
(PURSUANT TO THE PROVISIONS OF THE
ENVIRONMENTAL PROTECTION ACT 1986)

Roe Highway Extension

Proposal: The proposal is to construct and operate a dual carriageway road from the current terminus of Roe Highway at Kwinana Freeway in Jandakot, to Stock Road in Coolbellup, as documented in Schedule 1 of this statement.

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

Proponent Address: Waterloo Crescent
EAST PERTH WA 6004

Assessment Number: 1787

Report of the Environmental Protection Authority Number: 1489

This statement authorises the implementation of the proposal described and documented in Columns 1 and 2 of Table 2 of Schedule 1. The implementation of the proposal is subject to the following implementation conditions and procedures and Schedule 2 details definitions of terms and phrases used in the implementation conditions and procedures.

1 Proposal Implementation

1-1 When implementing the proposal, the proponent shall not exceed the authorised extent of the proposal as defined in Column 3 of Table 2 in Schedule 1, unless amendments to the proposal and the authorised extent of the proposal has 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 the expiration of five (5) years from the date of this statement, and any commencement, within this five (5) year period, must be substantial.

3-2 Any commencement of implementation of the proposal, within 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 and maintain a compliance assessment plan to the satisfaction of the CEO.

4-2 The proponent shall submit to the CEO the compliance assessment plan required by condition 4-1 at least six (6) months prior to the first compliance assessment report required by condition 4-6, or prior to implementation, whichever is sooner.

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 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 potential 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.

The compliance assessment report shall:

(1) be endorsed by the proponent’s Managing Director or a person delegated to sign on the Managing Director’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 Data

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 validated environmental data (including sampling design, sampling methodologies, empirical data and derived information products (e.g. maps)) relevant to the assessment of this proposal and implementation of this statement.

5-2 If any data referred to in condition 5-1 contains particulars of:

(1) a secret formula or process; or

(2) confidential commercially sensitive information;

the proponent may submit a request for approval from the CEO to not make this data publicly available. In making such a request the proponent shall provide the CEO with an explanation and reasons why the data should not be made publicly available.

6 Infrastructure Plan

6-1 The proponent shall demonstrate that the proposal is designed and constructed consistent with the authorised extent(s) as referred to in Column 3 of Table 2 in Schedule 1, through the implementation of conditions 6-2 and 6-3.

6-2 Prior to commencement of construction, unless otherwise agreed by the CEO, the proponent shall prepare an Infrastructure Plan which is to be approved by the CEO. The 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 final height of the noise walls as referred to in Table 2 of Schedule 1, consistent with the *Noise Management Plan (AECOM) dated 11 July 2012*;

(3) areas of native vegetation to be retained within the development envelope; and

(4) spatial data for 6-2(1), 6-2(2) and 6-2(3).

6-3 The proponent shall provide spatial data for the constructed key elements of the proposal as set out in Columns 1 and 2 of Table 2 in Schedule 1 to the CEO, two (2) months following the completion of construction.

7 Construction (Inland waters environmental quality, Hydrological processes and Flora and vegetation)

7-1 The proponent shall ensure that impacts from construction on wetland hydrology, water quality and flora and vegetation are minimised, through the implementation of conditions 7-2 to 7-10.

7-2 The proponent shall construct the Roe Swamp bridge identified in Table 2 of Schedule 1 using 'top down' construction methods.

7-3 The proponent shall not abstract groundwater during construction within 1.5 kilometres of the wetland boundaries of North Lake, Bibra Lake and Roe Swamp as identified in the most up to date Geomorphic Wetland Swan Coastal Plain dataset (custodians the Department of Parks and Wildlife).

7-4 The proponent shall not undertake dewatering activities prior to or during construction of the proposal.

Acid Sulfate Soils Management

7-5 The proponent shall minimise excavation activities in the development envelope in areas mapped as 'high to moderate' using the most up to date Acid Sulfate Soils risk mapping by the Department of Environment Regulation.

7-6 Prior to commencement of construction the proponent shall prepare an Acid Sulfate Soils Management Plan to minimise impacts from construction on inland waters environmental quality, to the requirements of the CEO, on advice of the Department of Environment Regulation.

7-7 The Acid Sulfate Soils Management Plan shall:

(1) address testing of soils and groundwater to determine treatment regimes and management; and

(2) address the requirements of the Department of Environment Regulation's Acid Sulfate Soil Guidelines Series *Identification and Investigation of Acid Sulfate Soils and Acidic Landscapes* (2009) and *Treatment and Management of Soils and Water in Acid Sulfate Soil Landscapes* (2011), or any approved update of these guidelines.

7-8 The proponent may review and revise the Acid Sulfate Soils Management to the requirements of the CEO.

7-9 The proponent shall review and revise the Acid Sulfate Soils Management as and when directed by the CEO.

7-10 The proponent shall implement the approved revisions of the Acid Sulfate Soils Management required by conditions 7-8 and 7-9.

8 Drainage (Inland Waters Environmental Quality)

8-1 The proponent shall ensure that impacts to groundwater quality from the ongoing operation of the proposal are maintained relative to pre-construction conditions established in baseline surveys required by condition 8-3.

8-2 Prior to commencement of construction, the proponent shall prepare a Drainage Management and Monitoring Plan to the requirements of the CEO, on advice of the Department of Water. The Drainage Management and Monitoring Plan shall:

(1) when implemented, substantiate whether condition 8-1 is being met;

(2) identify the locations, capacity and dimensions of bioretention and infiltration basins consistent with the *Water Management Strategy (AECOM) dated 16 January 2013;*

(3) include ongoing maintenance measures to ensure the bioretention and infiltration basins are performing effectively;

(4) include protocols and procedures for baseline monitoring of groundwater levels and groundwater quality;

(5) include protocols and procedures for monitoring contaminant and nutrient levels within the bioretention and infiltration basins;

(6) include protocols, procedures and locations for monitoring contaminants and nutrient levels of groundwater upstream and downstream of the bioretention and infiltration basins;

(7) identify criteria to trigger implementation of management measures to remediate contaminants within the bioretention and infiltration basins and ensure the basins are performing effectively;

(8) include management measures referred to in condition 8-2(7); and

(9) determine the timing and frequency of reporting to the CEO.

8-3 Prior to commencement of construction, the proponent shall implement the approved Drainage Management and Monitoring Plan in order to collect baseline data and continue implementation until otherwise agreed by the CEO.

8-4 The proponent may review and revise the Drainage Management and Monitoring Plan to the requirements of the CEO.

8-5 The proponent shall review and revise the Drainage Management and Monitoring Plan as and when directed by the CEO.

8-6 The proponent shall implement the approved revisions of the Drainage Management and Monitoring Plan required by conditions 8-4 and 8-5.

9 Wetlands (Inland Waters Environmental Quality)

9-1 The proponent shall ensure that impacts to wetland quality associated with the implementation of the proposal are minimised, through implementation of conditions 9-2 to 9-8.

9-2 The proponent shall undertake a Baseline Wetland Condition Survey prior to commencement of construction to the requirements of the CEO on advice from the Department of Parks and Wildlife and the Department of Water. The Baseline Wetland Condition Survey shall:

(1) cover Bibra Lake, Roe Swamp and North Lake areas adjacent to the road;

(2) identify the indicators of wetland quality including physicochemical parameters and bio-indicators; and

(3) include protocols to measure the indicators of wetland quality as identified in condition 9-2(2) including duration, timing and frequency.

9-3 Prior to commencement of construction, the proponent shall report the results of the Baseline Wetland Condition Survey required by condition 9-2 to the CEO.

9-4 Prior to commencement of construction, the proponent shall prepare a Wetlands Monitoring and Management Plan to the requirements of the CEO, on advice from the Department of Parks and Wildlife and the Department of Water. The Wetlands Monitoring and Management Plan shall:

(1) when implemented, substantiate whether condition 9-1 is being met;

(2) include the location of monitoring and reference sites;

(3) include protocols for monitoring the indicators as identified under condition 9-2(2);

(4) determine the trigger levels for indicators of wetland quality to achieve the requirements of condition 9-1;

(5) include protocols for monitoring wetland quality against the trigger levels identified in condition 9-4(4);

(6) identify management measures to be implemented in the event that trigger levels identified under condition 9-4(4) are not met; and

(7) determine the timing and frequency of reporting to the CEO.

9-5 Prior to commencement of construction, the proponent shall implement the approved Wetlands Monitoring and Management Plan, and continue implementation until otherwise agreed by the CEO.

9-6 The proponent may review and revise the Wetlands Monitoring and Management Plan to the requirements of the CEO.

9-7 The proponent shall review and revise the Wetlands Monitoring and Management Plan as and when directed by the CEO.

9-8 The proponent shall implement the approved revisions of the Wetlands Monitoring and Management Plan required by conditions 9-6 and 9-7.

10 Flora and vegetation

10-1 The proponent shall ensure that the ongoing implementation of the proposal does not cause any detectible adverse effects on flora and vegetation communities immediately outside of the ‘zone of indirect impacts’ as shown in Figure 2.

10-2 The proponent shall undertake a Baseline Flora and Vegetation Condition Survey prior to commencement of construction to the requirements of the CEO on advice from the Department of Parks and Wildlife. The Baseline Flora and Vegetation Condition Survey shall:

(1) use plot based surveys and cover the area immediately outside the ‘zone of indirect impacts’ and reference site locations;

(2) identify the indicators of flora and vegetation health including the condition and composition of flora and vegetation communities and correlative environmental parameters including soil moisture within the survey area; and

(3) include protocols to measure the indicators of flora and vegetation health including duration, timing and frequency.

10-3 Prior to commencement of construction, the proponent shall report the results of the Baseline Flora and Vegetation Survey required under condition 10-2 to the CEO.

10-4 Prior to commencement of construction, the proponent shall prepare a Flora and Vegetation Monitoring and Management Plan to the requirements of the CEO, on advice from the Department of Parks and Wildlife. The Flora and Vegetation Monitoring and Management Plan shall:

(1) when implemented, substantiate whether the requirements of conditions 10-1 are being met;

(2) include the location of impact and reference vegetation condition plots;

(3) include protocols for monitoring the indicators as identified in condition 10-2(2);

(4) determine the trigger levels for the indicators of flora and vegetation condition to apply to the area immediately outside the 'zone of indirect impacts';

(5) include protocols for monitoring flora and vegetation condition against the triggers levels identified in condition 10-4(4);

(6) identify management measures to be implemented in the event that trigger levels identified under condition 10-4(4) are not being met;

(7) include a Vegetation Rehabilitation Plan consistent with the *Rehabilitation Strategy – Roe Highway Extension (AECOM) dated 11 July 2012* for areas that have been temporarily cleared within the development envelope; and

(8) determine the timing and frequency of reporting to the CEO.

10-5 Prior to commencement of construction, the proponent shall implement the approved Flora and Vegetation Monitoring and Management Plan, and continue implementation until otherwise agreed by the CEO.

10-6 The proponent may review and revise the Flora and Vegetation Monitoring and Management Plan to the requirements of the CEO.

10-7 The proponent shall review and revise the Flora and Vegetation Monitoring and Management Plan as and when directed by the CEO.

10-8 The proponent shall implement the approved revisions of the Flora and Vegetation Monitoring and Management Plan required by conditions 10-6 and 10-7.

11 Fauna

11-1 The proponent shall ensure that the proposal is implemented to facilitate movement of fauna within Beeliar Regional Park and minimise impacts as a result of fragmentation, through implementation of conditions 11-2 to 11-6.

11-2 Prior to commencement of construction, unless otherwise agreed by the CEO, the proponent shall prepare a Fauna Management Plan to the requirements of

the CEO on advice of the Department of Parks and Wildlife. The Fauna Management Plan shall:

(1) provide the surveyed locations and frequency of the fauna underpasses necessary to meet the requirements of condition 11-1;

(2) detail the size, shape and furniture within the fauna underpasses;

(3) provide an ongoing program of inspections and maintenance to ensure the underpasses are performing effectively;

(4) detail the visual barriers to be installed to reduce the risk of vehicle strikes to birds between North Lake and Bibra Lake; and

(5) determine the timing and frequency of reporting to the CEO.

11-3 Prior to commencement of construction, unless otherwise agreed by the CEO, the proponent shall implement the approved Fauna Management Plan required by condition 11-2, to the satisfaction of the CEO.

11-4 The proponent may review and revise the Fauna Management Plan to the requirements of the CEO.

11-5 The proponent shall review and revise the Fauna Management Plan as and when directed by the CEO.

11-6 The proponent shall implement the approved revisions of the Fauna Management Plan required by conditions 11-4 and 11-5.

12 Residual Impacts and Risk Management Measures

12-1 In view of the significant residual impacts to the environment, including impacts to threatened species, priority flora, fauna habitat, migratory birds, native vegetation, wetlands, Beeliar Regional Park and Bush Forever sites, as a result of implementation of the proposal, the proponent shall undertake the following requirements relating to offsets as outlined in conditions 12-2 to 12-16.

Land Acquisition and Management Plan

12-2 Prior to commencement of construction, or as otherwise agreed by the CEO, the proponent shall submit a Land Acquisition and Management Plan to the requirements of the CEO.

12-3 The proponent shall implement the Land Acquisition and Management Plan, prior to commencement, or as otherwise agreed by the CEO, until the CEO advises implementation may cease.

12-4 The Land Acquisition and Management Plan shall:

(1) identify at least 234 hectares of land to be acquired;

(2) demonstrate that individual land parcels to be acquired are at least 100 hectares in area;

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

(a) at least 234 hectares of *Calyptorhynchus latirostris* (Carnaby's Cockatoo) and *Calyptorhynchus banksii naso* (Red-tailed Black Cockatoo) potential foraging habitat;

(b) at least 7.5 hectares of *Calyptorhynchus latirostris* (Carnaby's Cockatoo) and *Calyptorhynchus banksii naso* (Red-tailed Black Cockatoo) potential breeding habitat;

(c) at least 7 hectares of Conservation Category Wetland areas and an appropriate buffer;

(d) unless subject to condition 12-4(4) remnant native vegetation similar or better than the vegetation association being impacted by the proposal; and

(e) an assemblage of fauna and flora species similar to those being impacted.

(4) detail a Rehabilitation Plan for any areas identified in 12-4(1) that require rehabilitation measures. The Rehabilitation Plan on advice of the Department of Parks and Wildlife shall:

(a) identify the areas to be rehabilitated;

(b) outline the objectives and targets to be achieved;

(c) outline timeframes and responsibilities for implementation;

(d) outline the funding schedule and financial arrangements; and

(e) outline monitoring, reporting and evaluation mechanisms.

(5) detail the arrangements and funding for the ongoing management of the land acquired on advice from the Department of Parks and Wildlife; and

(6) include monitoring and reporting requirements.

12-5 Prior to commencement of construction, or as otherwise agreed by the CEO, the proponent shall acquire, or fully fund the acquisition of, the land identified in the approved Land Acquisition and Management Plan for the purpose of conservation.

Wetland Restoration Plan

12-6 Prior to commencement of construction, or as otherwise agreed by the CEO, the proponent shall prepare a Wetland Restoration Plan to the requirements of the CEO.

12-7 The Wetland Restoration Plan identified in condition 12-6, shall include details on:

(1) activities to be undertaken including the final area to be rehabilitated and restored;

(2) timeframes for undertaking management activities;

(3) roles and responsibilities;

(4) funding arrangements for implementation of the plan;

(5) monitoring and reporting requirements; and

(6) completion criteria.

12-8 The Wetland Restoration Plan identified in condition 12-6 shall apply to the areas delineated in Figure 3.

12-9 Prior to commencement of construction, or as otherwise agreed by the CEO, the proponent shall implement the Wetland Restoration Plan until the CEO advises implementation may cease.

12-10 The proponent shall transfer 14.5 hectares of land as shown in Figure 4 into Beeliar Regional Park. This transfer shall commence within twelve (12) months of the completion of the proposal.

Arum Lily Control Program

12-11 Prior to commencement of construction, or as otherwise agreed by the CEO, the proponent shall prepare an Arum Lily Control Program for the land referred to in condition 12-10 to the requirements of the CEO.

12-12 The Arum Lily Control Program required by condition 12-11 must include details on:

(1) an assessment and mapping of the existing Arum Lily infestation;

(2) activities to be undertaken;

(3) timeframes for undertaking management activities;

(4) roles and responsibilities;

(5) funding arrangements for implementation of the program;

(6) monitoring and reporting requirements; and

(7) completion criteria.

12-13 The proponent shall commence implementation of the Arum Lily Control Program, within twelve (12) months of completion of the proposal, until the CEO advises implementation may cease.

Typha orientalis Control Program

12-14 Prior to commencement of construction, or as otherwise agreed by the CEO, the proponent shall prepare a *Typha orientalis* Control Program for Thomsons Lake to the requirements of the CEO.

12-15 The *Typha orientalis* Control Program identified in condition 12-14 shall include:

(1) an assessment and mapping of the existing *Typha orientalis* infestation;

(2) activities to be undertaken;

(3) timeframes for undertaking management activities;

(4) roles and responsibilities;

(5) funding arrangements for implementation of the program;

(6) monitoring and reporting requirements; and

(7) completion criteria.

12-16 Prior to commencement of construction, or as otherwise agreed by the CEO, the proponent shall implement the *Typha orientalis* Control Program and continue implementation until the CEO advises implementation may cease.

Schedule 1

Table 1: Summary of the Proposal

Proposal Title	Roe Highway Extension
Short Description	The proposal is to extend Roe Highway from its current terminus at Kwinana Freeway in Jandakot to Stock Road in Coolbellup. The proposal will consist of the construction of a dual carriageway road with two lanes in each direction; separated by a concrete barrier in place of a median strip and all associated road furniture, lighting, drainage and structures.

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

Column 1	Column 2	Column 3
Element	**Location**	**Authorised Extent**
Clearing and disturbance	Located within the proposal development envelope as shown in Figure 1a and 1b. Includes clearing for road, drainage, and noise walls.	Clearing and disturbance of less than: • 97.8 ha of native vegetation; and • 0.95 ha of EPP Lakes, within a 167 ha development envelope.
Bridges	Over a large part of Roe Swamp and Horse Paddock Swamp/Bibra Lake. Located within the proposal development envelope as shown in Figure 1a and 1b.	Roe Swamp bridge minimum length of 120 m. Horse Paddock Swamp/Bibra Lake bridge minimum length 70 m.
Noise Walls	Located within the proposal development envelope as shown in Figure 1a and 1b.	The height of noise walls to be finalised in the Infrastructure Plan as required by condition 6-2(2).

Table 3: Abbreviations

Abbreviation	Term
m	metre
ha	hectare
CCW	Conservation Category Wetland
EPP	Environmental Protection Policy

Figures (attached)

Figure 1(a) – Western section of Roe Highway development envelope
Figure 1(b) – Eastern section of Roe Highway development envelope
Figure 2 – Roe Highway Extension 'zone of indirect impacts' buffer
Figure 3 – North Lake and Horse Paddock Swamp Rehabilitation Areas
Figure 4 – Indicative diagram of Beeliar Regional Park Boundary Amendment

Figure 1(a) Western section of Roe Highway Extension development envelope

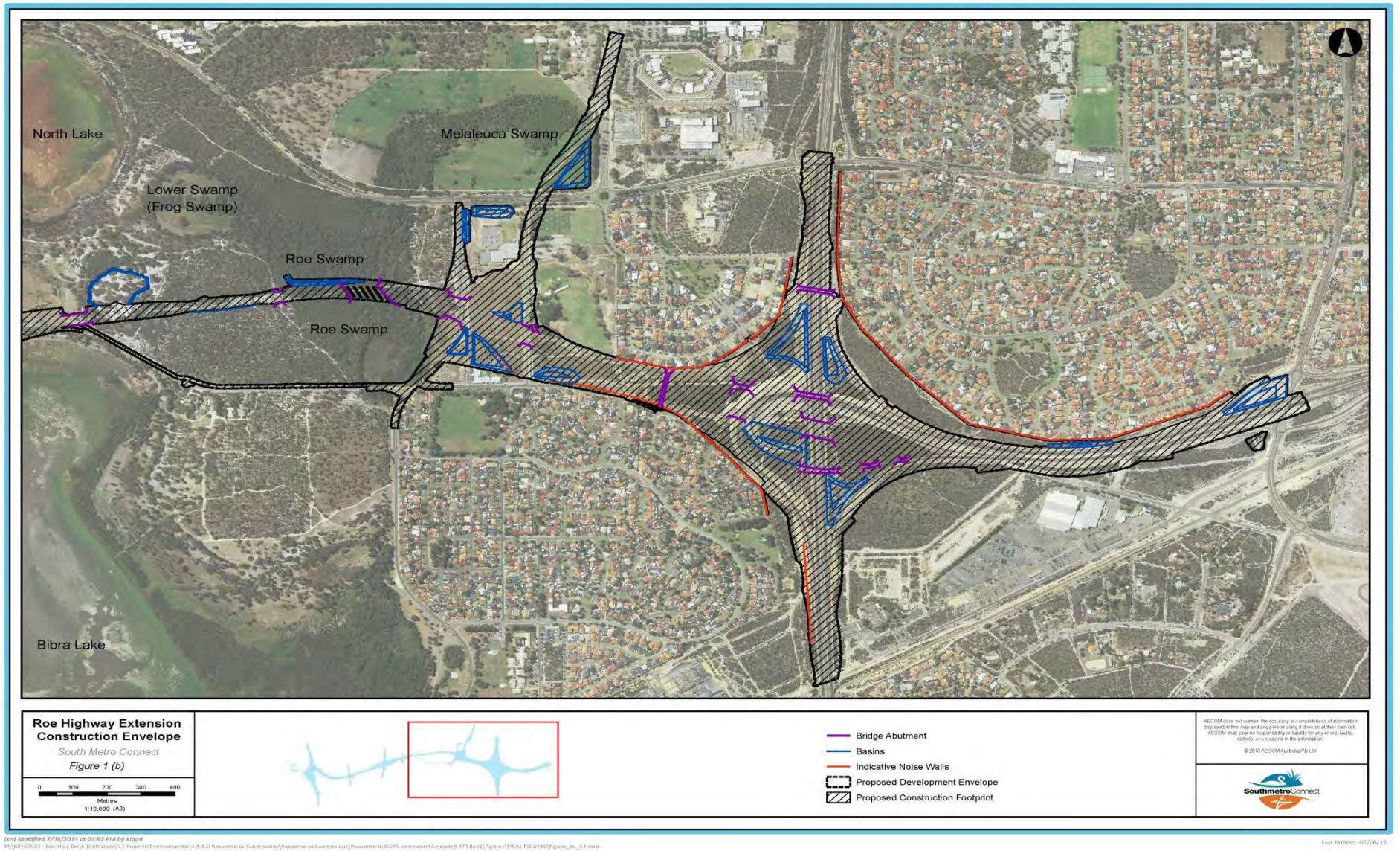

Figure 1(b) Eastern section of Roe Highway Extension development envelope

Figure 2 Roe Highway Extension 'zone of indirect impacts' buffer

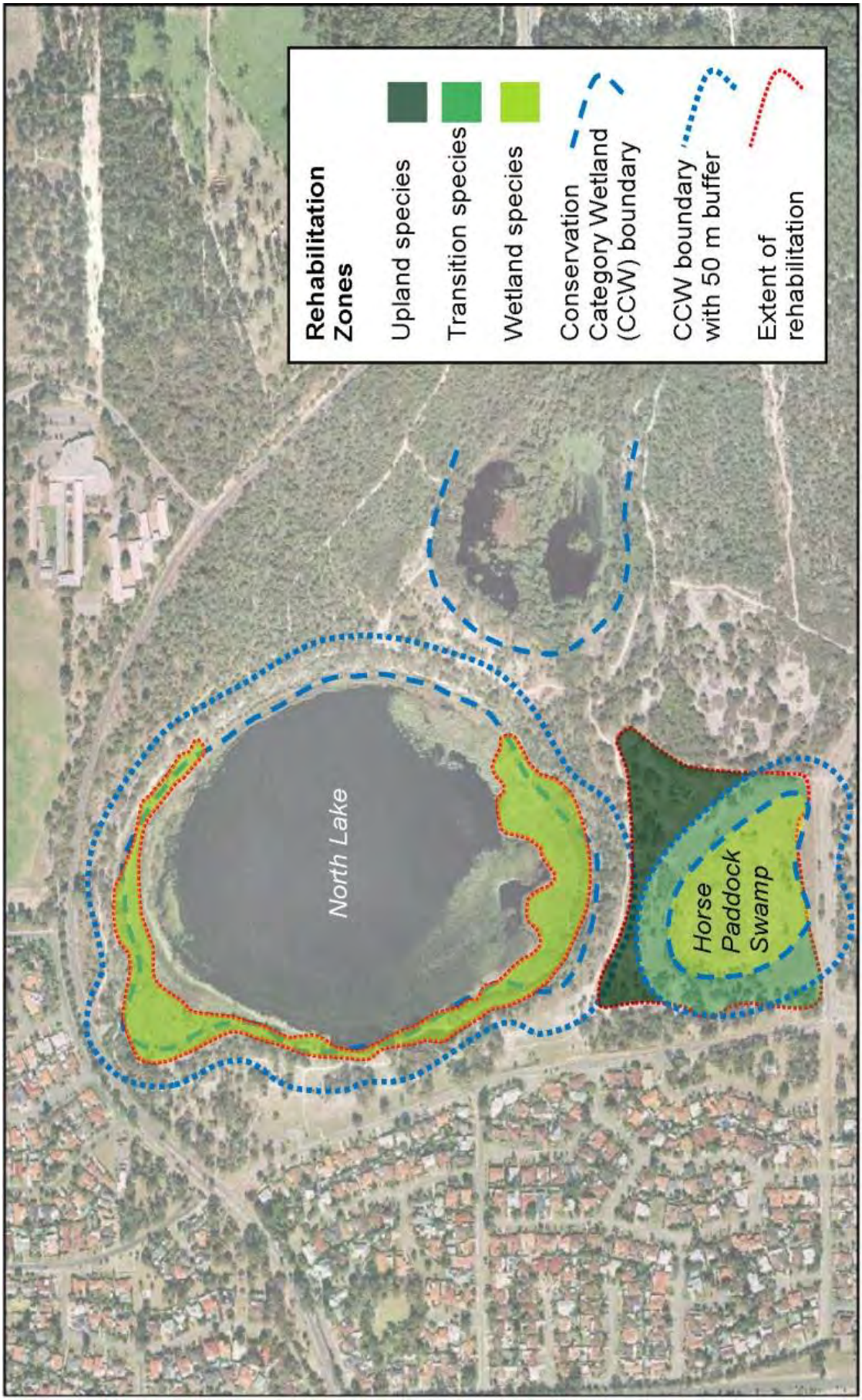

Figure 3 North Lake and Horse Paddock Swamp Rehabilitation Areas

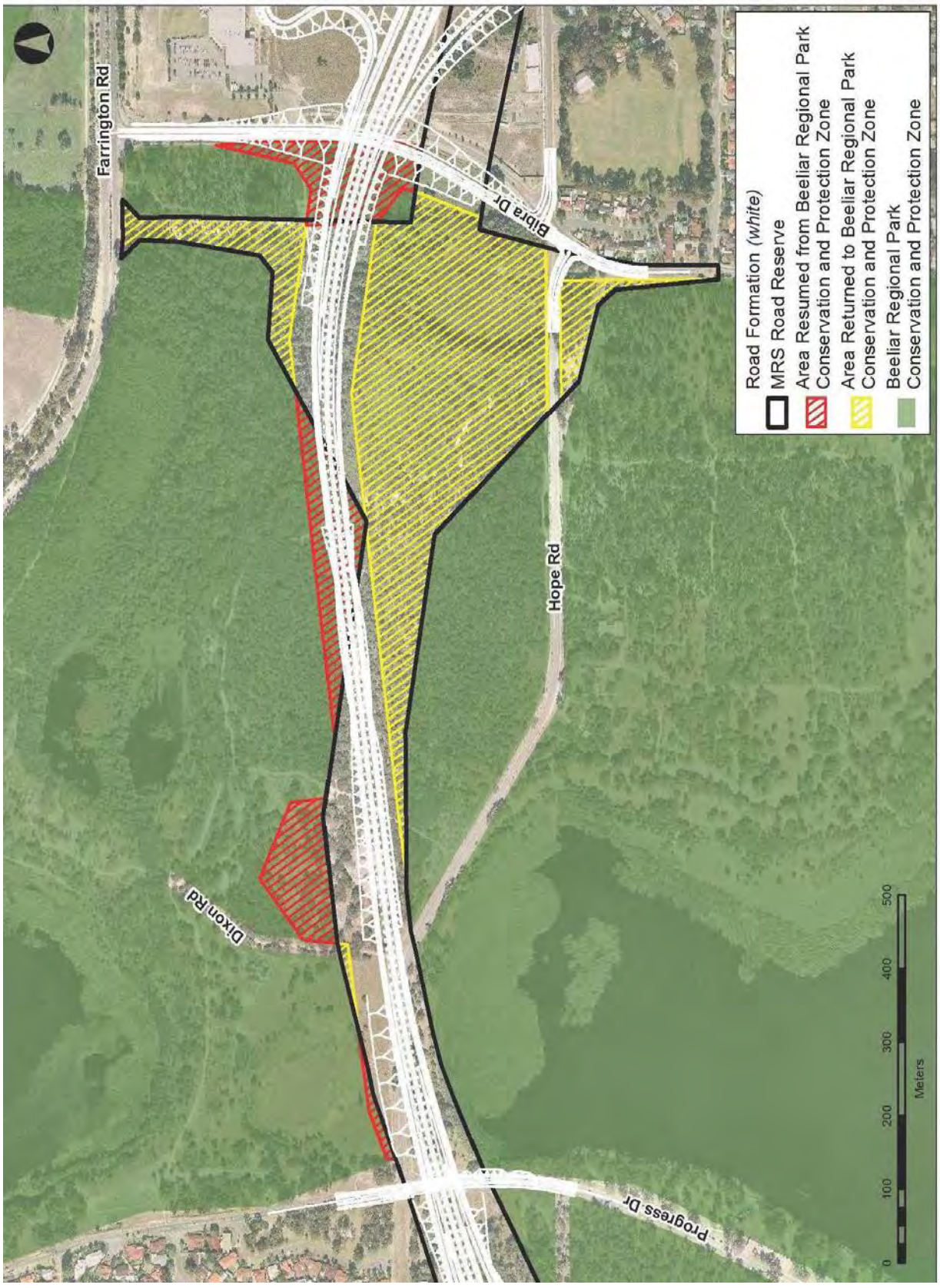

Figure 4 Indicative diagram of Beeliar Regional Park Boundary Amendment

Schedule 2

Term or Phrase	Definition
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.
EPA	Environmental Protection Authority
EP Act	*Environmental Protection Act 1986*
Furniture	Includes logs, rocks and vegetation in the underpass.
Top-down construction method	A method of constructing bridges which avoids the need for construction machinery vehicles to access sensitive areas on either side of the road formation.

Roe Highway Extension

Coordinates defining development envelope as shown in Figure 1 of Schedule 1

Reference “Roe Highway Extension spatial data” submitted to the Office of the Environmental Protection Authority 5 June 2013.

Notes

The following notes are provided for information and do not form a part of the implementation conditions of the statement:

- The proponent for the time being nominated by the Minister for Environment under section 38(6) of the *Environmental Protection Act 1986* is responsible for the implementation of the proposal unless and until that nomination has been revoked and another person is nominated.
- If the person nominated by the Minister, ceases to have responsibility for the proposal, that person is required to provide written notice to the Environmental Protection Authority of its intention to relinquish responsibility for the proposal and the name of the person to whom responsibility for the proposal will pass or has passed. The Minister for Environment may revoke a nomination made under section 38(6) of the *Environmental Protection Act 1986* and nominate another person.
- To initiate a change of proponent, the nominated proponent and proposed proponent are required to complete and submit *Post Assessment Form 1 – Application to Change Nominated Proponent*.
- The General Manager of the Office of the Environmental Protection Authority was 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* at the time the statement was signed by the Minister for Environment.
- Post Assessment Forms and Guidelines may be found at www.epa.wa.gov.au

Appendix 5

Summary of Submissions and
Proponent's Response to Submissions