

Environmental values associated with the alignment of Roe Highway (Stage 8)

**A report by the Environmental Protection Authority under
Section 16(j) of the Environmental Protection Act 1986**

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1. Introduction and background

1.1 The purpose of this report

Following a request from the Minister for Planning and Infrastructure, the Minister for the Environment and Heritage sought advice from the Environmental Protection Authority (EPA) in late August 2002 pursuant to Section 16(j) of the *Environmental Protection Act 1986* in relation to the alignment for Stage 8 of Roe Highway. Specifically, the Minister for the Environment and Heritage sought the EPA's confirmation of the environmental values that would be impacted if Stage 8 of Roe Highway were to be constructed.

This EPA report provides environmental advice on the key environmental values associated with the alignment of Roe Highway Stage 8 and likely impacts arising if construction was undertaken.

This advice is issued by the EPA under Section 16 of the *Environmental Protection Act 1986* and does not constitute a formal assessment or approval by the EPA. The purpose of the advice is to provide independent guidance on environmental issues to government at a stage when formal assessment by the EPA under Part IV of the *Environmental Protection Act 1986* is not possible. There is no right of appeal against Section 16 advice.

1.2 Background

Roe Highway currently runs from the Great Northern Highway in the north to Welshpool Road in the south. The EPA formally assessed the construction of Roe Highway from Welshpool Road to South Street under Part IV of the *Environmental Protection Act 1986* (hereafter known as EP Act), with the level of assessment set at Public Environmental Review. The alignment for Stage 7 of Roe Highway, from South Street to Kwinana Freeway, is currently being assessed by the EPA pursuant to Part IV of the EP Act.

The alignment for Roe Highway Stage 8 is reserved as Primary Regional Roads in the Metropolitan Region Scheme (MRS) and runs from Kwinana Freeway through to the Fremantle Eastern Bypass (see Figure 1). It was first set aside as a Controlled Access Highway in the MRS in 1963. The reservation of this highway forms part of the ring road system which surrounds the Perth metropolitan region.

The alignment for Roe Highway Stage 8 runs between North Lake and Bibra Lake, which are within the Beeliam Regional Park and are part of the eastern chain of the Beeliam Wetlands. The area's conservation values have also been recognised through its inclusion in System Six area M93 and *Bush Forever* Site 244 (see Figure 2). The alignment for Stage 8 of Roe Highway is also located within close proximity of residences and sensitive land uses west of Progress Drive and east of Bibra Drive. The alignment also runs along a portion of Forrest Road, which is located to the west of Stock Road and within close proximity of residences and sensitive land uses.

The need for the alignment of Stage 8 of Roe Highway has recently been subject to extensive discussion and consultation through the Freight Network Review, which the government recently undertook in order to devise better ways of moving freight in the metropolitan area (DPI 2002). It has involved the participation of community, industry and government. As a result of the First Freight Network Review, which was undertaken in October 2001, three major road alignments were identified as requiring urgent resolution (DPI 2002). These were Roe Highway Stages 7 and 8, and alternatives to the Fremantle Eastern Bypass (DPI 2002).

Further workshops undertaken in 2002 analysed these road alignments and a comprehensive multi-criteria analysis (MCA) process was undertaken (DPI 2002). Stakeholders from the community and industry were engaged to identify options for these road segments and develop the criteria for assessment (DPI 2002). As a result, 21 alternative options were identified and assessed against social, economic and environmental criteria (DPI 2002). The options identified comprised of five options for Roe Highway Stage 7, two options for freight only roads, eight options to upgrade existing roads between Kwinana Freeway and Stock Road and six options for Roe Highway Stage 8 alignments (DPI 2002).

As a result of the MCA process the following conclusions were drawn (DPI 2002):

- The highest ranked option was Roe Highway Stage 7 (as a new road) coupled with a major upgrading of Stock Road.
- The options for Roe Highway Stage 8 between the Beeliam Wetlands all ranked low; and
- The clear alternative to the Fremantle Eastern Bypass was a major upgrading to Stock Road.

In relation to the Fremantle Eastern Bypass, the government has initiated the removal of the reservation for the Bypass in the MRS and the City of Fremantle Town Planning Scheme.

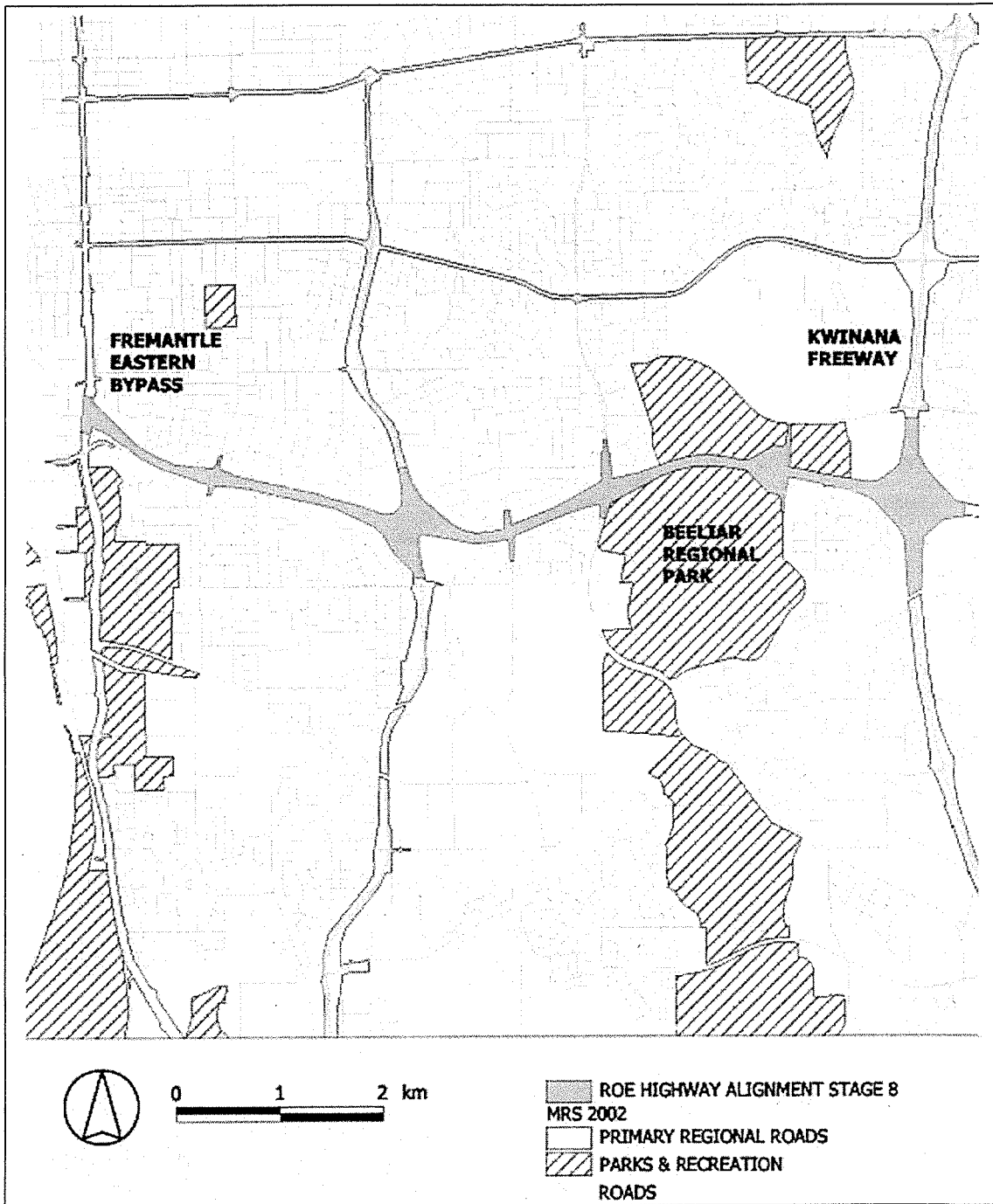


Figure 1: Reservation for Roe Highway (Stage 8)

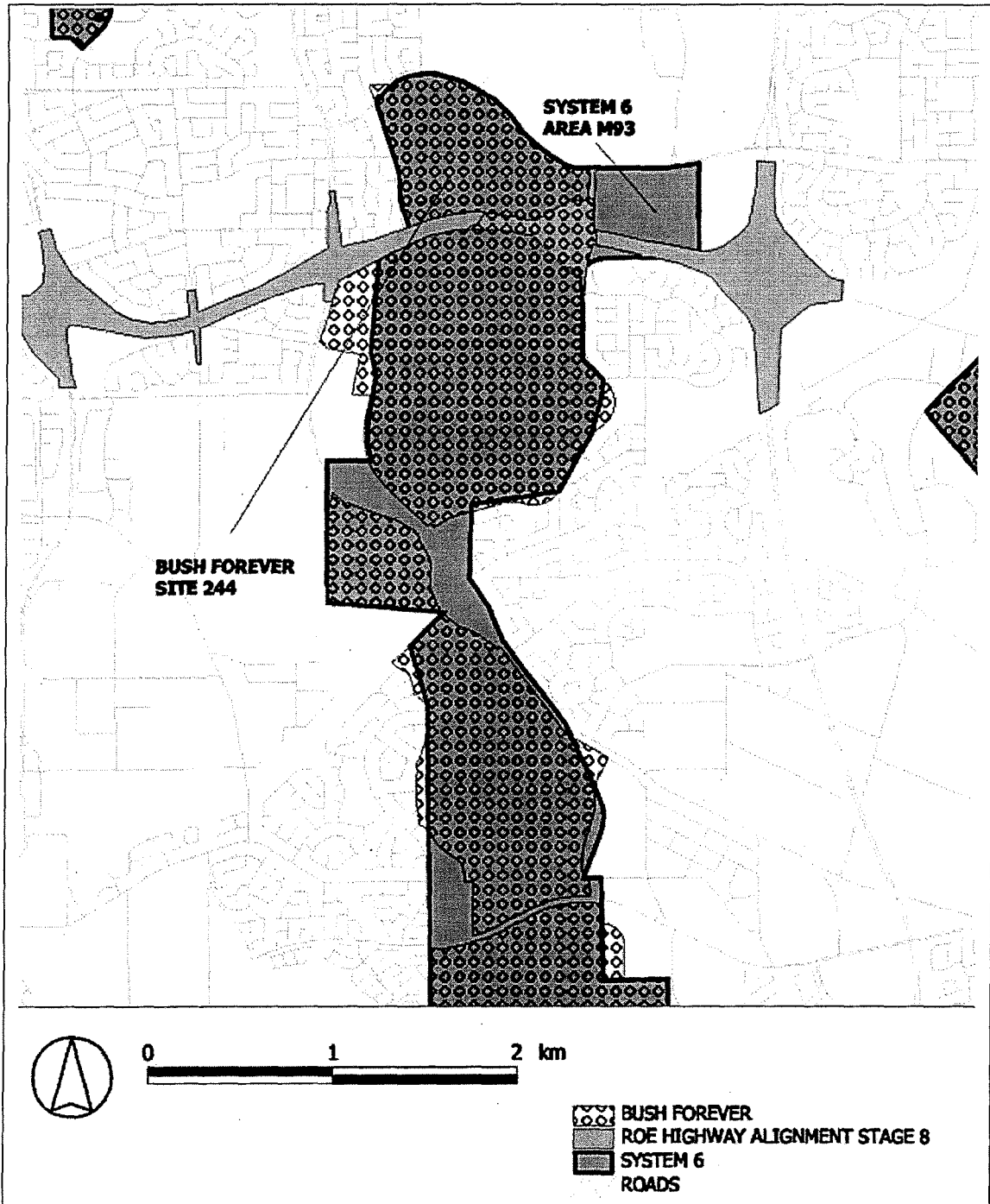


Figure 2: Bush Forever and System 6 Boundaries

1.3 The role of the EPA

With respect to the alignment for Stage 8 of Roe Highway, the EPA has never assessed a proposal to construct this highway under Part IV of the EP Act. This advice is provided at the request of the Ministers for Planning and Infrastructure and Environment and Heritage to inform them of the environmental values that would be affected if Stage 8 were to proceed.

It should be noted that the EPA does not have specific design details on the alignment for Roe Highway Stage 8 and therefore, the EPA's analysis is based on the overall alignment area for Stage 8 of Roe Highway as currently shown in the MRS. The EPA's assessment is based on existing information and there is an expectation that more detailed data would be provided regarding any future proposal to construct the highway.

2. Environmental values and likely impacts

The key environmental values that have been identified as being associated with the construction of the alignment for Roe Highway Stage 8 relate to wetlands, vegetation, fauna, ecological linkages, Aboriginal heritage, residential amenity, recreation and education. A broad review and outline of these values and how the proposed alignment would impact these values is provided in this section.

The wetland, vegetation, flora, fauna and ecological linkage values within this area have been well documented and the following reports have been reviewed and drawn on as part of the EPA's assessment of these environmental values and the likely impacts associated with the alignment for Stage 8 of Roe Highway:

- *Beeliar Regional Park – Draft Management Plan 2001 – 2011*. Conservation Commission of Western Australia *et al.*, 2001.
- *Bush Forever*, Government of Western Australia, 2000.
- *Conservation Reserves for Western Australia as recommended by the Environmental Protection Authority, 1983. The Darling System. System 6, Part I and II*. Department of Conservation and Environment, 1983.
- *Jenny Arnold's Perth Wetlands Resource Book – Chapters 1-4*, Environmental Protection Authority and the Water Authority of Western Australia, 1990.
- *Jenny Arnold's Perth Wetlands Resource Book – Chapters 9 –11*, Environmental Protection Authority and the Water Authority of Western Australia, 1990.
- *National Trust Assessment – North Lake and Bibra Lake, are A Class Calm Reserve*, National Trust of Australia (WA), 2001.
- *Register of the National Estate Database - Beeliar Regional Park and Adjacent Areas*, Australian Heritage Commission, 2002.
- *Roe Highway Alignment Review – North Lake Road to Kwinana Freeway*, Sinclair Knight & Partners and LeProvost, Semeniuk & Chalmer, 1988.
- *The Cockburn Wetlands – An Environmental Study*, Cockburn Wetlands Committee, 1976.

2.1 Wetlands

The alignment for Roe Highway Stage 8 runs between North Lake and Bibra Lake (see Figure 3). As well as these two major lakes the area contains several ephemeral wetlands. This assemblage of wetlands forms part of the eastern chain of the Beelihar Wetlands, which occurs in the contact depression between two major geographic units, which are the Spearwood Dunes to the west and the Bassendean Dunes to the east.

North Lake is mostly open water with relatively steep sides and is a groundwater expression situated on the western side of the Jandakot unconfined groundwater flow system. A narrow band of peripheral wetland vegetation exists, which is comprised primarily of patches of Banbar (*Melaleuca teretifolia*) and low forest of Swamp Paperbark (*Melaleuca raphiophylla*) and Flooded Gum (*Eucalyptus rudis*). The south-east section of the lake has been extensively cleared.

To the east of North Lake is a very shallow open water body, with parts of it displaying macrophytic vegetation. The vegetation around the wetland's margins is similar to that of North Lake.

Bibra Lake is also mostly open water and a reflection of groundwater levels on the western side of the Jandakot Mound. Tall closed scrub of Banbar occurs around the inner shelf of the wetland, with low forest of Swamp Paperbark and Flooded Gum occurring on the outer shelf of the wetland. The south eastern section of Bibra Lake is comprised of dense closed scrub of *Agonis*, Swamp Banksia (*Banksia littoralis*), reeds and Moonah (*Melaleuca preissiana*).

Located between North Lake and Bibra Lake is another open water body, commonly known as Horse Paddock Swamp. This area has been colonized by aquatic vegetation, however, its gently sloping shores and surrounds have been cleared with only scattered trees of Swamp Paperbark remaining.

On the south eastern side of North Lake occurs Roe Swamp, which is a seasonal swamp. Roe Swamp has remained relatively unaltered in relation to its hydrological regime and vegetation cover. Several sumplands occur within the area, however, Roe Swamp is the largest of all and is considered the most complex due to a mosaic of open water and vegetated habitats. With its adjoining complex to the north, Roe Swamp has a large number of micro-habitats, which exhibit variable life forms, density, structural heights and species composition.

The conservation values associated with North Lake, Bibra Lake and the surrounding wetland areas has long been recognised through its inclusion in System Six area M93 and subsequently, *Bush Forever* Site 244 (see Figure 2).

In 1992, the former Department of Planning and Urban Development prepared the document *Proposals for the Establishment, Administration and use of Beeliam Regional Park*, which sought to establish the boundaries for the Beeliam Regional Park as well as addressing issues associated with land tenure, land use conflicts and management structures. North Lake and Bibra Lake were included within the boundaries of the Beeliam Regional Park, however, the road reservation for Stage 8 of Roe Highway was excluded from the Park boundaries.

The conservation values of the Beeliam Regional Park have also been recognised through its inclusion on the Interim List of the Register of the National Estate. Additionally, North Lake and Bibra Lake, A Class Reserves, have been entered in the National Trust's List of Classified Heritage places.

North Lake and Bibra Lake are both protected under the *Environmental Protection (Swan Coastal Plain) Lakes Policy 1992* (see Figure 3), which prohibits unauthorised filling, excavation, mining, effluent disposal and drainage (Government of Western Australia 1992). The two additional wetland areas located to the east of North Lake and in-between North Lake and Bibra Lake (Horse Paddock Swamp) are also protected under the *Environmental Protection (Swan Coastal Plain) Lakes Policy 1992* (see Figure 3).

According to the Water & Rivers Commission's latest version (2002) of wetland mapping for the Swan Coastal Plain, a significant portion of the wetlands have been classified as conservation category (see Figure 3). This includes North Lake and parts of Roe Swamp as well as the two wetlands located to the east of North Lake and between North Lake and Bibra Lake. It should be noted that a section of the Roe Highway alignment which transects Roe Swamp has been categorised as Multiple Use (see Figure 3). However, upon further inspection of aerial photography, the wetland and its vegetation do not appear to correspond with this mapping in terms of condition and degradation. The management categories identified for Bibra Lake are Resource Enhancement and Multiple Use (see Figure 3).

The EPA places a great importance on the wetlands remaining on the Swan Coastal Plain, considering that 80% are estimated to have been lost. As a result, the EPA expects the remaining wetlands to be managed according to the principles of ecologically sustainable development regardless of land use or activity (EPA 2000).

Wetlands identified as conservation category wetlands and also being subject to an Environmental Protection Policy are considered to be areas of high conservation and environmental significance. The construction of the alignment for Roe Highway Stage 8 would, in some places, involve the filling and clearing of parts of these wetlands. Specifically, the construction of Roe Highway Stage 8 would directly impact a portion of Horse Paddock Swamp in the southern section, a portion of Bibra Lake in the northern section, as well as a sizeable portion of Roe Swamp.

The construction of Roe Highway Stage 8 would also indirectly impact the other wetland areas located outside the alignment through creating a severance in the wetland linkages that occur between Bibra Lake and North Lake, between Roe Swamp and North Lake, as well as the rest of the wetland complex located further to the north. As a result of this severance, there would be significant impacts on the

values and functions of the various wetlands within the area, and on the unity of the eastern chain of the Beelias Wetlands.

This area of wetlands has previously been subject to significant public concern regarding road proposals. A report and analysis by the Environmental Protection Authority on any additional or new information on the M93.3 Red Book Recommendation on Farrington Road was requested by the then Minister for the Environment in 1984 (EPA 1984).

The EPA concluded at that time that the construction of Farrington Road as a four lane dual carriageway would be inappropriate and that a single 7.4m carriageway only be constructed subject to management provisions (EPA 1984).

The EPA considered at that time that the impact of the construction and operation of a road adjacent to the boundary of the MRS Parks and Reservation reserve in the north would have no significant effects on the unity of the eastern chain of wetlands or on the reserve. However, the EPA identified the Roe Highway alignment as being of more significance to the management of the area (EPA 1984).

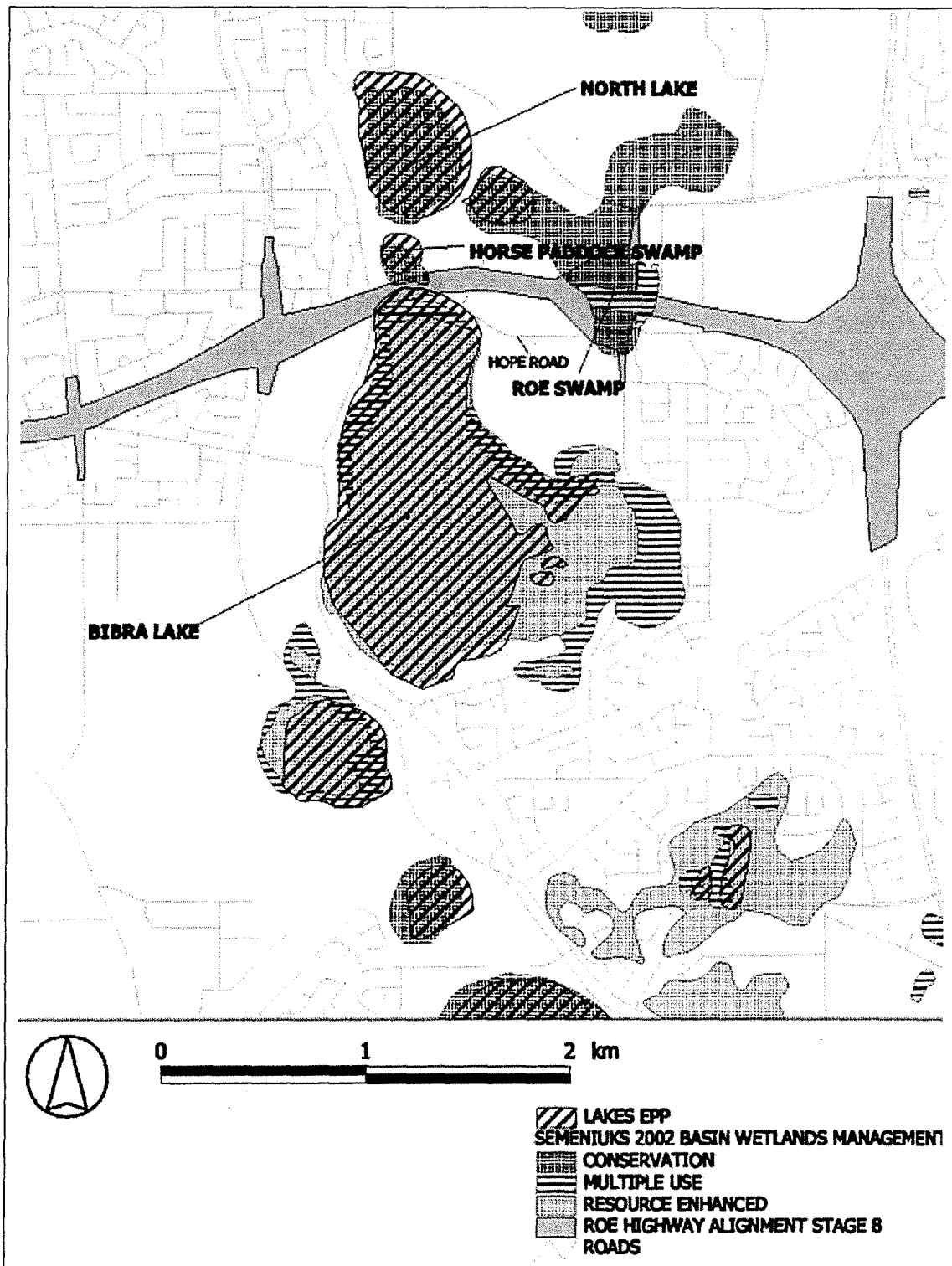


Figure 3: EPP Wetland Boundaries and Wetland Management Categories

2.2 Vegetation and Flora

Construction of a road within the alignment for Roe Highway Stage 8 would lead to the clearing of remnant native vegetation within *Bush Forever* Site 244, as well as vegetation to the east and west of this site (Figure 4). The *Bush Forever* Site 244 is almost coincidental with this portion of the Beeliar Regional Park boundary.

At a broad level, *Bush Forever* Site 244 contains Bassendean Complex – Central and South, Herdsman Complex and a small portion of Karrakatta Complex – Central and South to the west. Construction within the alignment for Roe Highway within *Bush Forever* Site 244 would directly impact on Bassendean Complex – Central and South, with the reservation for the alignment covering approximately 15 to 20 hectares of this vegetation complex. The construction of a highway would also lead to off-site impacts on vegetation located south of the alignment and within the western portion of *Bush Forever* Site 244, which has been identified as Karrakatta Complex – Central and South.

Construction of a highway would also impact on vegetation located west of Progress Drive and east of Bibra Drive. With respect to the vegetation located to the west, the alignment covers approximately 60 to 70 hectares of Karrakatta Complex – Central and South. With regard to the vegetation located east of Bibra Drive, the alignment covers approximately 10 to 15 hectares of Bassendean Complex – Central and South. Upon review of aerial photography it would appear that the vegetation is relatively intact in some places and degraded in others.

At a more detailed level, the area contains a diverse array of vegetation units. The upland vegetation units are composed of *Banksia* woodland, Jarrah-*Banksia* woodland and Marri Woodland. The wetland vegetation units, which inhabit the central to peripheral parts of the various wetland habitats, are composed of Swamp Paperbark forest, Moonah woodland, Moonah/Swamp *Banksia* forests, Banbar scrub, *Kunzea* scrub/heath, Flooded Gum woodland, *Agonis* scrub, sedgelands and marshlands.

The vegetation within this area is varied and complex, with the overall ecological condition considered to be reasonable. The vegetation within this area is not well represented within the eastern chain of the Beeliar Wetlands. As a result, it is 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.

Additionally, the dense wetland vegetation associated with Roe Swamp potentially plays a role in moderating the chemistry of groundwater inputs from the east. Therefore, the protection of this vegetation is considered to be a high priority.

Construction within the alignment for Stage 8 of Roe Highway would result in a loss of gradation from wetland to upland vegetation, as well as loss in regionally significant vegetation which is not well represented within the eastern chain of the Beeliar Wetlands. A significant amount of the vegetation within the Roe Swamp complex, which has a mosaic of open water and vegetated habitats as well as a large number of micro-habitats, would be cleared. This would lead to significant impacts on the wetland's functions and values, fauna habitats and ecological linkages that it maintains with North Lake and the wetland complex located to the north.

The long-term management and viability of the vegetation within this area is increased due to the reserve's substantial size. Construction within the alignment for Roe Highway Stage 8 would reduce the vegetation's viability and its long-term management, through the area being further fragmented.

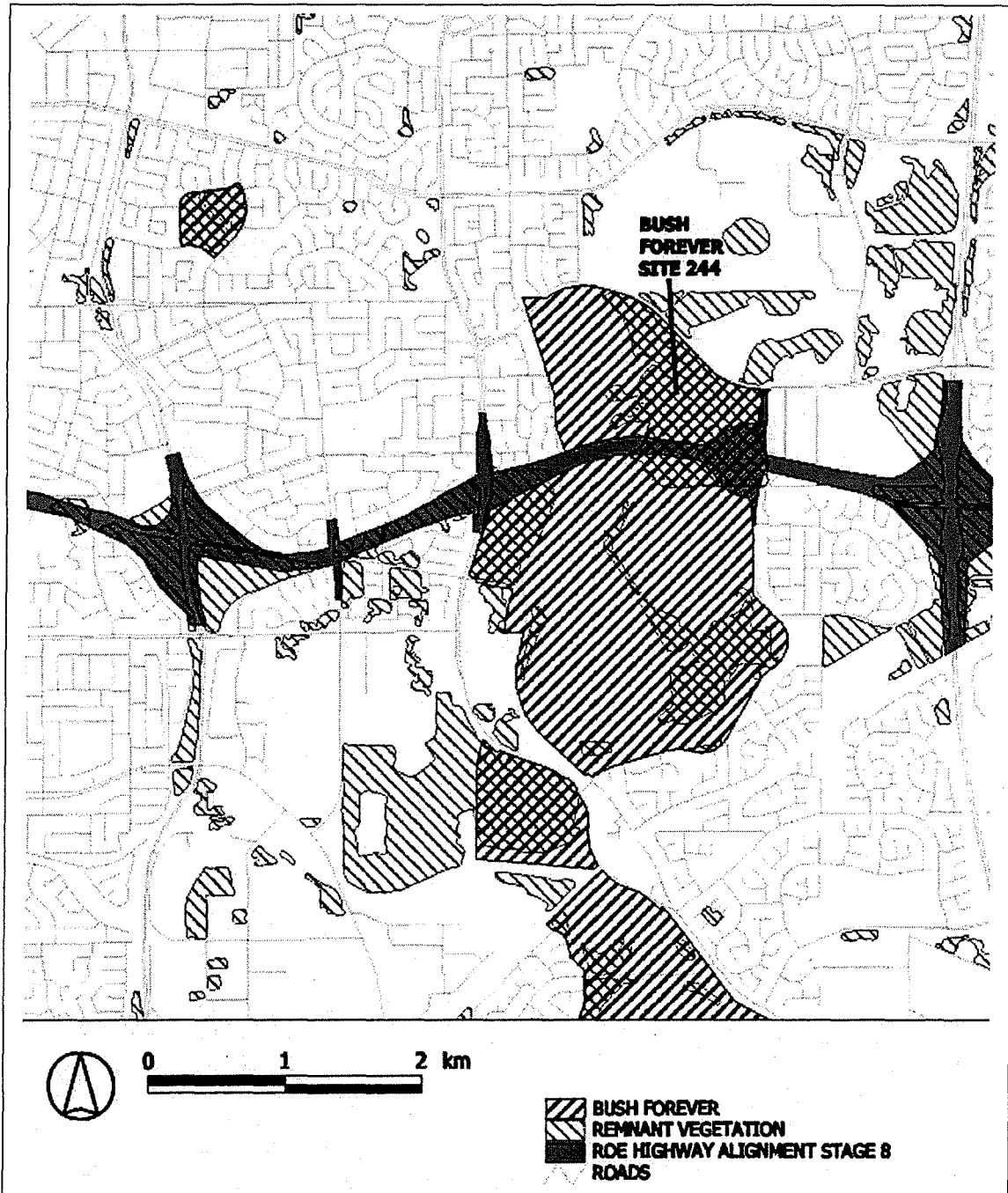


Figure 4: Extent of Remnant Vegetation

2.3 Fauna

Around 122 native bird species have been recorded within the area containing North Lake, Bibra Lake and its surrounding wetlands, and 24 of these species were found to be uncommon. *Bush Forever* identifies that the area supports significant populations of the Australasian Shoveler, Hardhead, Blue-billed, Musk and Pink-eared Ducks. It is also used by migratory waterbirds, such as greenshanks, dotterels, plovers and sandpipers. Migratory birds covered by the JAMBA/CAMBA agreements are protected under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

The area is known to support the Quenda (Southern Brown Bandicoot), which is a Priority 4 species and is considered to be a significant mammal species. The area is also known to support the brushtail possum, a diverse group of reptiles, 1 species of tortoise, 8 species of frog and the Swan River Goby fish. In addition, North Lake is the only urban wetland known to support fresh water sponges.

One of the factors that contribute to the area's significance is that the area is large enough to maintain and support a wide array of fauna. Additionally, there is a variety in habitats due to the different interacting vegetation and soil types, as well as the wide range of wetland and dryland habitats. The area also maintains a high degree of ecological integrity despite some historical and current degradation, with the only major barrier to terrestrial fauna movement being Hope Road.

With respect to waterbirds, the wetlands provide an important summer refuge when lakes within the more arid areas east and north of the coastal plain are dry. In combination, the area provides an ideal environment for many species of bird to breed due to the combination of dense woodland, shrubland, lakes and swamps.

Construction within the alignment for Stage 8 of Roe Highway would lead to a direct impact on the significant faunal values for the area through loss of habitat and breeding areas, as well as creating a severance in some strategic linkages between the area's wetlands and upland vegetation which would impact on faunal movement within the area.

Additionally, the viability of the various fauna habitats within the area is being maintained through its large size, and a proposal to construct a highway through this area would sever and reduce the area's size leading to potential impacts on the fauna habitats within the area and their long-term viability.

2.4 Ecological Linkages

Bush Forever and the Beeliar Regional Park Management Plan (2001 – 2011) have identified the area containing North Lake, Bibra Lake and its surrounding wetlands as being part of several greenways linkages. The first linkage moves in a north-south direction along the eastern chain of the Beeliar Wetlands. There is another greenways linkage which comes from the south west and connects the area containing North lake

and Bibra Lake to the western side of the Beelihar Regional Park, specifically Lake Coogee. In addition to this, a greenway linkage from the North-Bibra Lake area to the west has also been identified.

At present, major arterial roads and other infrastructure limit the linkages between the various parts of the Beelihar Regional Park as well as to other Parks. Construction within the alignment for Stage 8 of Roe Highway would significantly impact:

- the direct linkages between North Lake and Bibra Lake and the surrounding wetlands in the immediate area; and
- the linkages within the eastern chain of the Beelihar Wetlands and subsequently, the eastern side of the Beelihar Regional Park.

Maintaining these links and corridors between and within the Beelihar Regional Park is important in order to maintain the diversity and vigour of the Park's ecological systems. Construction within the alignment for Roe Highway Stage 8 would create a significant impact on the ecological linkages within the immediate area and the Regional Park as a whole, which could diminish the diversity and ecological systems for the area and the Regional Park in the long term.

2.5 Aboriginal Heritage

The eastern chain of the Beelihar Wetlands has been identified as part of a former major trade route between Aboriginal people in the Swan and Murray River areas (Conservation Commission of Western Australia *et al.* 2001). However, there appears to be little ethnographic evidence to support this with the exception of Bibra and North Lakes where archaeological sites have been identified (Conservation Commission of Western Australia *et al.* 2001).

The area has been identified as a significantly important cultural site for the Beelihar people, who are a dialect group of the Nyungar, as well as for other Nyungar groups (National Trust of Australia (WA) 2001). It has also been identified as being the most significant historical site, within the Perth metropolitan region, south of the Swan River (National Trust of Australia (WA) 2001).

Archaeological investigations of North Lake and Bibra Lake have confirmed the ethnographic evidence that the perimeters of the lakes were camping areas with a diversity of activities sites (National Trust of Australia (WA) 2001). The lakes are also known to hold importance as mythological and spiritual locations (Conservation Commission of Western Australia *et al.* 2001) and are also registered with the WA Museum as a mythological site (National Trust of Australia (WA) 2001).

As a result of the Freight Network Review, an assessment of the Roe Highway options in relation to Aboriginal heritage and Aboriginal tourism was undertaken by Rory O'Connor for the Department for Planning and Infrastructure in April 2002. The options assessed for Roe Highway Stage 8 and which followed the current alignment under the MRS, identified that the alignment would pass through the Bibra Lake mythological site, and also pass through a known archaeological site.

Also, depending on the degree of disturbance, the alignment would intrude into several other archaeological sites. The potential for other unknown archaeological sites and/or sub-surface material being disturbed was also identified. It was also identified that there would also be a severe impact on Aboriginal tourism trails between the two lakes.

2.6 Residential Amenity

West of Progress Drive and east of Bibra Drive the alignment for Stage 8 of Roe Highway is located within close vicinity of residences and sensitive land uses on either side. The construction of this highway would result in significant changes to the noise environment for residences and sensitive land uses in the vicinity of the corridor. With respect to the section of the alignment that runs along Forrest Road, there would also be a significant change in the noise environment for nearby residences and sensitive land uses within the vicinity of Forrest Road. Therefore, there is the potential for these areas to be impacted on from noise and vibration during construction and operation of the highway.

2.7 Recreation and Education

The environs surrounding North Lake and Bibra Lake currently support recreational activities which involve cycling, walking, exercising, picnicking and educational pursuits for school and university students (North Lakes Residents Association Inc. 2001). Currently, the Cockburn Wetlands Education Centre is located within the Beeliar Regional Park and is utilised by a various number of groups such as the Bibra Lake Scouts, the Wetlands Conservation Society, Friends of Ken Hurst Park, Wildlife Conservation Society. In addition, there is also a native animal rehabilitation centre at Bibra Lake. Construction within the alignment for Stage 8 of Roe Highway would detract significantly from the recreational and educational values that the area currently provides.

3. Conclusion

This report provides advice on the key environmental values that would be impacted by construction of a highway within the alignment of Roe Highway Stage 8.

The area within and adjacent to the alignment where it bisects Beeliar Regional Park is considered to be of high conservation value and significance due to the ecological linkages it provides and the wetland, vegetation, faunal, ecological, aboriginal and social values that are represented. In addition to directly impacting on the wetland, vegetation and faunal values, the construction and operation of a highway through the area will also lead to further severance of these ecological linkages, reducing the area's viability and long-term management.

As well as the direct impacts of the construction of a road, there would also be a significant increase in traffic moving through the area. The current projections for the number of vehicles that would travel through this area as a result of construction and operation of Roe Highway Stage 8 is estimated to be approximately 40,000. This would have a significant impact on the area's wetlands, vegetation, fauna and ecological linkage. Construction and operation of a highway would also significantly impact on the fauna movement through the area due to the significant barrier it would pose as well as the potential for increased road kills. There is also the potential for spillages due to the significant increase in freight vehicles moving through the area.

Accordingly, the EPA concludes that any proposal for the construction of the alignment 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 alignment, 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.

It is recommended that other alternatives to direct freight through the general area, which do not involve the clearing and filling of the wetlands within the Beeliar Regional Park, be pursued.

Any associated upgrading and/or changes within the existing road and rail network would require the careful management of impacts associated with social amenity and risk in order to ensure that residences and sensitive land uses within the general area are not significantly impacted.

The EPA recommends that if a decision is made on environmental and planning grounds not to proceed with Roe Highway Stage 8, the road reserve be removed from the MRS and the area bounded by the Beeliar Regional Park be reserved as Parks and Recreation in the MRS and incorporated into the Regional Park.

Additionally, it is recommended that consideration be given to downgrading the eastern section of Hope Road, which currently runs through the subject area, with further rehabilitation to strengthen the ecological linkages within the area.

Appendix 1

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