South West Metropolitan Railway
Perth to Mandurah

Commissioner of Railways

Report and recommendations
of the Environmental Protection Authority

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Summary and recommendations

This report provides the Environmental Protection Authority's (EPA's) advice and recommendations to the Minister for the Environment and Heritage on the environmental factors relevant to the proposal to construct and operate the South West Metropolitan Railway from Perth to Mandurah. The proponent is the Commissioner of Railways.

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment and Heritage on the 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.

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

(a) Terrestrial flora;

(b) Fauna;

(c) Wetlands;

(d) Noise and vibration – operations phase;

(e) Surface water and groundwater quality; and

(f) Visual amenity.

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

Conclusion
The EPA has considered the proposal by the Commissioner of Railways to construct and operate the South West Metropolitan Railway from Perth to Mandurah.

The EPA notes that portions of the roads and railways reserves that accommodate the proposal have been the subject of previous environmental assessments. Environmental factors previously considered by the EPA for portions of the route are not reassessed in this report.

This report addresses:

- Impacts on terrestrial flora, fauna, wetlands, and surface water and groundwater quality, other than those associated with the gazetted railways reserve for the South West Metropolitan Railway in the Metropolitan Region Scheme area; and
- The operational and post-construction factors, noise and vibration, and visual amenity, along the entire alignment.

The EPA notes the proposed route through the Leda Nature Reserve and the northern Lake Cooloongup bushland, that utilises the Garden Island Highway Reserve, involves considerably less clearing and fragmentation of regionally significant bushland, compared with the gazetted railways reserve. The proposed route brings a number of potential future transportation routes into the one corridor, and is therefore preferred by the EPA to the gazetted railways reserve that it replaces.

Significant impacts on terrestrial flora and wetlands considered in this report include impacts to:

- Conservation category wetland at Pickle Swamp in the Leda Nature Reserve;
- Threatened ecological communities in the northern Lake Cooloongup bushland and at the Waikiki Station site; and
- Declared Rare Flora at the South Street Station site.

This report addresses the issue of mitigation for the loss of part of the buffer to Paganoni Swamp and Black Swan Lake, and loss of significant vegetation in the road reserve that accommodates the South West Metropolitan Railway in the Peel Region Scheme area, and notes that the reserves accommodating the railway in these areas are an agreed outcome of the Peel Region Scheme Environmental Review process.

The EPA considers that its objectives can be met for the factors terrestrial flora, fauna, wetlands, and surface water and groundwater quality, provided that there is satisfactory implementation by the proponent of its commitments. The commitments include the preparation and implementation of the following environmental management plans for the entire alignment:

- Construction Management Plans;
- Biodiversity and Wetland Mitigation Plan;
- Fauna Management Plan;
- Wetlands, Hydrology and Drainage Management Plan;
- Stakeholder Consultation Strategy;
- Visual Amenity, Rehabilitation and Landscape Management Plan; and
- Access Management Plan (bushland).

The EPA notes that the proponent has agreed to manage operational noise and vibration in accordance with management plans based on compliance with specified criteria developed in consultation with the Department of Environment, and the objective of keeping noise and vibration as low as reasonably practicable.

With respect to the issue of the protection of visual amenity, the EPA notes that station sites and portions of the route will be subject to development applications, and considers that land-use planning and Swan River Trust processes are the appropriate arena for addressing this issue. However, to ensure that visual amenity is addressed for all parts of the rail alignment, the proponent has committed to prepare and implement a Visual Amenity, Rehabilitation and Landscape Management Plan.

The EPA has therefore concluded that it is unlikely that the EPA's objectives would be compromised provided there is satisfactory implementation by the proponent of the proponent's commitments and the recommended conditions set out in Appendix 4 and summarised in Section 4.

Recommendations

The EPA submits the following recommendations to the Minister for the Environment and Heritage:

1. That the Minister notes that the proposal being assessed is for the construction and operation of the South West Metropolitan Railway from Perth to Mandurah;
2. That the Minister considers the report on the relevant environmental factors as set out in Section 3;
3. That the Minister notes that the EPA has concluded that it is unlikely that the EPA's objectives would be compromised, provided there is satisfactory implementation by the proponent of the recommended conditions set out in Appendix 4, including the proponent's commitments; and
4. That the Minister imposes the conditions and procedures recommended in Appendix 4 of this report.

Conditions

Having considered the proponent's commitments and information provided in this report, the EPA has developed a set of conditions that the EPA recommends be imposed if the proposal by the Commissioner of Railways to construct and operate the South West Metropolitan Railway from Perth to Mandurah is approved for implementation. These conditions are presented in Appendix 4. The conditions require the implementation of the proponent's commitments in the Consolidated Commitments statement set out as an attachment to the recommended conditions in Appendix 4.

Contents

Appendices

1. List of submitters
2. References
3. Identification of relevant environmental factors
4. Recommended environmental conditions and proponent's consolidated commitments
5. Proponent's response to submissions

1. Introduction and background

This report provides the advice and recommendations of the Environmental Protection Authority (EPA) to the Minister for the Environment and Heritage on the environmental factors relevant to the proposal by the Commissioner of Railways to construct and operate the South West Metropolitan Railway from Perth to Mandurah. The location of the South West Metropolitan Railway proposal is shown in Figure 1.

The EPA has assessed the proposal at the level of Public Environmental Review (PER).

Some aspects of the proposal have been previously assessed by the EPA. These aspects were not able to be reassessed in this assessment.

The previous assessments applying to the South West Metropolitan Railway are:

- Assessment No. 838 *Proposal to change land use affecting System 6 areas and lakes protected under the Environmental Protection Policy to Urban, Industrial, Special Uses and transportation purposes, to be reflected in the major Metropolitan Region Scheme Amendments for the South West Corridor* - Portions of the current proposal that were subject to assessment no. 838 are indicated on Figure 2 as "MRS 937/33 and 938/33 amendment areas". These portions of the railways reserve were evaluated in terms of potential impacts on System 6 areas, the Beeliar Regional Park, regionally significant vegetation, wetlands and fauna. The EPA's report on those factors is in Bulletin 746 (EPA 1994). The alignment of the currently gazetted railways reserve between Jandakot and the southern Metropolitan Region Scheme (MRS) boundary is an outcome of assessment no. 838. These portions of the railways reserve are subject to the environmental conditions in Statement No. 368; and
- Assessment No. 1047 *Peel Region Scheme* - The portions of the route that are subject to the Environmental Review (ER) of the Peel Region Scheme are shown in Figure 2. The EPA deferred detailed consideration of the environmental factors vegetation, wetlands, noise and vibration. The EPA's report on the Peel Region Scheme is in Bulletin 994 (EPA 2000). The existing road and rail reserves which the proposed railway is to occupy in the Peel Region Scheme area are an approved outcome of the ER process.

The previous assessments have examined portions of the currently proposed rail alignment. The current assessment no. 1395 considers:

- The portions of the proposal not previous assessed (including areas the subject of deferred factors) - for the following biophysical and pollution management factors: terrestrial flora; fauna; wetlands; and surface water and groundwater quality; and
- The entire alignment – for the following operational and post-construction factors: noise and vibration; and visual amenity.

Portions of the alignment that have not been previously assessed by the EPA for any factors are coloured green and blue on Figure 2. These areas comprise:

- The route and stations between Perth and the Anketell Tunnel, along the Kwinana Freeway;
- The route through the Leda and Lake Cooloongup bushland areas via the Garden Island Highway reserve that replaces portions of the gazetted railways reserve; and
- Additional station sites, expansion of some station sites and additional land required to accommodate the railway generally as shown in blue on Figure 2.

The EPA set the level of assessment for the proposal on 24 September 2001. The proponent prepared its PER document, and this was released for public review and comment for ten weeks from 2 December 2002 to 10 February 2003. Submissions were received during and after the public review period from 26 parties comprising 15 government agencies, four organisations and 7 individuals. The EPA requested additional information from the proponent to clarify issues raised, and all requirements were submitted by 21 May 2003.

The EPA is aware that consultation carried out by the proponent during the PER process includes consultation with the project Environmental Community Consultative Committee.

Further details of the proposal are presented in Section 2 of this report. Section 3 discusses the environmental factors relevant to the proposal. The conditions and commitments to which the proposal should be subject, if the Minister determines that it may be implemented, are set out in Section 4. Section 5 provides other advice by the EPA, Section 6 presents the EPA's conclusions and Section 7, 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.

Figure 1
Overview of South West Metropolitan Railway Alignment

Figure 2(a)

Environmental Assessments for the South West Metropolitan Railway

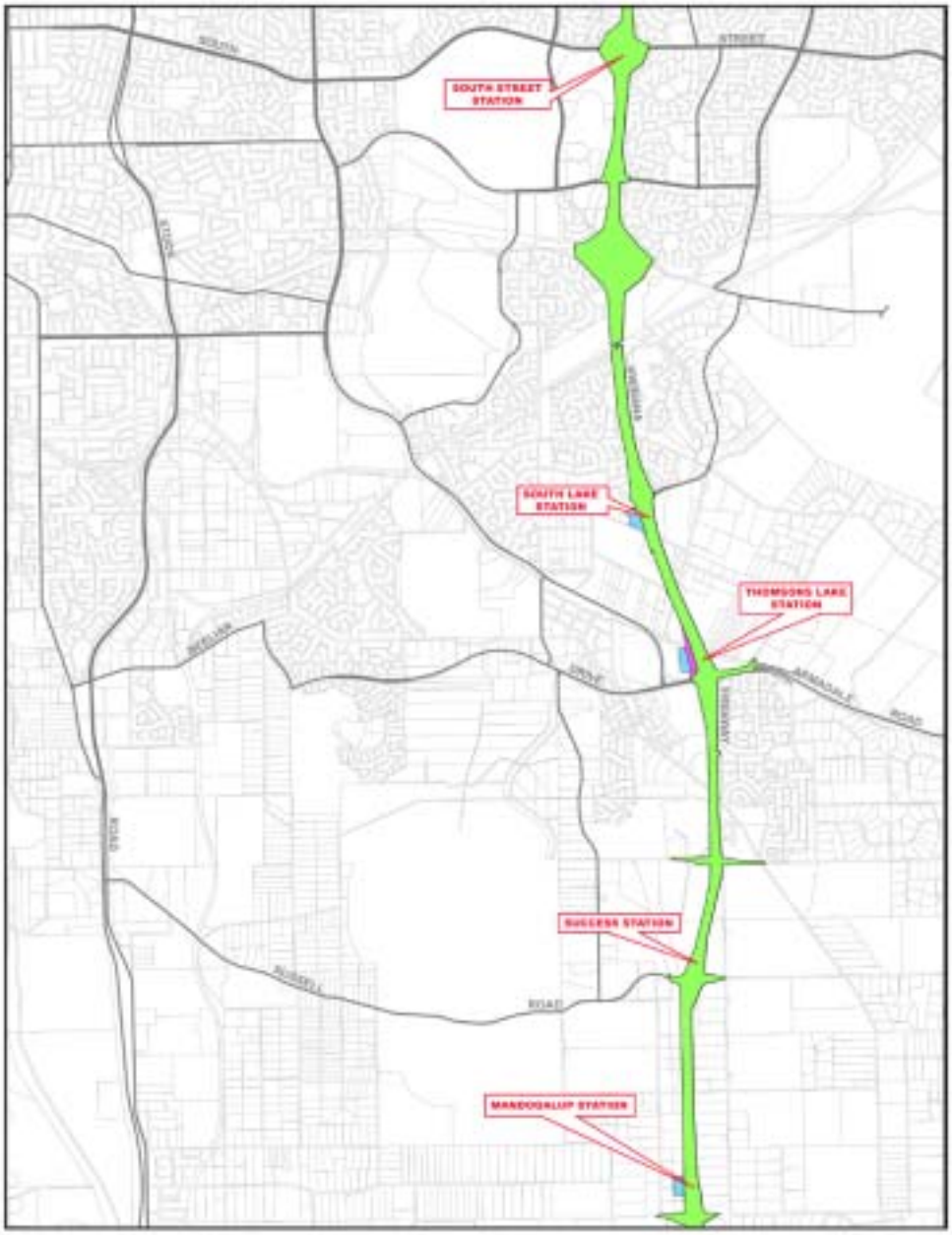


Figure 2(b)

Environmental Assessments for the South West Metropolitan Railway

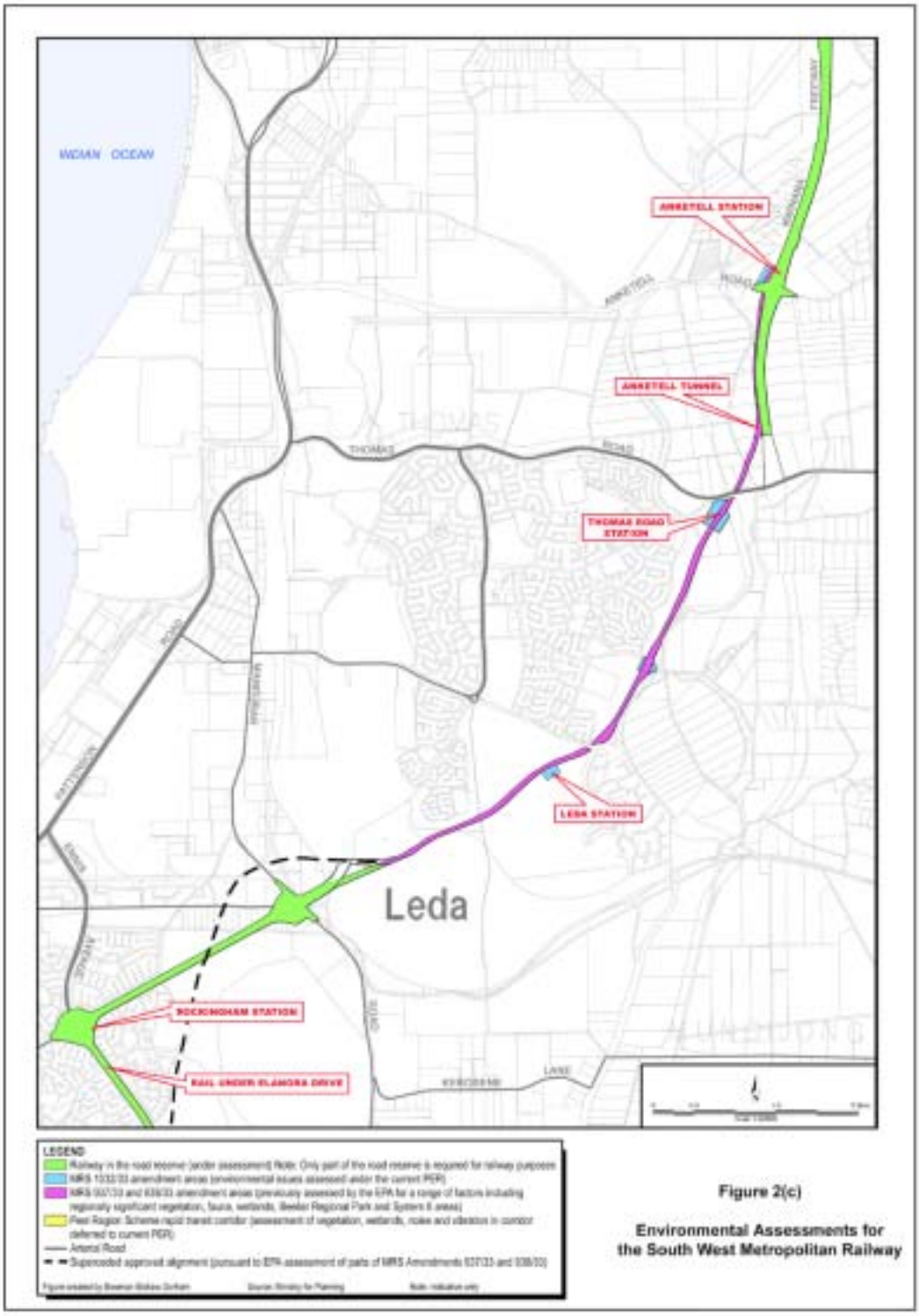


Figure 2(c)

Environmental Assessments for the South West Metropolitan Railway

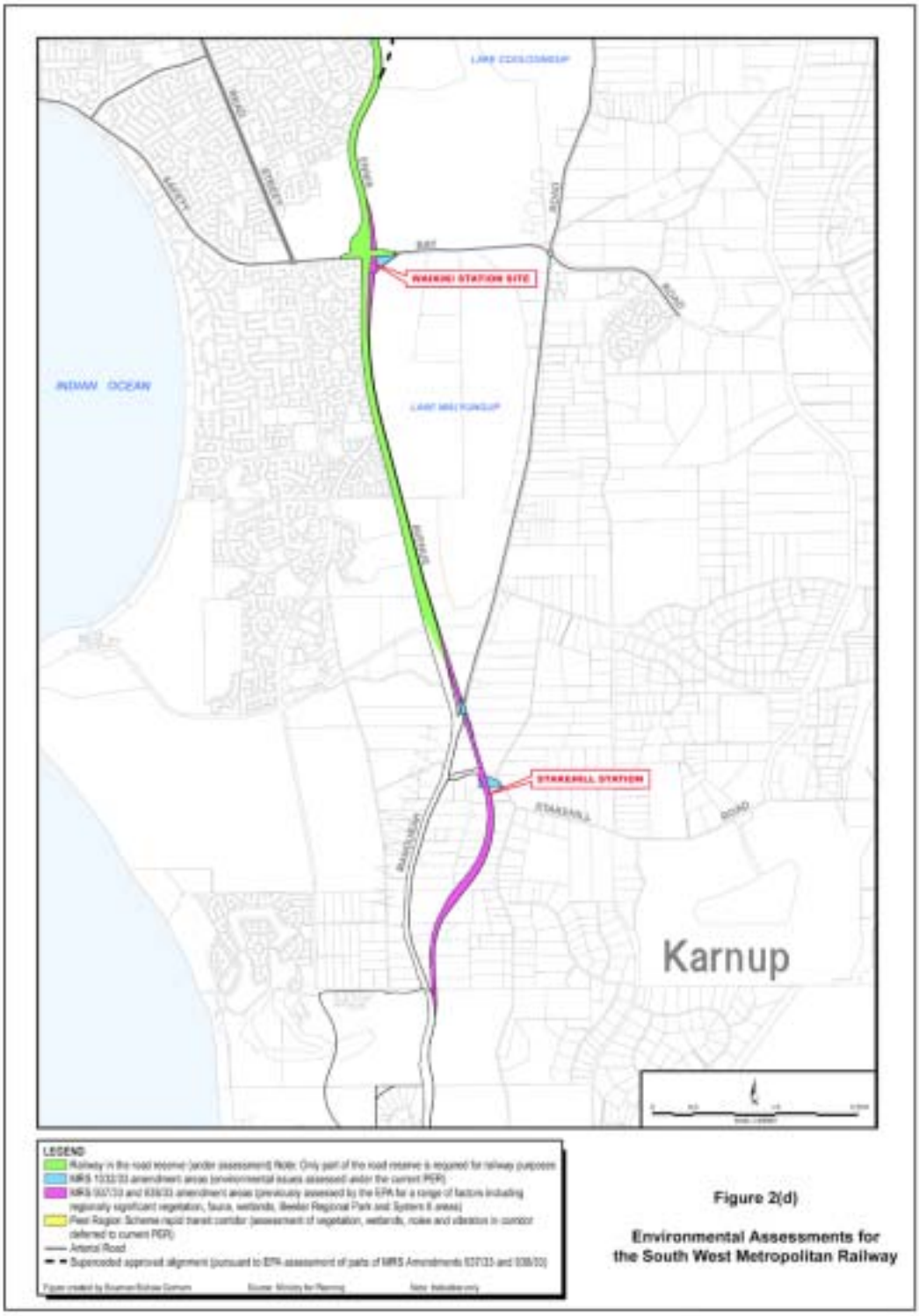


Figure 2(d)

Environmental Assessments for the South West Metropolitan Railway

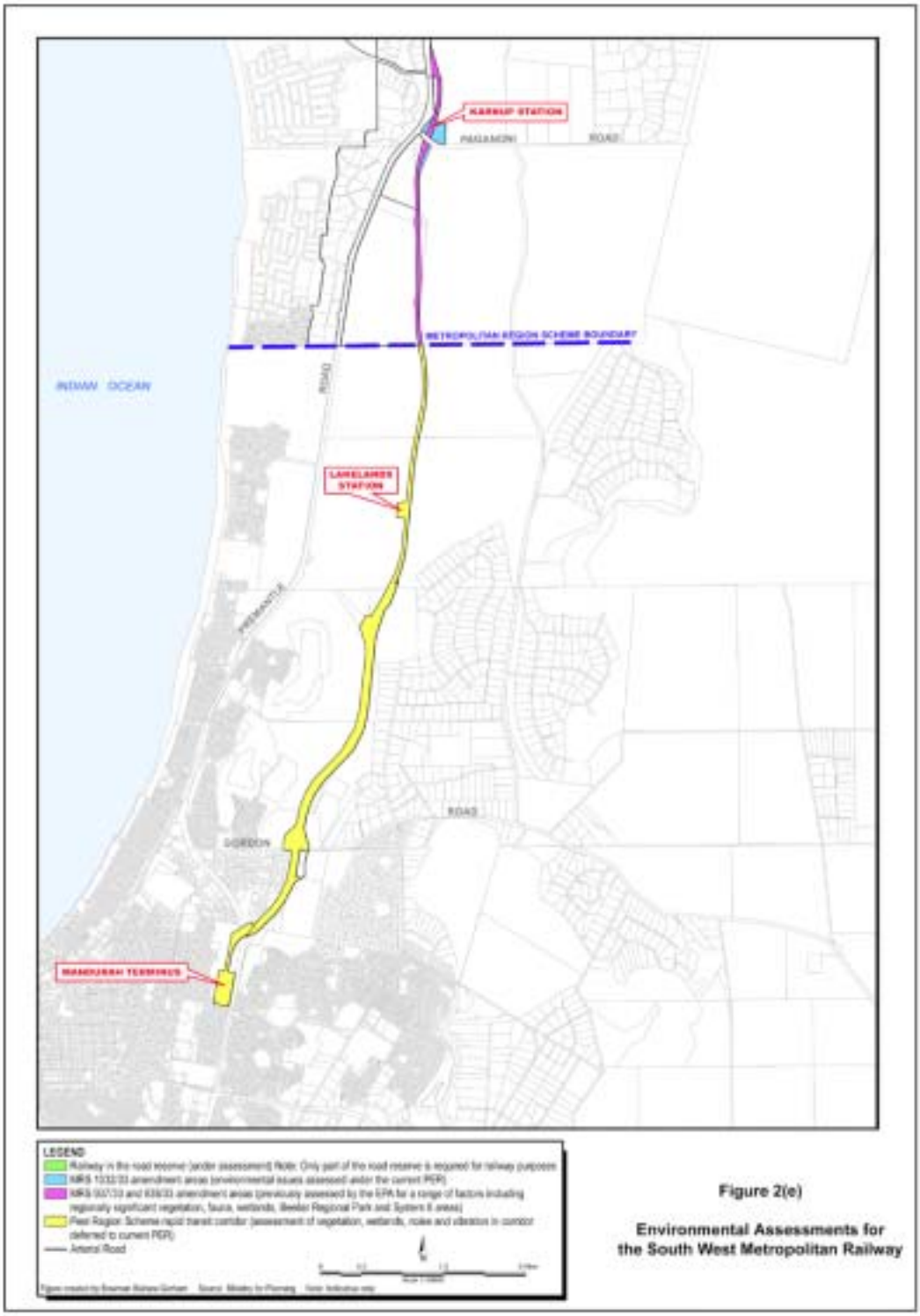


Figure 2(e)

Environmental Assessments for the South West Metropolitan Railway

The proposal

The proposal is to construct and operate the South West Metropolitan Railway from Perth to Mandurah. The proponent is the Commissioner of Railways.

The proposal includes the establishment of rail infrastructure between Perth and Mandurah with the northern section of the line running from the Perth Central Business District to Anketell tunnel via the Kwinana Freeway. South of the Anketell tunnel, the proposed railway passes through the local government areas of the Town of Kwinana, the City of Rockingham and the City of Mandurah, and terminates in Mandurah at Allnutt Street. An overview of the route is provided in Figure 1. The total length of the railway is approximately 72 kilometres.

Implementation of the proposed railway is expected to result in some significant benefits to the community including social benefits, reduced traffic on roads, reduced travel times, and protection of local air quality.

The main characteristics of the proposal are summarised in Table 1 below.

Table 1: Key Proposal Characteristics

Element	Description
Proposal description	Construction and operation of a passenger railway service from Perth to Mandurah. The proposal includes construction of the railway line, stations, vehicular and pedestrian areas and access ways associated with the railway, drainage facilities, road/rail intersections, bridges, tunnels, facilities to accommodate power and other services, signals, lighting, noise barriers, fauna and service vehicle underpasses, fencing, landscaping, signage, and associated earthworks.
Length of railway	Approximately 72 kilometres
Typical cross-section and corridor to be cleared for railway line	Embankments and cuttings generally with a slope of 1 in 2 on both sides of railway, 6 metres for fencing and access track on one side, 12 metres for two tracks on ballast, 2 metres for fencing on other side to access track. The typical width of the corridor to be cleared ranges from 25 to 40 metres, of which all but 20 metres is to be landscaped.
Stations	In the short term, approximately 11 as follows: William Street The Esplanade Canning Bridge Leach Highway South Street Thomsons Lake Thomas Road Leda Rockingham

Element	Description
	Waikiki Mandurah
Future Stations	In the longer term approximately 7 as follows: Success Mandogalup Anketell South Parmelia Stakehill Karnup Lakelands
River crossings	Narrows Bridge – bridge between existing Freeway bridges. Mt Henry Bridge - widening and strengthening of existing bridge to accommodate railway. Bridgeworks require additional piers and footings in the river bodies.
Tunnels	From Narrows Interchange to Perth Station yard Anketell Tunnel (existing) Fremantle Road Tunnel, Mandurah
Grade separations/intersections	*Road bridges over rail: –* Road Bridges over the Kwinana Freeway from Mill Point Road, South Perth to Anketell Road, inclusive (existing) Thomas Road, Bertram Challenger Avenue, Parmelia Wellard Road, Wellard Elanora Drive, Rockingham Safety Bay Road, Waikiki (existing) Stakehill Road, Baldivis Gordon Road, Greenfields *Rail bridges over road: –* Mandurah Road, Hillman (also rail bridge over rail) Mandurah Road, Baldivis Paganoni Road, Karnup *Rail bridge over rail: -* Glen Iris, Jandakot (existing) Provision for up to two occupational crossings at Lakelands.
Underpasses for service vehicles	Northern end of Leda Nature Reserve, and at Paganoni Bushland approximately 350 metres north of Metropolitan Region Scheme boundary.
General standard of design and construction	Design speed 140 kilometres per hour for track infrastructure
Rail cars	Electric Multiple Units, 25kV a.c. supply, coupled as three-car sets, running at a maximum service speed of 130 kilometres per hour

Element	Description
	The existing two-car sets may be used from time to time between Thomsons Lake and Perth.
Construction material source	Local cut and fill, all materials (ballast and rails etc) sourced by construction contractor from approved sources and suppliers.

Since the PER document (BBG 2002) was completed in November 2002, a number of modifications to the proposal have been made by the proponent. Changes relevant to this assessment include:

- deletion of the future stations at Gordon Road (Mandurah) and South Perth from this proposal;
- the proposed maximum operating speeds of trains in the area between the Mt Henry and Narrows Bridges has been reduced from 130 to 100 kph;
- Slab track construction between the Mt Henry and Canning Bridges will be replaced by ballast track;
- The car parking area in the south east quadrant of the South Street and Kwinana Freeway intersection is to be brought forward to first stage construction; and
- The proposal does not include land to be used for the Mandurah Bus Depot next to the Mandurah Terminus.

2. Relevant environmental factors

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment and Heritage on the 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 relevant 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 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 environmental factors relevant to the proposal require detailed evaluation in this report:

(a) Terrestrial flora:

- Bush Forever sites, vegetation complexes and floristic community types;
- Threatened ecological communities; and
- Significant species;

(b) Fauna;

(c) Wetlands;

(d) Noise and vibration – operations phase;

(e) Surface water and groundwater quality; and

(f) Visual amenity.

The above relevant 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 relevant environmental factors and their assessment are contained in Sections 3.1 - 3.6. 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.

3.1 Terrestrial flora

This assessment considers the likely impacts on terrestrial flora in the following areas along the alignment of the South West Metropolitan Railway:

- Perth to Anketell tunnel;

- Station sites and widenings that are not part of the current gazetted railways reserve for the South West Metropolitan Railway;
- The alignment in the Leda and Lake Cooloongup bushland areas via the Garden Island Highway reserve that is to replace a portion of the gazetted railways reserve; and
- Peel Region Scheme area.

Impacts on native flora associated with the construction of the railway within the current gazetted railways reserve for the South West Metropolitan Railway have been previously assessed by the EPA under Part IV of the *Environmental Protection Act 1986.* As mentioned in Section 1, the environmental conditions in Statement 368 apply. These include the following:

"3-2 Prior to construction commencing, to ameliorate and minimise the environmental impacts associated with the construction and operation of the Rapid Transport System, the proponent shall prepare an Environmental Management Programme to the requirements of the Minister for the Environment on advice of the Department of Environmental Protection and the Department of Conservation and Land Management ….

This Programme, which shall be released for public review for four weeks, shall address, but not be limited to:

1 Impacts on vegetation, fauna, hydrology and wetlands; and

2 Access to reserves."

For portions of the alignment to which Statement 368 applies, compliance with the above condition is required in addition to any other conditions and procedures that may result from the current environmental impact assessment.

Impacts on terrestrial flora include:

- The clearing of native terrestrial vegetation;
- Fragmentation and reduced connectivity of vegetation;
- Edge effects, including increased risk of the spread of weeds and dieback;
- Impacts from altered drainage regimes and erosion;
- Dust damage during construction; and
- Increased bushfire risk.

The factor terrestrial flora is addressed below under the following sub-headings:

- Bush Forever sites, vegetation complexes and floristic communities;
- Threatened ecological communities;
- Significant species; and
- Mitigation plan.

3.1.1 Bush Forever sites, vegetation complexes and floristic communities

Description

Bush Forever sites

The Bush Forever sites that the proposed alignment will impact on, in ways substantially different to the previously assessed alignment, are as follows:

- Bush Forever Site 349: Leda and adjacent bushland; and
- Bush Forever Site 356: Lake Cooloongup and Lake Walyungup and adjacent bushland.

In these Bush Forever sites it is proposed that the railway will connect with the Garden Island Highway reserve, and that the railways reserve that this alignment replaces can be deleted. Impacts on these two Bush Forever sites include the clearing of vegetation, earthworks, drainage and edge effects.

The proposal has the potential to impact on the following areas of regionally significant vegetation:

- Bush Forever Site 227: Mount Henry bushland - potential impacts on this site include drainage impacts, and construction impacts associated with bridge works; and
- The Regional Open Space in the Peel Region Scheme that contains the southern part of Paganoni Swamp - potential impacts include edge effects, and impacts from drainage.

The proponent proposes to pursue land adjustments adjoining the currently gazetted rail reserve. In some places, land can be returned to the adjoining Bush Forever site. In other places, additional land may be required to accommodate embankments, cuttings, or access tracks (to be usually shared with other agencies eg Department of Conservation and Land Management (DCLM) and Fire and Emergency Services (FESA). Adjoining the currently gazetted rail reserve, the proponent proposes that there will be a net gain of land to each Bush Forever site except near Waikiki Station. The Bush Forever sites the subject of proposed encroachments and the gain of land surplus to railway requirements are:

- Bush Forever Site 269: The Spectacles;
- Bush Forever Site 272: Sicklemore Road bushland;
- Bush Forever Site 349: Leda and adjacent bushland;
- Bush Forever Site 356: Lake Cooloongup and Lake Walyungup and adjacent bushland;
- Bush Forever Site 275: Stakehill Swamp;
- Bush Forever Site 379:Anstey Swamp; and
- Bush Forever Site 395: Paganoni Swamp and adjacent bushland, Karnup.

Vegetation complexes

In the area that requires assessment, the proponent has estimated impacts on vegetation complexes as follows.

Table 2: Proposed areas of vegetation complexes to be removed

Vegetation complex	Total area to be removed that requires assessment*
Bassendean Complex – central and south	7.18 ha
Cottesloe Complex – central and south	48.18 ha
Karrakatta Complex – central and south	25.68 (0.51 ha in fair to very good condition)
Quindalup Complex – central and south	42.71 ha
Herdsman Complex	1.85 ha

* Figures are considered to be indicative only.

Floristic communities

Vegetation units were mapped by Ecoscape (Australia) Pty Ltd along the route of the South West Metropolitan Railway south of the Anketell tunnel, and were assigned to their respective Gibson floristic community type (Gibson et al 1994).

The following Gibson floristic community types are likely to be impacted in the areas the subject of this assessment: 5, 11, 21a, 23a, 24, 28, 17, 19b, 30b, and 30c.

Community 19b is a threatened ecological community and is addressed in Section 3.1.2 of this report. Community 24 is considered well reserved with conservation status - susceptible. Community 30c may correspond to the Ecoscape vegetation unit EgAr that was found in the Garden Island Highway reserve in the Lake Cooloongup bushland area. This community was considered in Gibson et al (1994) to be unreserved with conservation status - insufficiently known. The remaining communities are classified as well reserved with conservation status – low risk.

Submissions

Concerns were raised about minimising bushland clearance both within and outside regional parks (DCLM, Town of Kwinana, City of Melville, Conservation Council of Western Australia, Peel Preservation Group). Revegetation to ensure compatibility with surrounding areas and consultation with Local Government was sought by the City of Melville. The City of South Perth sought planting of disturbed areas with native species and adequate maintenance.

The Conservation Council of Western Australia sought that surplus land is returned to regional parks, that impacts on regional parks are avoided, and that further opportunity is provided for public comment on revegetation, and Waikiki station. The Conservation Council also sought the avoidance of "gaps" between Main Roads and railway land, and upgraded Fire Management Plans to counter the extra risk from trains and the public. A firm process was sought for pegging and ground truthing before clearing, and monitoring of clearing.

The City of Rockingham saw conservation benefits in using the Garden Island Highway Reserve for the railway, with subsequent rationalisation of transport corridors, resulting in significant retention of native vegetation.

Concerns were raised about works in Pickle Swamp by two private submissions and the Conservation Council of Western Australia. The Conservation Council submitted that this project should be tied in with any proposed realignment of Gilmore Avenue. The Town of Kwinana requested detailed drainage design to minimise any contamination of the remaining wetland.

DCLM and two private submissions sought the retention of existing vegetation at station sites where possible.

Private submissions, the Peel Preservation Group and the Conservation Council of Western Australia supported the retention and regeneration of Tuart trees. Areas of concern included the Leda Nature Reserve, the Mandurah area and opposite Anstey Swamp.

Concerns were raised by the Town of Kwinana regarding dieback management during clearing.

The Mt Henry Peninsula Conservation Group were concerned that there would be impacts on Bush Forever site 227 (Mt Henry Peninsula). Matters of concern included lack of recognition of the conservation values of the area in the PER, drainage, impacts on the works of the Conservation Group near the bridge, impacts on the slopes and foreshore, and consideration of the draft Mt Henry Peninsula Foreshore Management Plan section on Mt Henry Bridge expansion.

A private submission considered that there is insufficient discussion in the PER of the impact of the proposed Thomsons Lake Station. The Town of Kwinana sought sufficient preservation of vegetation at Thomas Road to provide a corridor linking Bush Forever sites 272 and 269. A private submission noted that the PER barely mentioned the Stakehill Bush Forever site, in contrast to the extent of the wetland.

DCLM expects to be involved in discussion on mitigation measures for impacts on regional parks. A private submission supported a clearing mitigation plan.

DCLM urged that it is consulted on any clearing that may be required in areas it manages. Fencing prior to construction is supported to reduce the risk of accidental damage to vegetation. Weed control should remain a responsibility of the rail managers indefinitely. Penalties for breaching environmental conditions were also raised as an issue.

The Town of Kwinana expressed concern that the railway may sever connectivity along the Crown Tramways Reserve, with retention of vegetation a consideration. Similarly the City of Melville requested revegetation of areas to be carried out in consultation with the City.

A private submission sought assessment by the EPA of areas where the rail alignment passes through all Bush Forever sites to determine whether that is acceptable.

Other grounds of submission referring to threatened ecological community 19b and significant flora are in Sections 3.1.1 and 3.1.3.

The proponent's response to the issues raised is in Appendix 5.

Assessment

The area considered for assessment of this factor is the footprint of the rail proposal in the context of the Perth Metropolitan and Peel Region Scheme portions of the Swan Coastal Plain.

The EPA's environmental objectives for terrestrial flora are:

- to maintain the abundance, species diversity, geographic distribution and productivity of flora at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge; and
- to ensure that regionally significant flora and vegetation communities in Bush Forever and Regional Open Space sites are adequately protected from impacts including the spread of weeds and diseases.

Bush Forever sites

The EPA endorses Bush Forever as a sound commitment to a comprehensive plan for the conservation of Perth's biodiversity, and expects that Bush Forever will be implemented as set out in the published documents (Government of Western Australia 2000).

EPA expects no net loss of the environmental values and functions of Bush Forever sites, and Regional Open Space outside the Bush Forever area.

The consideration of impacts, relevant to this assessment, on each Bush Forever site along the alignment of the South West Metropolitan Railway follows.

Bush Forever Site 349: Leda and adjacent bushland and Site 356: Lake Cooloongup and Lake Walyungup and adjacent bushland

The main impacts on these Bush Forever sites that have not previously been assessed are a proposed widening of the railways reserve north of Pickle Swamp to accommodate earthworks, the route via the Garden Island Highway reserve, impacts on Pickle Swamp, enlargement of Waikiki Station and impacts on threatened ecological communities. Impacts on Pickle Swamp, a wetland of conservation significance, are addressed in Section 3.3, and impacts on threatened ecological communities are addressed in Section 3.1.2.

Compared with the previously assessed route, the route in this PER in the southern Town of Kwinana/northern City of Rockingham area overall involves less clearing and fragmentation of Bush Forever sites and bushland outside Bush Forever sites, and brings a number of potential future transportation routes into the one corridor.

Overall the route in this PER between Leda and Hillman is preferred to the previously approved route. It is noted that the previous alignment also impacted on areas of wetland and a threatened ecological community.

The proponent has committed to provide mitigation measures for impacts affecting Pickle Swamp, threatened ecological communities and Waikiki Station site. The proponent's mitigation plan is outlined in Section 3.1.4.

Bush Forever Site 395: Paganoni Swamp and adjacent bushland

Compared to the previously approved alignment, the current proposal shows a proposed widening of the railways reserve south of Paganoni Road. The proponent advises that this is now unlikely to be cleared, given the expected timing of construction of a rail bridge over Paganoni Road. Should the land be required for rail purposes, then mitigation for the loss of this land from the conservation estate is expected, consistent with the proponent's commitments.

Bush Forever Site 227: Mount Henry bushland

Submissions raised concern about potential impacts on this site. There is a potential for construction and drainage impacts. It is considered that these impacts can be managed through the proponent's commitments that include the preparation and implementation of a Construction Management Plan to minimise impacts on Bush Forever sites; a Wetlands, Hydrology and Drainage Management Plan; a Stakeholder Consultation Strategy requiring stakeholder input into all management plans; and a Visual Amenity, Rehabilitation and Landscape Management Plan.

Land adjustments Bush Forever Sites 269, 272, 349, 356, 275, 379, 395

On-going detailed design work for the railway is resulting in modifications to the proposed extent of works. In some cases, notably in the Spectacles area, surplus land has been identified. The proponent proposes to pursue processes to change the reservation of the land from Railways to Parks and Recreation where appropriate.

In other places, encroachment into the Parks and Recreation reserve for embankments, cuttings and shared access tracks is sought. The final requirements are not yet known as they depend on such matters as ongoing detailed design, consultation with DCLM, and resolution of shared access track maintenance issues. Information supplied by the proponent indicates that, overall, the area of land that is surplus to requirements and can be returned to Parks and Recreation, exceeds encroachments.

The main areas where land in Bush Forever sites adjoining the approved alignment of the railway is likely to be sought are north of Safety Bay Road, and south east of Anstey Road.

The EPA considers that Bush Forever sites should be subject to no net loss of values as a result of encroachments for embankments, cuttings and shared access tracks. The proponent has committed to provide mitigation for land adjustments in the circumstances specified in Section 3.1.4.

Unexploded Ordnance Search Areas

Following consultation with FESA and DCLM, the proponent has advised that there is the potential for unexploded ordnance in the vicinity of the Rockingham Lakes Regional Park in the Lake Cooloongup and Lake Walyungup areas adjoining Ennis Avenue between Willmott Drive and the southern tip of Lake Walyungup.

The proponent expects that a 100 percent survey for unexploded ordnance will be required by FESA within the railways reserve and any areas of adjoining land in the Rockingham Lakes Regional Park that may be impacted by construction works. The proponent's initial enquiries indicate that the survey techniques are likely to involve the slashing of vegetation. The proposed search area extends in places inside the Regional Park to include the boundary track.

The EPA considers that the proponent's commitment to prepare and implement a Vegetation Management Plan for Unexploded Ordnance Search Areas is adequate to ensure search methods do not unduly disturb vegetation in the Regional Park. The proposed Management Plan is to address:

- Potential impacts on native vegetation;
- Delineation of search areas;
- Measures to minimise impacts on native vegetation; and
- Management of disturbed areas to promote repair where disturbance is outside area to be cleared for rail construction purposes.

Thomsons Lake Station Site

This bushland site was proposed for inclusion in Bush Plan. The planning of a regional centre in the area resulted in the selection of a replacement site on Lyon Road (Bush Forever Site 492). The replacement has previously been considered and accepted by the EPA.

Management of impacts on Bush Forever sites

With respect to impacts on Bush Forever sites and Regional Open Space, the EPA considers that the proponent's commitments are adequate to manage potential direct and indirect impacts, and to ensure no net loss of values. The commitments include the preparation and implementation of the following management plans:

- Construction Management Plan;
- Biodiversity and Wetland Mitigation Plan (discussed in Section 3.1.4);
- Visual Amenity, Rehabilitation and Landscape Management Plan;
- Wetlands, Hydrology and Drainage Management Plan;
- Access Management Plan;
- Stakeholder Consultation Strategy; and
- Vegetation Management for Unexploded Ordnance Search Areas.

Vegetation complexes

In the Metropolitan Region Scheme (Swan Coastal Plain) area, the EPA expects that the implementation of Bush Forever will generally ensure sufficient retention of vegetation complexes. In the case of the Karrakatta Central and South complex where more than 10 per cent remains vegetated in the Perth Metropolitan area, but less than 10 per cent is proposed for protection, the EPA will consider the regional conservation value of vegetation that may be lost in the context of changes to the

representation of ecological communities being protected through the on-going implementation of Bush Forever (EPA 2003).

Areas of Karrakatta Central and South complex occur around Wellard Road, in the Karnup Station - Paganoni bushland area, and south into the Lakelands area. Areas under assessment are considered to equate to floristic community type 28 or 21a that are considered to be well reserved and in a low risk conservation category (Gibson et al 1994). In most portions of this complex under assessment, the vegetation condition is mapped as "poor" or "very poor". Any widening of the gazetted railways reserve into the Paganoni Bush Forever site as shown in Figure 2e would be subject to the proponent's commitment to provide mitigation measures pursuant to the Biodiversity and Wetland Management Plan.

Outside the Bush Forever area, the proponent has committed to mitigation for loss of the vegetation mapping unit SpD shown within the Cottesloe Central and South complex (BBG 2002), as addressed under the following heading.

The EPA concludes that there will be no unacceptable loss of a vegetation complex.

Floristic communities

With the exception of threatened ecological communities (see Section 3.1.2), in the Swan Coastal Plain portion of the Perth metropolitan area, the EPA accepts that the implementation of Bush Forever will generally satisfy its objectives for the protection of floristic communities.

In the Peel Region Scheme area, the most extensive vegetation type that persists in good to excellent condition is the Ecoscape vegetation mapping unit SpD that is considered to equate to floristic community type 24. The extent of this community type north of Mandurah along the railway alignment is shown in Figure 7. This vegetation type was considered to be of "susceptible" conservation status by Gibson et al (1994). The proponent estimates clearing requirements at approximately 6.3 ha.

The proponent proposes to implement mitigation measures for the loss of this vegetation community, in accordance with a Biodiversity and Wetland Mitigation Plan.

Summary

Having particular regard to:

(a) The proponent's commitments; and

(b) The alignment of the railway through the Garden Island Highway that reduces fragmentation and clearing of Bush Forever sites and bushland, compared with the alignment of the gazetted railways reserve;

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

3.1.2 Threatened ecological communities

Description

The floristic community types according to Gibson et al (1994) that were assigned to the vegetation mapping units along the route include community type no. 19b "woodlands over sedgelands in Holocene dune swales". Community 19b is a subgroup of Community 19 that has been identified as Critically Endangered by English and Blyth (1997) and as Endangered under the *Environment Protection and Biodiversity Conservation Act 1999*. It is recognised as a threatened ecological community (TEC) by the Department of Conservation and Land Management.

The proponent commissioned studies of the Lake Cooloongup and Lake Walyungup bushland areas to identify areas of TEC 19 that may be impacted by the railway, and to ascertain the extent of the community in the Lake Cooloongup and Lake Walyungup area (Ecoscape 2001a, and Ecoscape 2001b).

Within the footprint of the South West Metropolitan Railway proposal, TEC 19b was identified by Ecoscape in four swales near the intersection of Dixon and Mandurah Roads (north of Lake Cooloongup), and at Waikiki station site.

Near the intersection of Dixon and Mandurah Roads, Ecoscape (2001a) found Swales A and B were in "good to very good" condition, Swale C was in "degraded" condition, and a fourth swale was in "very poor" condition. The area of clearing in the vicinity of these swales within the Garden Island Highway reserve is estimated by the proponent to be less than 1.6 hectares.

TEC 19b at Waikiki Station site was found to be in "very good to excellent" condition. The total area of the mapped extent of TEC 19b in the area bound by the existing and previous alignments of Safety Bay Road, and impacted by the station design shown in the PER document, is 1.37 ha.

Areas of TEC 19b mapped by Ecoscape in the Lake Cooloongup and Lake Walyungup bushland areas are shown in Figure 3. (The Department of Conservation and Land Management has not confirmed that all the areas mapped on Figure 3 are definitely TEC 19b.)

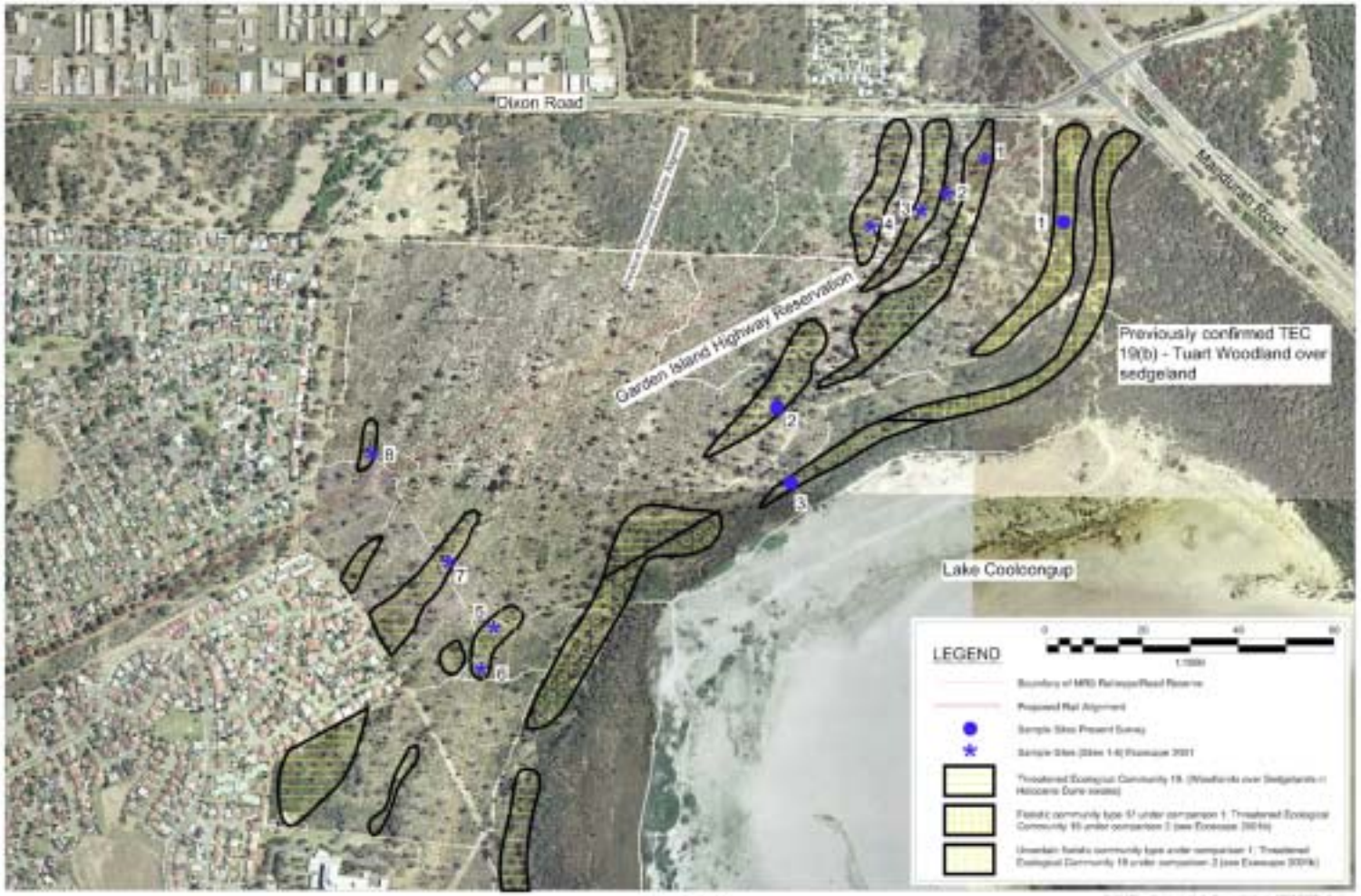


Figure 3(a)
Areas of TEC 19b in the Lake Cooloongup and Lake Walyungup Reserves

Figure 3(b)
Areas of TEC 19b in the Lake Cooloongup and Lake Walyungup Reserves

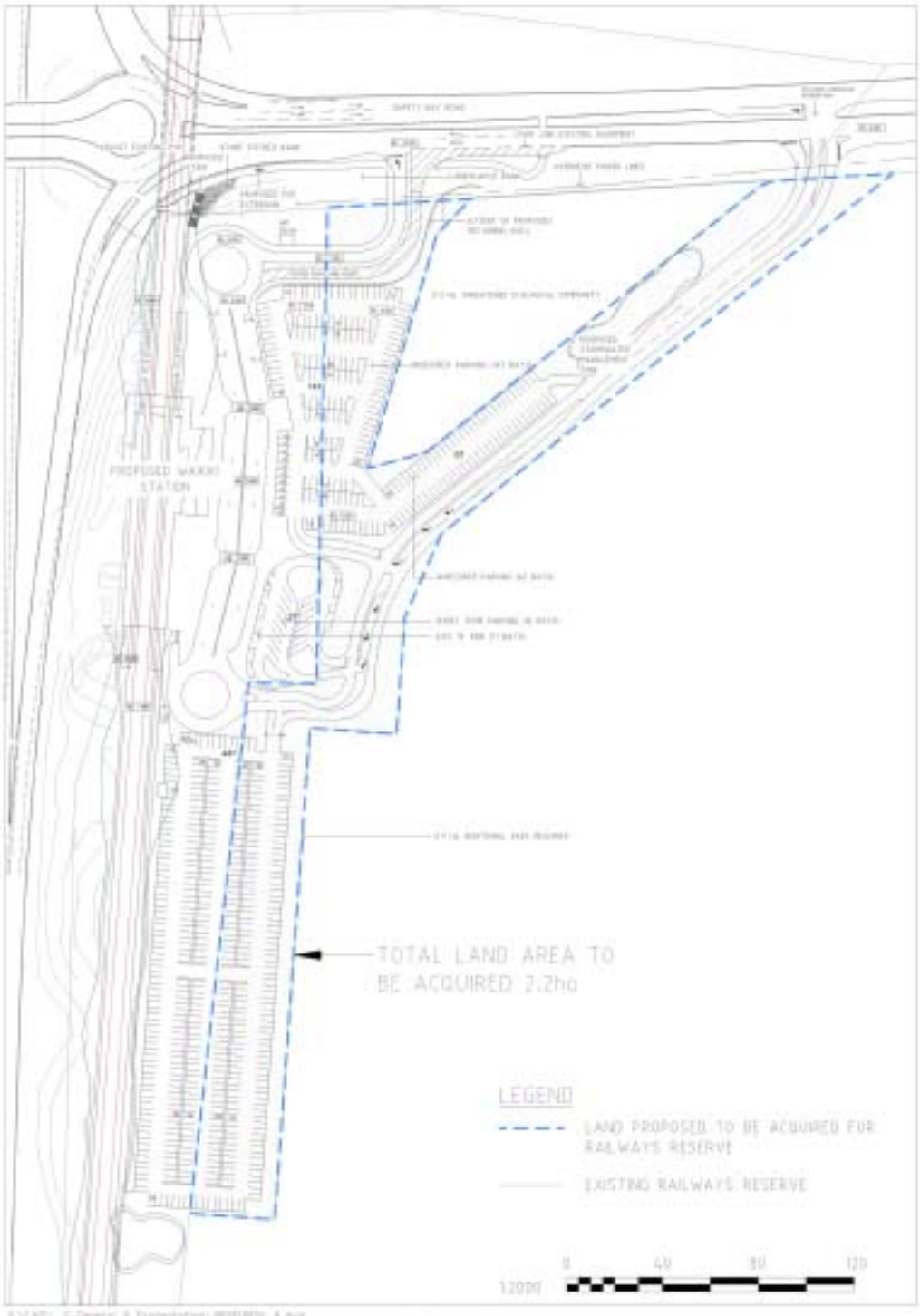


Figure 4
Concept for Waikiki Station

The proponent has considered alternative designs for the Waikiki Station site with a view to reducing impacts on TEC 19b. The design proposed by the proponent following consideration of public submissions is shown at Figure 4.

Submissions
Some submitters sought the avoidance of any impacts on TEC 19b at the Waikiki Station site (private submission and Conservation Council of Western Australia). Further research on the likely impacts on any preserved TEC was sought (private). WRC sought the redesign of Waikiki Station to avoid loss and impact on the TEC.

DCLM supported further discussion with the proponent on the issue of compensation for the loss of regionally significant vegetation.

Assessment
Threatened ecological communities are of high conservation significance. The EPA expects that impacts on threatened ecological communities will generally be avoided, and where this is not feasible, that adverse impacts will be minimised as far as practicable by high quality management, and that mitigation measures will be implemented to provide values equal to those that may be lost.

The EPA notes that the proposed route of the railway through TEC 19b north of Lake Cooloongup has some advantages, in that overall less clearing and fragmentation of bushland and Bush Forever sites would occur compared with the previously approved alignment, and that the previous alignment also involved impacts on an area of TEC 19b that is avoided by the current proposal.

The EPA considers that the impacts on the swales north of Lake Cooloongup are acceptable provided that clearing is minimised as far as practicable, and that the proponent implements its Biodiversity and Wetland Mitigation Strategy, to include mitigation for the loss of values associated with all areas of TEC 19b.

In relation to the Waikiki Station site, the EPA notes that the proponent has considered a number of alternatives, and has had discussions with a range of stakeholders including the DCLM and the Project Environmental Community Consultative Committee. The EPA is aware that the general preference articulated for the site is that it not be cleared. The EPA notes that impacts on TEC 19b require referral to Environment Australia pursuant to the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.*

The option that the proponent is pursuing following consideration of stakeholder and public input, is shown in Figure 4. This design involves the retention of 0.9 hectares of the 1.37 hectare portion of TEC 19b, enclosed by a road and parking area along the existing former alignment of Safety Bay Road. The design also involves encroachment into the Parks and Recreation reserve to the east and south of the current approved station site, involving the clearing of approximately 0.9 hectares of an area mapped as vegetation type Aj by Ecoscape, and considered to be floristic community type 24. The conservation and reservation status of this community is "well reserved/susceptible" (Gibson et al 1994). In the PER it is mapped as being in "poor" condition.

The proponent has taken steps to investigate the practicality of retaining the 0.9 hectare area of wetland bound by roads and a station site. Provided that the site and drainage are carefully managed, the community is expected to persist.

To complement the retention of most of the TEC at the Waikiki Station site, the proponent has committed to the establishment of a management plan for TEC 19b and the provision of mitigation measures for the loss of values at the site. The EPA expects to sight further demonstration that all reasonable options to minimise encroachment into the Bush Forever site have been examined.

Summary
Having particular regard to the:

(a) Proposed alignment for the railway utilising the Garden Island Highway reserve that is overall preferred to the previous alignment;

(b) Specific site information relating to the Waikiki Station site;

(c) Proponent's commitments and in particular the commitment to prepare and implement a Biodiversity and Wetlands Mitigation Strategy;

it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective for threatened ecological communities.

3.1.3 Significant flora

Description
The proponent commissioned studies as reported in BBG (2002), Ecoscape (2001c) and Hart, Simpson and Associates (2001) to describe the vegetation in the area generally south of Anketell tunnel and at some of the proposed station sites north of the Anketell Tunnel.

Three priority species were identified during the field investigations. These were:

- *Grevillea thelemanniana* (Priority 4) in vegetation types SpD and LR;
- *Jacksonia sericea* (now Priority 4) in vegetation type SpD; and
- *Lasiopetalum membranaceum* (Priority 3) east of Paganoni Reserve.

No declared rare flora were found during the field investigations.

The PER (BBG 2002) identified habitat where declared rare and priority flora may exist, and noted that as the flora surveys did not cover the entire alignment, there is the possibility that some populations of threatened species may occur within the alignment, that were not picked up during the field surveys.

Since the PER was released for public review, the proponent has advised that it intends to bring forward the construction of a car park in the south east quadrant of South Street and the Kwinana Freeway for the South Street Station. This site is a registered site for the Critically Endangered Grand Spider Orchid *Caladenia huegelii*. The proponent has made application to take this species, and has been advised by the Department of Conservation and Land Management that the Minister will need to

consider the case and that the recommended practice is that the applicant includes a package of appropriate environmental offset measures if an alternative to taking the flora is not feasible (correspondence from DCLM 9 May 2003).

The proponent is obliged to refer the proposal to Environment Australia under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.*

Bush Forever has identified some species as significant, in addition to those on DCLM's declared rare and priority lists. Two additional species designated as significant in Bush Forever (Government of Western Australia 2000) were identified in the South West Metropolitan Railway study area. These were *Kennedia coccinea* found in the Lake Cooloongup Reserve, and *Laxmannia grandiflora* found south of Thomas Road.

Tuart (*Eucalyptus gomphocephala)* is a species of both public and conservation interest that will be impacted by the proposal. Areas where impacts are proposed include the Leda and Lake Cooloongup bushland areas, and the Peel Region Scheme area.

Submissions
A number of submitters considered that the occurrence of the declared rare flora Grand Spider Orchid (*Caladenia huegelii*) at sites impacted by the railway including the south east quadrant of the South Street and Kwinana Freeway intersection needs to be addressed (private, Main Roads of Western Australia, City of Melville).

The Peel Preservation Group and the City of Mandurah support the relocation and seed collection of priority flora in the Mandurah area.

The retention and regeneration of Tuart trees was supported in submissions by individuals, the Peel Preservation Group and the Conservation Council of Western Australia. Areas of concern included the Leda Nature Reserve, opposite Anstey Swamp, and the Mandurah area, including the Mandurah terminus.

Assessment
The EPA expects that declared rare and priority flora will be protected in accordance with the provisions of the *Wildlife Conservation Act 1950* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.* The EPA expects the proponent to carry out diligent investigations for rare and priority flora, to avoid impacts where possible, and to comply with the provisions of the legislation when species are found.

In relation to significant species, the EPA notes that the proponent has committed to:

- Carry out further investigations for declared rare and priority flora*;*
- Collect seed and material for propagation;
- Establish a stakeholder consultation strategy and consult with the community with respect to all management plans including the Construction Management Plan and the Visual Amenity, Rehabilitation and Landscape Management Plan; and

- Mitigate for the clearing of vegetation mapping unit SpD north of Mandurah, that contains tuart (*Eucalyptus gomphocephala*).

Summary
Having particular regard to:

(a) The requirements of the *Wildlife Conservation Act 1950* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*; and

(b) The proponent's commitments;

it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective for threatened ecological communities.

3.1.4 Mitigation Plan

The EPA considers that the preparation and implementation of the proponent's Biodiversity and Wetlands Mitigation Plan is a key element in ensuring that the proposal results in an acceptable outcome.

The proponent has committed to prepare a Biodiversity and Wetland Mitigation Plan which addresses the provision of mitigation measures for the following areas of land that are to be cleared or are otherwise required for railways purposes:

- Portions of Pickle Swamp and the buffer of Pickle Swamp in the Leda Nature Reserve and Gilmore Avenue road reserve;
- Areas of threatened ecological community 19b in the Garden Island Highway reserve north of Lake Cooloongup;
- Land outside the existing gazetted railways reserve and the previous cleared alignment of Safety Bay Road that is required for the Waikiki Station site, including portions of threatened ecological community 19b and floristic community type 24;
- Portions of land within the 50 metre buffer of Paganoni Swamp and Black Swan Lake (Fremantle Road sumpland);
- Land containing floristic community type 24 in the Peel Region Scheme area north of Gordon Road, Mandurah; and
- Any other land adjustments required from Bush Forever sites or significant wetlands and their buffers that are additional to the above and are not in the gazetted railways reservation, subject to the following:
    - the area is in excess of that which will be returned to the conservation estate in the general vicinity; and
    - the land is to be used for purposes other than an unfenced access track used by a number of agencies.

The objective of the proposed Mitigation Plan is to mitigate for the effects of clearing and disturbance of regionally significant bushland, wetlands and wetland buffers and achieve the objective of no net loss of regional biodiversity and wetland values and functions, in relation to areas for which mitigation is required.

It is proposed that the Plan will include the following elements:

1. The following matters will be addressed:
    - Demonstration that each area of land for which mitigation is required (see above) is minimised as far as practicable;
    - Detailed delineation of the areas for which mitigation is required;
    - Detailed identification of the biodiversity and wetland values and functions of land for which mitigation is required;
    - Specification of detailed mitigation measures including areas to be acquired or managed, and other measures, to meet the objectives for this commitment;
    - Where appropriate, the preparation of an Environmental Management Plan for mitigation measures that involve a specific area of land;
    - Mitigation to be by the acquisition of natural areas rather than rehabilitation or other natural area management measures, where practicable;
    - Where acquisition is not considered practicable, demonstration that acquisition has been reasonably explored, and the reasons why it is not practicable;
    - Where rehabilitation is proposed, an area of land the equivalent of at least twice the area of that for which mitigation is required, shall be rehabilitated, and rehabilitation will meet completion criteria specified in the relevant Environmental Management Plan; and
    - Vesting, maintenance and long term management responsibility in relation to each mitigation measure.

2. An Environmental Management Plan will be prepared for the Waikiki Station site.

3. Land purchased for the railway comprising 7.4 hectares of land adjoining the southern tip of Stakehill Swamp, shall be transferred to the conservation estate.

4. Land purchased for the railway comprising 6.7 hectares of land adjoining the north west tip of Anstey Swamp shall be transferred to the conservation estate.

5. The proponent will pursue the transfer to the conservation estate of land reserved for Railways purposes that is surplus to requirements and has the potential to be added to the adjoining conservation estate, in consultation with stakeholders.

The EPA considers that key aspects of mitigation are:

- Demonstration that impacts on the site for which mitigation is required are minimised as far as practicable;
- That there will be no net loss of environmental values and functions; and
- That acquisition of replacement sites will be pursued in preference to rehabilitation or other management measures, as far as practicable.

The EPA considers that the proponent's commitment is sufficient to meet the EPA's objectives provided that it is satisfactorily implemented.

3.2 Fauna

Description
Implementation of the proposal in the gazetted reserve for the South West Metropolitan Railway in the Metropolitan Region Scheme area is subject to the environmental conditions in Statement No. 368. The conditions include the requirement that an environmental management plan be prepared to address impacts on fauna.

This assessment considers the impacts on fauna in places not previously the subject of assessment by the EPA, for this factor.

The most likely impacts on fauna include the following:

- Fragmentation of fauna habitat is expected to affect some species, including some species of conservation significance;
- The railway will act as a barrier to movement between habitat areas eg dryland used in conjunction with wetland;
- Areas of habitat will be lost. The loss of habitat of species with restricted habitat requirements or of is of particular concern, eg the areas of tuart open woodland over heath in the south of the railway route provide for a few species that may not occur elsewhere in the study area and may be important in providing seasonal food for some species;
- Important habitat elements will be lost, such as nesting and roosting trees and hollows in mature trees;
- Impacts on wetland water levels and water quality from stormwater drainage or spillages can affect wetland fauna; and
- By passing through areas of native vegetation, the railway has the potential to encourage invasion of weed species and decline in the quality of native vegetation.

Investigation of the fauna of the route south of Anketell Tunnel was carried out by M.J. and A.R. Bamford Consulting Ecologists and reported in Ecoscape and Bamford (2001d) and BBG (2002). Further information was provided in Ecoscape (2003) and correspondence from new MetroRail received in 2003.

Fauna likely to be impacted was identified by desktop review and by a survey and trapping programme in November 2001 at five locations along the route. The studies of fauna were for the continuous alignment, and were not limited to areas the subject of this assessment.

The proponent's consultants found that along the alignment south of Anketell Tunnel, the area may support 9 species of frogs, 5 species of freshwater fish, 43 species of

reptiles, 146 species of birds (regular users), and 26 species of mammals (Ecoscape 2003).

It was found that 51 bird species recorded or expected to occur in the study area are listed as significant birds of the Swan Coastal Plain in Bush Forever (Government of Western Australia 2000). The bird species that may be expected along the route include 8 species of national conservation significance, 11 listed under international treaties, and 2 of regional conservation significance. These species and the species referred to below, are listed in the references quoted above.

Fish are unlikely to be impacted except in the event of spillage polluting a wetland. One species is listed as Priority 3 by DCLM.

Development of the South West Metropolitan Railway is likely to lead to some habitat loss for frogs and a barrier that could disrupt access between wetlands and adjoining dryland habitat. Changes to hydrology could affect the breeding of some species, and stormwater and pollution could also affect frogs.

Three species of reptiles that may be present were considered to be of national conservation significance, and six are of regional conservation significance. These are generally species at the northern or southern limit of their distribution in the study area.

For mammals, habitat fragmentation is of particular concern. Because of the decline of native mammal species all native species can be considered of at least regional conservation significance. Five species are of national conservation significance.

Invertebrates have not been specifically investigated, although the proponent's consultants have had discussions with staff of the Western Australian Museum and the University of Western Australia on land snails, millipedes, and mygalomorph spiders. Threatened fauna that may occur along the alignment include 3 native bee species.

Important habitat for species of conservation significance includes:

- Wetland habitat;
- Connected dryland and wetland habitat;
- Woodland;
- Heathland and shrubland; and
- Large tuarts and other large eucalypts.

Submissions

Submissions raised concern that the railway will be a barrier to much fauna eg reptiles, amphibians, mammals and some species of birds (Town of Kwinana, Peel Preservation Group, Conservation Council of Western Australia).

Fauna underpasses and the preservation of vegetation on both sides of the track were sought by the Town of Kwinana. The City of Mandurah was concerned about long-necked tortoises that may not be able to access higher breeding ground near Paganoni

Swamp and Black Swan Lake. More research on fauna underpasses to address fragmentation, was sought by the Peel Preservation Group. Also the Conservation Council of Western Australia and a private submission sought consideration of fauna underpasses at such locations as the Lake Cooloongup area near Dixon Road and Leda. Rail kill was an issue for the Town of Kwinana.

Other concerns related to the proximity of the railway to wetlands and impacts on frogs and long-necked tortoises (Peel Preservation Group submissions), seasonal clearing affecting nesting period (City of Mandurah), the impact of electrification on birds such as pelicans and migratory waders in the South Perth foreshore (private submissions), impacts on migratory birds at the Milyu Nature Reserve from noise and vibration (City of South Perth), and migratory birds using the Black Swan Swamp (Peel Preservation Group).

Private submissions sought compensatory mechanisms for effects on fauna including nesting boxes to replace hollows in large trees, contributions to threatened fauna breeding programs, bird hides, and acquisition of wetlands with bird breeding habitat.

The proponent's response to these issues is provided in Appendix 5.

Assessment

The context area considered for assessment of this factor comprises the Perth metropolitan and Peel Region Scheme portions of the Swan Coastal Plain.

The EPA's environmental objective for fauna is to maintain the abundance, diversity, geographic distribution and productivity of fauna at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.

For the entire alignment, fragmentation of habitat and barrier to movement between habitat types, is likely to have a significant impact on fauna. The issue of fragmentation and loss of habitat was previously addressed by the EPA in assessment no. 838. The gazetted railways reserves for the South West Metropolitan Railway in the Metropolitan Region Scheme and the Peel Region Scheme areas are approved outcomes of environmental and planning assessment processes.

The EPA notes that the alignment under assessment reduces fragmentation of fauna habitat and the clearing of habitat in the vicinity of the Leda and Lake Cooloongup Bush Forever sites, compared with the gazetted railways reserve. Nonetheless there will be fragmentation of the northern Lake Cooloongup bushland with the area between Dixon Road and the Garden Island Highway reserve effectively cut off from the remainder of the Lake Cooloongup bushland.

To address the issues of loss of fauna habitat and fragmentation, the proponent has committed to the preparation and implementation of a Fauna Management Plan for all the proposal, that addresses:

- Identification and replacement, in the locality, of significant fauna habitat elements;

- Survey before construction for targeted species including the Masked Owl (*Tyto novaehollandiae novaehollandiae*) and sampling of groundwater for stygofauna;
- Identification of significant fauna movements that may be impacted by the rail corridor;
- Actions to limit impacts on fauna including measures to accommodate fauna movement, and relocation of fauna, as appropriate; and
- Monitoring of impacts on fauna.

The proponent proposes to provide fauna underpasses in consultation with DCLM and other stakeholders.

The EPA notes the advice in relation to threatened and priority fauna, that none of the species that may occur along the alignment, are likely to be critically dependent on the habitat of those sites. However, some species of conservation significance may be disadvantaged by the loss of some habitat elements and fragmentation of habitat along the route. The proponent has agreed to carry out fauna surveys for targeted species eg the Masked Owl *Tyto novaehollandiae novaehollandiae*, and to carry out management measures pursuant to the Fauna Management Plan. Appropriate management measures are likely to include the provision of nesting boxes to replace tree hollows.

The proponent was requested by the EPA Service Unit to address the potential occurrence of stygofauna along the alignment. The proponent obtained advice from the Zoology Department of the University of Western Australia. The advice indicates the it is unlikely that suitable karst conditions exist to support a diverse and abundant suite of groundwater fauna. However, little is known regarding stygofauna south of the Swan River. In order to provide more certainty to the preliminary advice, sampling of bore water bores in the vicinity of the alignment was suggested (Dr B. Knott correspondence 28 March 2003). The proponent has undertaken to sample water bores for stygofauna.

A number of species of conservation significance are associated with wetlands. The proponent proposes to provide mitigation for wetland impacts that are the subject of this assessment, in accordance with a Biodiversity and Wetland Mitigation Plan.

Summary
Having particular regard to the:

(c) Reduced fragmentation of fauna habitat associated with the Garden Island Highway Reserve alignment, compared with the gazetted railways reserve; and

(d) The proponent's commitments;

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

3.3 Wetlands

Description
This assessment considers the potential impacts on wetlands from the construction and operation of the railway in portions of the alignment not previously evaluated by

the EPA for this factor. Wetlands of particular relevance to this assessment along the route of the proposed South West Metropolitan Railway are as follows:

- Swan-Canning Estuary – conservation category wetland, Swan Estuary Marine Park (Milyu);
- Modified wetlands at the northern end of the route and in the Kwinana Freeway reserve – multiple use management category wetlands;
- Pickle Swamp – conservation category wetland, subject to the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992*, within a Bush Forever Site;
- Swales north of Lake Cooloongup – threatened ecological community 19b, Bush Forever Site;
- Wetland at the Waikiki Station site – conservation category wetland, Bush Forever Site, threatened ecological community 19b);
- Paganoni Swamp - conservation category wetland, subject to the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992*, in Regional Open Space; and
- Black Swan Lake – resource enhancement wetland, subject to the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992.*

Impacts on wetlands associated with the gazetted railways reserve in the Metropolitan Region Scheme area have previously been assessed by the EPA. The conditions in Statement No. 368 apply to those parts of the alignment.

Impacts on the swales containing threatened ecological community 19b in the Lake Cooloongup bushland and the Waikiki Station site are addressed in Section 3.1.2.

The management of surface water and groundwater quality generally is addressed in Section 3.5.

Submissions

The Water and Rivers Commission and the Peel Preservation Group were concerned about the potential for altering local groundwater that recharges wetlands. The Water and Rivers Commission expressed concern over the possible subsidence of fill near wetlands.

The Town of Kwinana was concerned that the rail operation would introduce contaminants such as oil in stormwater that may degrade areas such as Pickle Swamp.

The alignment of the railway in close proximity to parts of Paganoni Swamp and the Black Swan Lake was a cause for concern from the City of Mandurah, Water and Rivers Commission, Conservation Council of Western Australia, Peel Preservation Group and a private submission.

The Water and Rivers Commission, the Conservation Council of Western Australia and an individual requested mitigation for loss of wetland and wetland buffer areas. The Water and Rivers Commission and the Peel Preservation Group sought a comprehensive wetland monitoring program with monitoring of wetlands before construction works so a comparison can be made.

The City of Perth considered that the assessment needs to address the wetlands in the Narrows Interchange and former wetlands such as Lake Irwin and Kingsford.

Submissions from individuals, the Mt Henry Peninsula Conservation Group and the City of Perth considered that the environmental impacts of Mt Henry bridge needed to be further considered, and that bridge works should not adversely affect the foreshore.

Submissions relevant to the Waikiki Station site are referred to in Section 3.1.2, and submissions on surface water and groundwater impacts are outlined in Section 3.5.

Assessment

The context area considered for assessment of this factor comprises the wetlands and their catchments along the route of the South West Metropolitan Railway.

The EPA's environmental objective for this factor is to maintain the integrity, ecological functions and environmental values of wetlands.

This section addresses the following significant wetland issues (Lake Cooloongup bushland and Waikiki Station site issues are addressed in Section 3.1.2):

- Impacts on Pickle Swamp and its buffer in the Leda bushland, associated with the clearing of an estimated 0.4 hectares of wetland vegetation and further land in the buffer, earthworks and construction of infrastructure (see Figure 5);
- Mitigation for encroachment into the 50 metre buffer of Paganoni Swamp and Black Swan Lakes (see Figure 6);
- Potential land adjustments associated with the gazetted railways alignment in the Metropolitan Region Scheme area; and
- Management of drainage and hydrology near wetlands, appropriate to the management category of the wetland.

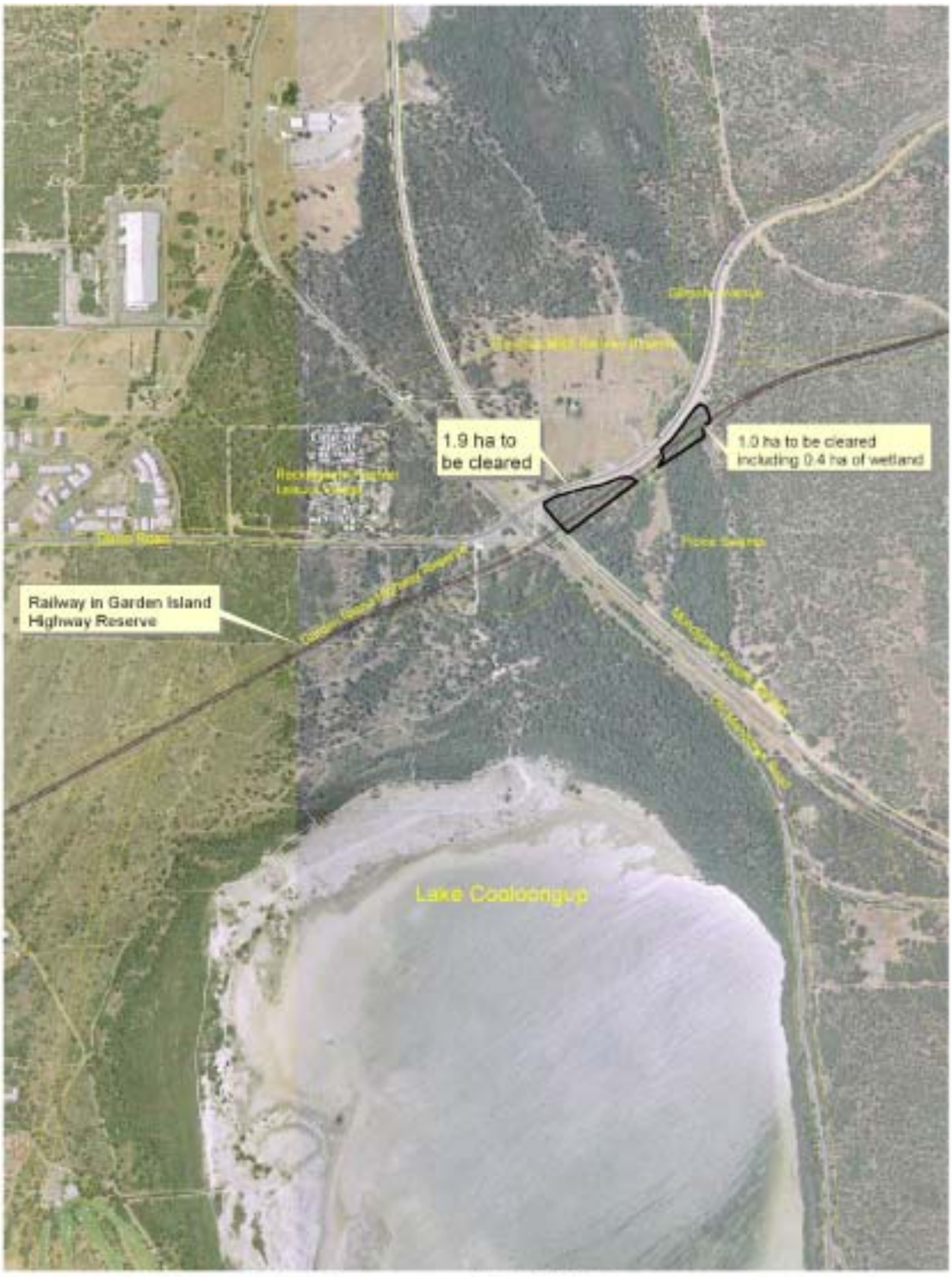


Figure 5: Clearing proposed at Pickle Swamp

Scale 1:12,000 200 0 200 400 Meters

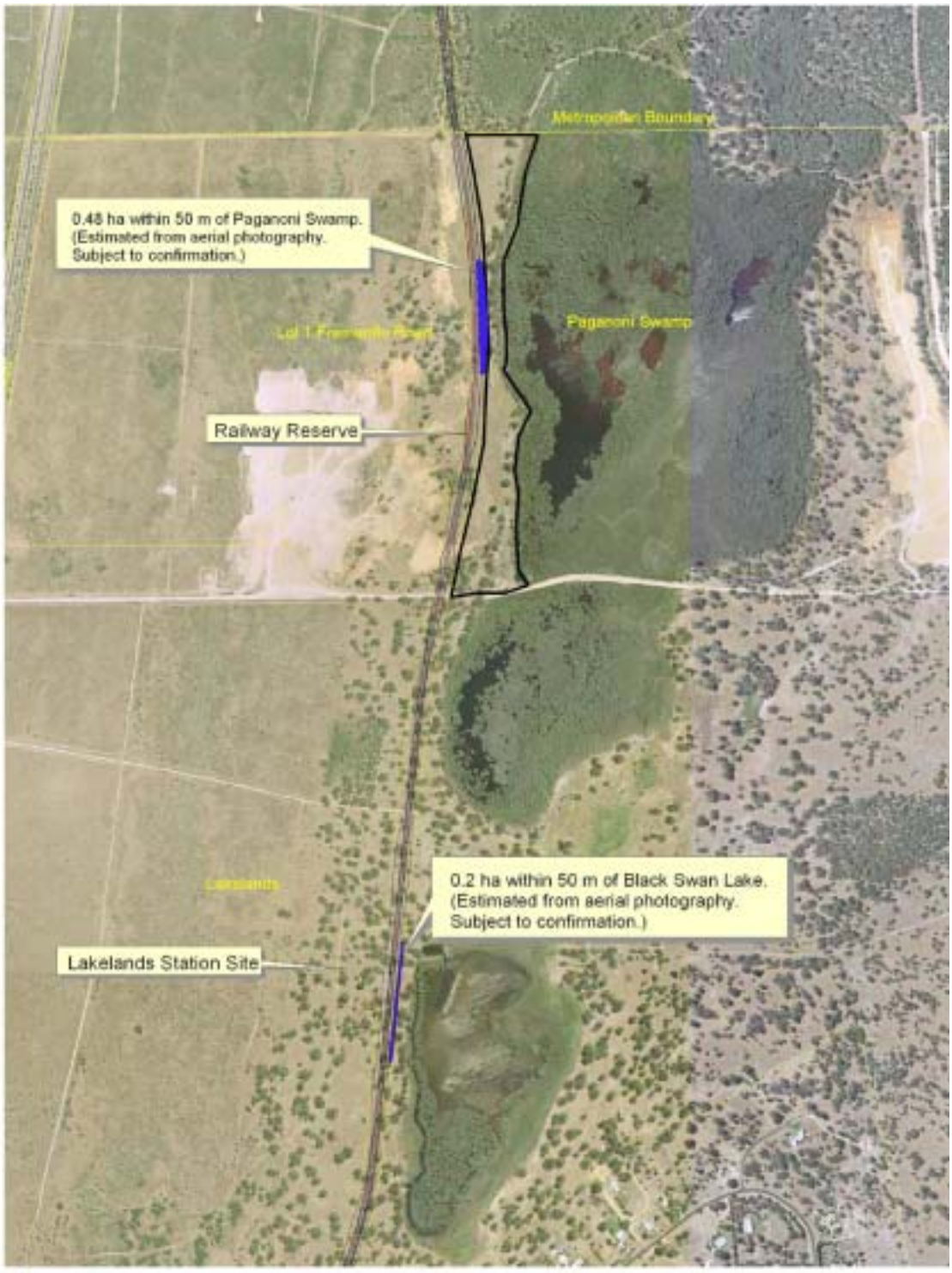
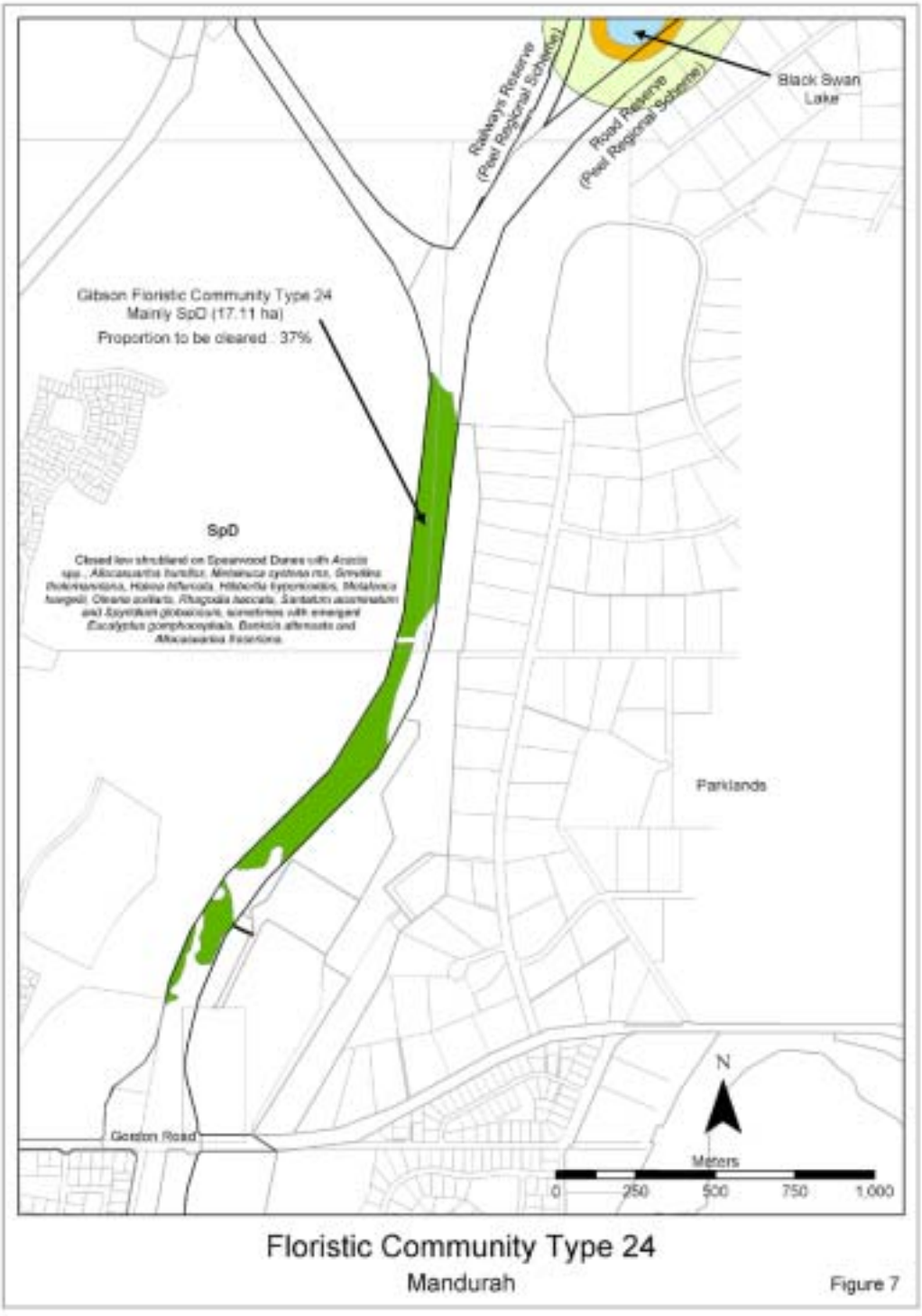


Figure 6: Paganoni Swamp and Black Swan Lake



Floristic Community Type 24

Mandurah

Figure 7

The EPA's position on wetlands is outlined in Preliminary Position Statement No. 4 *Environmental Protection of Wetlands* (EPA 2001b) and *A Policy Framework for the Establishment of Wetland Banking Instruments in Western Australia: Draft for Public Comment* (EPA 2001c).

In instances where the EPA considers a significant loss of wetland area or function to be "unavoidable", the EPA generally recommends to the Minister for the Environment and Heritage that the proponent be required to replace wetland areas and functions lost as a result of development, provided that all reasonable and practicable options to avoid and or minimise direct or indirect wetland impacts have first been explored.

With respect to impacts on Pickle Swamp, the EPA is mindful that the proposed route of the railway through the southern Leda Bushland into the Garden Island Highway Reserve and the Lake Cooloongup Bushland areas results in a reduction in the clearing and fragmentation of native vegetation and Bush Forever sites, compared with the previously assessed, now gazetted, railways reservation.

The EPA is aware that the proponent has considered options to avoid and to minimise impacts on wetlands. The EPA accepts impacts on Pickle Swamp provided that the final detailed design demonstrates that impacts are minimised as far as practicable, and that mitigation measures are implemented.

In consultation with the EPA, the proponent has committed to prepare a Biodiversity and Wetland Mitigation Plan to mitigate the effects of clearing and disturbance of wetlands and wetland buffers to achieve the objective of no net loss of wetland values and functions, as detailed in Section 3.1.4.

The area of encroachment of the approved railways reservation into the 50 metre buffer around Paganoni Swamp is approximately 0.48 hectares, and 0.20 hectares in the case of Black Swan Lake. The proponent's information shows that the condition of the buffer is "very poor" except for an area of 0.11 hectares. The proponent has committed to provide mitigation measures for the loss of environmental values and functions associated with these areas, in the Biodiversity and Wetland Mitigation Plan.

The proponent proposes to pursue land adjustments adjoining the currently gazetted rail reserve for the purposes of embankments and access tracks. The EPA considers that the land adjustments sighted are minor, and can be dealt with through the consideration of the specific plans which the proponent has committed to prepare, eg the Construction Management Plan.

To ensure appropriate stormwater drainage and management of impacts on hydrology in the vicinity of wetlands along the entire alignment, the proponent has committed to the preparation and implementation of a Wetlands, Hydrology and Drainage Management Plan that addresses:

- Potential pollutants;
- Drainage design and management maximising on-site infiltration;

- Dewatering impacts on environmentally sensitive areas;
- Wetland and groundwater monitoring;
- Minimising loss of wetland dependant vegetation and buffer vegetation;
- Corrective action to local resident water supplies (if required); and
- Site specific drainage management actions, with special attention to environmentally significant areas.

Additional proponent commitments that will assist in achieving an appropriate environmental outcome for wetlands include:

- Construction Management Plans with measures to limit clearing and impacts on wetlands, and to address drainage during the construction phase;
- A Visual Amenity, Rehabilitation and Landscape Management Plan that includes the reinstatement of original ecological functions as far as practicable; and
- Consultation with stakeholders pursuant to a Stakeholder Consultation Strategy.

Summary
Having particular regard to:

(a) The limited areas of wetland relevant to this assessment, that are likely to be impacted; and

(b) The comprehensive commitments made by the proponent;

it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective for this factor provided that the proponent's commitments are incorporated into the Statement of environmental conditions and are satisfactorily implemented.

3.4 Noise and vibration – operations phase

Description
Operational noise and vibration has the potential to affect the amenity, health and safety of the community, through:

- Train operating noise, acceleration and deceleration;
- Warning devices (horns);
- Noise associated with stations eg PA systems; and
- Vibration and regenerated noise associated with cuttings, tunnels and bridges.

The main sources of noise from electric passenger trains are rail and wheel interaction, and electric motors. Vibration is emitted largely from the rail/wheel interface and is more likely to be experienced in areas of rock eg limestone, or high water table. Vibration may be regenerated as noise in buildings located near bridges, tunnels and possibly cuttings.

The proponent has liaised extensively with the Department of Environment (DoE) to develop noise and vibration criteria, and prediction modelling. The criteria developed for operational noise and vibration are provided under the heading "Assessment", below.

The results of the preliminary modelling of railway noise south of the Narrows Bridge are reported in volume 2 of the PER (BBG 2002). Areas most likely to be affected by train noise include:

- Portions of the route between the Narrows Bridge and Bibra Lake;
- Near Spectacles Drive;
- Near Wellard Road;
- Areas in Rockingham and the urban area south of Rockingham;
- Stakehill; and
- Lakelands future residential area.

For the section south of the Narrows Bridge, preliminary assessment work indicates that vibration levels could exceed the proposed maximum criterion at 37 of 441 modelled receiving locations within about 35 metres of the track, while 135 receivers within about 70 metres may experience vibration levels between the proposed Criterion 1 and Criterion 2.

The issue of construction noise and vibration is discussed in Appendix 3, and in the proponent's response to submissions in Appendix 5.

Submissions

Submissions on the issue of noise and vibration during the operations phase were received from individuals and from the Town of Kwinana and the Cities of Perth, Mandurah, Rockingham, Melville and South Perth. Issues raised included impacts from passing trains on existing and future residential and commercial developments, the need for more information to be provided, and the need for more consultation with Local Governments and land owners. Additional noise modelling was sought by the Town of Kwinana for future residential areas.

The City of South Perth was concerned about the interaction between noise barriers, the visual amenity of residents and safety. The City of South Perth was also concerned about high noise level predictions, freeway noise, and with impacts on the Old Mill (Shentons Mill).

The City of Rockingham was concerned with impacts from acute noise events (horns, braking, cornering and PA systems at stations). The City of Rockingham wanted discussion on the cumulative effects of road and rail noise, more information on vibration, and more certainty that noise mitigation measures will be built for locations where Criteria 2 is exceeded.

The City of Perth was concerned about the impact of noise and vibration in tunnels (regenerated noise) on buildings and land uses in the Perth City area. A supplementary assessment for the City Rail Development Project was sought.

An individual submission recommended that a maximum noise level should apply, given the nature of train noise.

Main Roads Western Australia submitted that the noise from realigned roads was a relevant consideration.

The proponent's response to these issues is in Appendix 5.

Assessment

The area considered for assessment of this factor is the area within which noise and vibration impacts may be experienced by the community during the operations phase.

The EPA's environmental objective for noise and vibration is to protect the amenity of the nearby community from noise and vibration impacts resulting from activities associated with the proposal by ensuring the noise and vibration levels meet statutory requirements and acceptable standards.

Rail transportation noise is specifically excluded from the *Environmental Protection (Noise) Regulations 1997*. Criteria are currently being evaluated for Western Australia by the Working Group on Road and Rail Transportation Noise of the Infrastructure Co-ordinating Committee of the Western Australian Planning Commission. In the interim, project specific criteria have been developed by the EPA on advice of the DoE for transportation proposals.

Since the public review period, and as a result of discussions with the DoE, the proponent has agreed to the application of the following criteria in the proposed Operations Noise and Vibration Management Plans:

- Criterion 1: noise mitigation will be provided where the noise level is at or above $L_{Aeq(daytime)}$ 60 dB(A), $L_{Aeq(night\text{-}time)}$ 55 dB(A), or L_{Amax} 80 dB(A);
- Criterion 2: noise mitigation will be considered where the noise level is at or above $L_{Aeq(daytime)}$ 55 dB(A), $L_{Aeq(night\text{-}time)}$ 50 dB(A), or L_{Amax} 75 dB(A); and
- Noise levels shall be managed to as low as reasonably practicable.

The EPA considers that the proposed two stage L_{Aeq} (average level) noise criteria together with the L_{Amax} (maximum pass-by level) criteria, gives adequate recognition to environmental protection and recognises the work which has been done under the Infrastructure Co-ordinating Committee Working Group towards a whole-of-government approach to road and rail transportation noise.

The EPA supports the "as low as reasonably practicable" approach to implementation of noise control measures. It is considered appropriate that flexibility is retained to enable different approaches in different noise environments. Noise environments along the route include existing built up areas experiencing high existing ambient noise levels from major roads; other existing urban areas developed before the railway was proposed; future residential areas; and rural areas experiencing low ambient noise levels.

Measures proposed by the proponent to date to manage noise levels include noise barriers and bunds. The proponent has found that it is generally likely that a 1.5 metre high noise barrier on the boundary of the railway reserve would provide sufficient attenuation to achieve Criterion 2. Noise walls are under consideration for areas south of the Narrows, at the Leach Highway and Kwinana Freeway intersection, and at Golden Bay, and could be constructed at other locations in accordance with an approved Noise Management Plan.

It is noted that the newer rail cars, the sinking of the railway in places, slower speeds to meet safety requirements, and construction of the railway on concrete (eg south of the Narrows) rather than ballast, will have a beneficial effect on noise levels.

In Western Australia, there are no criteria for vibration levels from transportation corridors on affected premises. Any chosen vibration criteria must ensure that good public amenity is achieved at premises. The best available criteria for assessing the impacts from vibration in the environmental context is Australian Standard AS 2670.2-1990 – *Evaluation of Human Exposure to Whole Body Vibration Part 2.* This document suggests that a criterion that protects buildings from structural damage is not likely to be sufficient to address issues of general annoyance.

Since the PER was released, the criteria for vibration have been further developed. In addition to AS 2670.2-1990, the criteria below take into account the information, though limited, on complaints, and on vibration criteria internationally:

- Criterion 1: vibration isolation measures will be provided where the predicted or actual vibration is Curve 2 (109 dB) or greater;
- Criterion 2: the proposal will be designed to meet Curve 1.4 (106 dB);
- Isolation measures will be considered at the design stage where vibration is predicted to be between Criterion 1 and Criterion 2; and
- Vibration will be managed to as low as reasonably practicable.

For the section south of the Narrows Bridge, preliminary assessment work indicates that Criterion 1 (vibration limit) could be exceeded at 37 receiving locations within about 35 metres of the track, therefore likely to require track isolation, while a further 135 receivers within about 70 metres may require non-isolation measures after construction. Further detailed assessment will be needed.

It is noted that the Noise and Vibration Management Plan (Lloyd Acoustics 2002) in the PER document (BBG 2002) does not address noise re-radiated from bridge structures. While the proponent's commitment to isolate the track on the bridges is noted, the DoE has advised that detailed assessment will need to be conducted at the appropriate stage, to ensure that the re-radiated noise levels will be acceptable.

The DoE has carried out a preliminary review of a draft report submitted by the proponent's consultant in relation to the prediction and control of ground-borne noise and vibration in the Perth City section (Richard Heggie 2003). The DoE advises that the EPA's objectives for this factor appear to be practically achievable through careful design, incorporating specific vibration control measures in certain sections.

Having regard for Australian Standard AS 2107 and overseas guidelines, the following criteria for ground-borne noise and vibration have been developed:

- Ground-borne noise mitigation will be provided to ensure that regenerated noise levels caused by underground rail operations do not exceed the following criteria for maximum noise levels at the receivers listed*:

Receiver	$L_{A\ max}$** Noise Level
Auditorium/performing arts	30 dBA
Residential-private dwellings	35 dBA
Residential-hotels	40 dBA
Place of worship	35 dBA
Cinema	35 dBA
Office	40 dBA
Library/Educational	40 dBA
Specialty Retail	45 dBA#

* Additional criteria would be needed if more sensitive occupancies are identified

** $L_{A\ max}$ "Fast" response noise level (interpreted as applicable to the 95th percentile train passby event)

\# Based on AS 2107 recommendation for Specialty Retail.

Modifications to the proponent's original commitments on operational noise and vibration issues have been made to address matters raised in submissions and by the DoE.

In recognition of the very different environments between the Perth City and subsequent sections of the proposal, the proponent has committed to preparing a separate Operations Noise and Vibration Management Plan for the city sector. This plan requires compliance with the noise and vibration criteria discussed above.

The proponent has committed to addressing the following in the noise and vibration management plans, in addition to the above-mentioned criteria:

- Identification of all potential sources and impacts of noise and vibration;
- Location and sensitivity of premises, public places and future land uses that may receive noise;
- Sources of noise attributable to the railway and associated infrastructure;
- Noise management in areas of low ambient noise, and areas experiencing cumulative noise from the railway and other prominent noise sources eg roads;
- Noise and vibration level predictions and further studies for targeted areas;
- Regenerated noise (tunnels and bridges);
- Management of noise and vibration from maintenance activities;
- Measures to manage noise and vibration attributable to the railway and associated infrastructure;
- Monitoring and reporting program;
- Response to community issues including provision of community information and complaint response system; and

- A procedure for review of noise and vibration management measures should the operating conditions change.

The DoE expects to continue to have significant ongoing input into the noise and vibration management plans, as they develop.

The proponent has also committed to prepare and implement a Stakeholder Consultation Strategy, that requires stakeholder input into the environmental management plans prepared by the proponent.

Summary
Having particular regard to:

(a) The advice of the DoE on the appropriate criteria to be achieved for noise and vibration by the proposal, and on the management of noise and vibration; and

(b) The proponent's upgraded commitments;

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

3.5 Surface water and groundwater quality

Description
The South West Metropolitan Railway has the potential to impact on significant water resources, and surface water and groundwater catchment areas.

The management of impacts on hydrology and wetlands associated with the gazetted railways reserve for the South West Metropolitan Railway, is required to comply with the conditions and commitments in Statement No. 368.

This assessment addresses impacts on surface water and groundwater quality associated with the remainder of the proposal.

The following significant water resources and catchment areas area located along the portions of the route under assessment:

- The Swan River Estuary and the Canning River Estuary and their catchments;
- The Swan Estuary Marine Park (Milyu);
- The Jandakot Mound including the north western and western portions of the Jandakot Underground Water Pollution Control Area declared as Priority 3 Source Protection Areas;
- Two 300 metre well head protection zones south of Beeliar Drive;
- The Safety Bay and Stakehill Groundwater Mounds;
- Environmental Management Areas (EMAs) identified by the EPA to protect the north-south chain of wetlands that includes Thomsons Lake (EPA 1998);
- The Peel-Harvey Catchment in the southern-most portion of the route;
- Pickle Swamp - a conservation category wetland in the Leda Nature Reserve;

- Swales with threatened ecological community 19b in the Lake Cooloongup Bush Forever site;
- Conservation category wetland with threatened ecological community 19b at the Waikiki Station site; and
- Paganoni Swamp and Black Swan Lake in the Peel Region Scheme area.

Impacts on ground and surface water quality may occur during the construction and operation of the South West Metropolitan Railway as a result of:

- Altering existing flow patterns;
- Altering existing drainage infrastructure;
- Erosion and siltation during the construction phase;
- Stormwater drainage that may result in the flushing of pollutants and nutrients into natural and man-made drainage systems;
- Accidental spills; and
- Disturbance of acid sulfate soils.

Some measures proposed by the proponent to protect surface water and groundwater quality are outlined in the PER document (BBG 2002).

Submissions
Drainage from and across the railway reserve was of concern to the local governments of Perth, South Perth, Melville, Kwinana and Mandurah, as well as the Water and Rivers Commission and the Peel Preservation Group.

Ensuring effective pollution traps on drainage systems prior to discharge into waterways was a concern of the Cities of Melville and South Perth. The City of Mandurah sought to provide comment on the detailed management plans to ensure wetlands were protected and that drainage is handled in a manner that assists in the creation of a native corridor along the rail reserve.

Some local governments were concerned about the potential for oil injection onto rail tracks to effect soil and water quality.

The Water and Rivers Commission (WRC) sought a wetland mitigation strategy consistent with the WRC wetland mitigation hierarchy and criteria, and an adequate wetland monitoring program. Stormwater should be managed at source and not by drainage basins. The WRC raised the issue of potential interference of groundwater flow paths in the area of the Safety Bay Mound, and generation of acidic groundwater.

Concerns were raised in several submissions about drainage management near Paganoni and Black Swan Lakes.

The Peel Preservation Group expressed concern about groundwater contamination in the Serpentine River catchment area, impacts on shallow aquifers, and the potential for effects on the Stakehill Mound.

The Water Corporation had no objection to the proposal but requested coordination with the Corporation prior to construction, in respect to any excavation and dewatering to ensure minimal disruption to bores in the Jandakot Underground Water Pollution Control Area Wellhead Protection Zones. The Water Corporation sought that no incompatible use is made of protection areas in the construction phase.

The Swan River Trust reminded that approvals from the Trust are required for any drainage into the Swan or Canning Rivers and for any dewatering process that has the potential to impact on, or enter, the Swan or Canning Rivers.

Assessment

The context area considered for assessment of this factor comprises the surface water and groundwater catchments in which the proposal is located.

The EPA's environmental objectives for this factor are to maintain the quality of ground and surface water so that:

- existing and potential environmental values, including ecosystem maintenance, are protected; and
- emissions do not adversely affect the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards.

The protection of water quality is an important issue in the area in which the proposal is located. This is reflected in the number of high level environmental protection policies both gazetted and draft that apply to the region, including the following:

- *Environmental Protection (Swan and Canning Rivers) Policy 1998;*
- *Environmental Protection (Peel Inlet- Harvey Estuary)Policy 1992;*
- *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992 and Draft Environmental Protection (Swan Coastal Plain Wetlands) Policy;*
- *Draft Environmental Protection (Cockburn Sound) Policy; and*
- *Draft Environmental Protection (State Groundwater) Policy.*

The main State agency providing detailed guidance on the management of impacts on surface water and groundwater regimes is the Water and Rivers Commission. The EPA is aware that the proponent's consultants have been consulting with the Water and Rivers Commission.

The EPA notes that the proponent has made the following commitments relevant to the management of surface water and groundwater for the entire proposal:

- The preparation and implementation of Construction Management Plans to minimise impacts on surface water and groundwater, to include management of environmentally significant areas, water quality, erosion and sedimentation control, hazardous spill contingency plan, dewatering and water supply;
- The preparation and implementation of a Wetlands, Hydrology and Drainage Management Plan that addresses:

- Potential pollutants;
- Drainage design and management maximising on-site infiltration;
- Dewatering impacts on environmentally sensitive areas;
- Wetland and groundwater monitoring;
- Minimising loss of wetland dependant vegetation and buffer vegetation; and
- Corrective action to local resident water supplies (if required); and

- The preparation and implementation of a Contamination Assessment and Management Plan including investigation and procedures where there is a risk of disturbing acid sulfate soils.

It is proposed that the management plans will be subject to input and comment from a range of agencies including the Water and Rivers Commission, Swan River Trust, local governments, and stakeholder groups pursuant to the Stakeholder Consultation Strategy.

Summary
Having particular regard to the proponent's commitments, it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objectives for surface water and groundwater quality.

3.6 Visual amenity

Description
This assessment considers the environmental factor visual amenity for the entire route from Perth to Mandurah.

The main impacts on visual amenity, other than the temporary construction impacts, are expected to be from:

- overhead wires and masts;
- crash barriers in the centre of the Kwinana Freeway reserve (these already exist between the Narrows and Canning Bridge);
- clearing of vegetation, cuttings, embankments, bridges and construction of fences, which will affect views in bushland and other areas; and
- stations and parking areas.

The proposed railway will be below ground north of the Narrows Bridge portal. The proponent points out that the proposal will result in improved visual amenity in the area north of William Street Station, due to the sinking of a portion of the existing northern suburbs rail line.

A visual impact assessment was commissioned by the proponent in order to define the key visual impact areas of the proposal, and to identify measures to ensure that visual amenity issues are adequately managed (Ecoscape April 2003). Areas predicted to experience a high visual amenity impact were as follows:

- Mt Henry bridge to South Street area;
- Rockingham built up area; and
- Stakehill area where the railway goes through rural blocks.

Although the South Perth area was recognised as of high sensitivity, it was not found that there would be a high visual amenity impact in that area. In the context of the existing freeway it was concluded that the masts and wires would contribute a moderate visual impact.

The proponent has advised the EPA that it is examining the use of sensitive landscaping and station design to reflect surrounds, amenity screens, use of slab track in some sensitive areas, location of equipment, fencing materials and colours, and design of masts and overhead system.

Submissions

The Cities of Melville, Perth and South Perth considered that visual impacts and amenity are of high concern, including the impacts of overhead equipment and other railway infrastructure, impacts on the foreshore environment, and impacts on views from the City and Kings Park. MRWA raised the issue of visual impacts and privacy or screening along portions of Ennis Avenue and Mandurah Road. The City of Melville was concerned about visual pollution associated with the widening of Mt Henry Bridge. The City considered a reduction in poles by combining light standards with the rail standards would alleviate some clutter.

One of the key issues for the City of Rockingham was the possible intrusion of privacy from pedestrian bridges. The City recommended consultation on this issue.

DCLM was concerned that the railway would detract from scenic travel routes including views of the Rockingham Regional Park from Ennis Avenue.

Assessment

The area considered for assessment of this factor is the area within which the railway corridor and infrastructure will be visible.

The EPA's environmental objective for this factor is to ensure that aesthetic values are considered and measures are adopted to reduce visual impacts on the landscape as low as reasonably practicable.

The EPA recognises that the South West Metropolitan Railway proposal will have implications for views in built up, rural and conservation areas.

The EPA notes that the proponent commissioned a visual impact assessment study that makes visual impact management recommendations, and is examining visual impacts using landscape computer modelling tools. The EPA understands that station precincts and some portions of the alignment will be subject to planning approvals and that visual amenity is typically addressed during the planning process. The EPA further notes that the proponent is carrying out consultation with stakeholders, and has made commitments that will ensure that visual amenity is addressed for all portions of the railway alignment. These commitments are as follows:

- A Visual Amenity, Rehabilitation, and Landscape Management Plan which addresses the visual amenity of the railway corridor in relation to landscaping and infrastructure in the rail corridor; and
- The preparation and implementation of a Stakeholder Consultation Strategy.

Summary
Having particular regard to:

(a) The commitment of the proponent to prepare and implement a Stakeholder Consultation Strategy, and a Visual Amenity and Landscape Management Plan; and

(b) The development approval process applying to station sites;

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

3. Conditions and commitments

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment and Heritage on the 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.

In developing recommended conditions for each project, the EPA's preferred course of action is to have the proponent provide an array of commitments to ameliorate the impacts of the proposal on the environment. The commitments are considered by the EPA as part of its assessment of the proposal and, following discussion with the proponent, the EPA may seek additional commitments.

The EPA recognises that not all of the commitments are written in a form which makes them readily enforceable, but they do provide a clear statement of the action to be taken as part of the proponent's responsibility for, and commitment to, continuous improvement in environmental performance. The commitments, modified if necessary to ensure enforceability, then form part of the conditions to which the proposal should be subject, if it is to be implemented.

Proponent's commitments

The proponent's commitments as modified following the public review period, and as shown in Appendix 4, should be made enforceable.

Recommended conditions

Having considered the proponent's commitments and the information provided in this report, the EPA has developed a set of conditions that the EPA recommends be imposed if the proposal by the Commissioner of Railways to construct and operate the South West Metropolitan Railway, is approved for implementation.

These conditions are presented in Appendix 4. The conditions require that the proponent fulfil the commitments in the Consolidated Commitments statement set out as an attachment to the recommended conditions.

4. Other advice

The key environmental factors of concern to the EPA have been addressed in this report. The EPA notes that there are a number of other environmental factors which it expects to be managed by specialised processes and agencies with expertise in those matters.

Issues that have been raised in submissions include potential impacts on buildings particularly in the CBD, from dewatering and vibration during the construction phase.

The EPA has not recommended conditions in relation to these issues, as the EPA expects the issues to be dealt with through other regulatory processes, and through the contractual arrangements of the proponent's management program.

5. Conclusions

The EPA has considered the proposal by the Commissioner of Railways to construct and operate the South West Metropolitan Railway from Perth to Mandurah.

The EPA notes that portions of the roads and railways reserves that accommodate the proposal have been the subject of previous environmental assessments. Environmental factors previously considered by the EPA for portions of the route are not reassessed in this report.

This report addresses:

- Impacts on terrestrial flora, fauna, wetlands, and surface water and groundwater quality, other than those associated with the gazetted railways reserve for the South West Metropolitan Railway in the Metropolitan Region Scheme area; and
- The operational and post-construction factors, noise and vibration, and visual amenity, along the entire alignment.

The EPA notes the proposed route through the Leda Nature Reserve and the northern Lake Cooloongup bushland, that utilises the Garden Island Highway Reserve, involves considerably less clearing and fragmentation of regionally significant bushland, compared with the gazetted railways reserve. The proposed route brings a number of potential future transportation routes into the one corridor, and is therefore preferred by the EPA to the gazetted railways reserve that it replaces.

Significant impacts on terrestrial flora and wetlands considered in this report include impacts to:

- Conservation category wetland at Pickle Swamp in the Leda Nature Reserve;
- Threatened ecological communities in the northern Lake Cooloongup bushland and at the Waikiki Station site; and
- Declared Rare Flora at the South Street Station site.

This report addresses the issue of mitigation for the loss of part of the buffer to Paganoni Swamp and Black Swan Lake, and loss of significant vegetation in the road reserve that accommodates the South West Metropolitan Railway in the Peel Region Scheme area, and notes that the reserves accommodating the railway in these areas are an agreed outcome of the Peel Region Scheme Environmental Review process.

The EPA considers that its objectives can be met for the factors terrestrial flora, fauna, wetlands, and surface water and groundwater quality, provided that there is satisfactory implementation by the proponent of its commitments. The commitments include the preparation and implementation of the following environmental management plans for the entire alignment:

- Construction Management Plans;
- Biodiversity and Wetland Mitigation Plan;

- Fauna Management Plan;
- Wetlands, Hydrology and Drainage Management Plan;
- Stakeholder Consultation Strategy;
- Visual Amenity, Rehabilitation and Landscape Management Plan; and
- Access Management Plan (bushland).

The EPA notes that the proponent has agreed to manage operational noise and vibration in accordance with management plans based on compliance with specified criteria developed in consultation with the Department of Environment, and the objective of keeping noise and vibration as low as reasonably practicable.

With respect to the issue of the protection of visual amenity, the EPA notes that station sites and portions of the route will be subject to development applications, and considers that land-use planning and Swan River Trust processes are the appropriate arena for addressing this issue. However, to ensure that visual amenity is addressed for all parts of the rail alignment, the proponent has committed to prepare and implement a Visual Amenity, Rehabilitation and Landscape Management Plan.

The EPA has concluded that the proposal is capable of being managed in an environmentally acceptable manner such that it is most unlikely that the EPA's objectives would be compromised, provided there is satisfactory implementation by the proponent of the recommended conditions set out in Section 4, including the proponent's commitments.

6. Recommendations

The EPA submits the following recommendations to the Minister for the Environment and Heritage:

1. That the Minister notes that the proposal being assessed is for the construction and operation of the South West Metropolitan Railway;
2. That the Minister considers the report on the relevant environmental factors as set out in Section 3;
3. That the Minister notes that the EPA has concluded that it is unlikely that the EPA's objectives would be compromised, provided there is satisfactory implementation by the proponent of the recommended conditions set out in Appendix 4, including the proponent's commitments; and
4. That the Minister imposes the conditions and procedures recommended in Appendix 4 of this report.

Appendix 1

List of submitters

Organisations:

Peel Preservation Group (two submissions)
Mt Henry Peninsula Conservation Group
Conservation Council of Western Australia (three submissions)
Department of Mineral and Petroleum Resources
Water Corporation
Alinta Gas
Department of Indigenous Affairs
Swan River Trust
Department of Conservation and Land Management
Heritage Council
Main Roads Western Australia
Water and Rivers Commission
City of Perth
City of South Perth
City Melville
Town of Kwinana
City of Rockingham
City of Mandurah

Individuals:

V Stophopoulos
RD Stidwell
E Wajon
WA and J Higginson
J Cochrane
A Timmermanis
A Passhier

Appendix 2

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Appendix 3

Summary of identification of relevant environmental factors

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Vegetation - Bush Forever and conservation sites - Floristic communities and vegetation complexes	Native vegetation to be cleared. Potential impacts include fragmentation and reduced connectivity of bushland. Increased risk of bushfires, weed and dieback invasion, and edge effects. *Bush Forever* sites affected by clearing in area subject to assessment include – Site 349: Leda and adjacent bushland, Site 356: Lake Cooloongup and Lake Walyungup and adjacent bushland, and possibly Site 395: Paganoni Swamp and adjacent bushland. Also, railway is in Kwinana Freeway Reserve that adjoins Swan River Marine Park at South Perth, Bush Forever Site 269: The Spectacles, Site 270: Sandy Lake and adjacent bushland, Site 272 Sicklemore Road bushland, Site 275: Stakehill Swamp, Site 379:Anstey Swamp; and Freeway traverses Site 227: Mount Henry bushland. Rail adjoins Regional Open Space (at Paganoni swamp) in Peel Region Scheme area. Clearing of Gibson Floristic Community 24 (fair to good condition) in Peel Region Scheme area, and Gibson Floristic Community 24 in Bush Forever site (Waikiki station).	Concerns were raised about minimising bushland clearance both within and outside regional parks (DCLM, Town of Kwinana, City of Melville, Conservation Council of Western Australia, Peel Preservation Group). Revegetation to ensure compatibility with surrounding areas and consultation with Local Government was sought by the City of Melville. The City of South Perth sought planting of disturbed areas with native species and adequate maintenance. The Conservation Council of Western Australia sought that surplus land is returned to regional parks, that impacts on regional parks are avoided, and that further opportunity is provided for public comment on revegetation, and Waikiki station. The Conservation Council also sought the avoidance of "gaps" between Main Roads and railway land, and upgraded Fire Management Plans to counter the extra risk from trains and the public. A firm process was sought for pegging and ground truthing before clearing, and monitoring of clearing. The City of Rockingham saw conservation benefits in using the Garden Island Highway Reserve for the railway, with subsequent rationalisation of transport corridors, resulting in significant retention of native vegetation. Concerns were raised about works in Pickle Swamp by two private submissions and the Conservation Council of Western Australia. The Conservation Council submitted that this project should be tied in with any proposed realignment of Gilmore Avenue. The Town of Kwinana requested detailed drainage design to minimise any contamination of the remaining wetland. DCLM and two private submissions sought the retention of existing vegetation at station sites where possible. Private submissions, the Peel Preservation Group and the Conservation Council of Western Australia supported the retention and regeneration of Tuart trees. Areas of concern included the Leda Nature Reserve, the Mandurah area and opposite Anstey Swamp. Concerns were raised by the Town of Kwinana regarding dieback management during clearing. The Mt Henry Peninsula Conservation Group were concerned that there would be impacts on Bush Forever site 227 (Mt Henry Peninsula). Matters of concern included lack of recognition of the conservation values of the area in the PER, drainage, impacts on the works of the Conservation Group near the bridge, impacts on the slopes and foreshore, and consideration of the draft Mt Henry Peninsula Foreshore Management Plan section on Mt Henry Bridge expansion.	"Terrestrial flora" considered to be a relevant environmental factor

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
		A private submission considered that there is insufficient discussion in the PER of the impact of the proposed Thomsons Lake Station. The Town of Kwinana sought sufficient preservation of vegetation at Thomas Road to provide a corridor linking Bush Forever sites 272 and 269. A private submission noted that the PER barely mentioned the Stakehill Bush Forever site, in contrast to the extent of the wetland. DCLM expects to be involved in discussion on mitigation measures for impacts on regional parks. A private submission supported a clearing mitigation plan. DCLM urged that it is consulted on any clearing that may be required in areas it manages. Fencing prior to construction is supported to reduce the risk of accidental damage to vegetation. Weed control should remain a responsibility of the rail managers indefinitely. Penalties for breaching environmental conditions were also raised as an issue. The Town of Kwinana expressed concern that the railway may sever connectivity along the Crown Tramways Reserve, with retention of vegetation a consideration. Similarly the City of Melville requested revegetation of areas to be carried out in consultation with the City. A private submission sought assessment by the EPA of areas where the rail alignment passes through all Bush Forever sites to determine whether that is acceptable.	
- Threatened ecological communities (TECs)	Clearing of TEC 19b in the Lake Cooloongup and Lake Walyungup Reserves.	Avoidance of any impacts on Threatened Ecological Community 19b at the Waikiki Station site was sought by some submissions (private and Conservation Council of Western Australia. Further research on the likely impacts on any preserved TEC was sought (private). WRC sought the redesign of Waikiki Station to avoid loss and impact on the TEC.	See above
- Rare and priority flora	Clearing of a registered site for *Caladenia huegelii* (Grand Spider Orchid) at the proposed South Street station S/E car park. Priority flora species are located within the rail alignment.	The Peel Preservation Group and the City of Mandurah support the relocation and seed collection of priority flora in the Mandurah area. The occurrence of the declared rare flora Grand Spider Orchid (*Caladenia huegelii*) at sites impacted by the railway including the south west quadrant of the South Street and Kwinana Freeway intersection needs to be addressed (private, Main Roads of Western Australia, City of Melville). The retention and regeneration of Tuart trees was supported in submissions by individuals, the Peel Preservation Group and the Conservation Council of Western Australia. Areas of concern included the Leda Nature Reserve, opposite Anstey Swamp, and the Mandurah area, including the Mandurah terminus.	

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Wetlands	This assessment - Clearing of conservation category wetland and buffer at Pickle Swamp, Lake Cooloongup and Waikiki Station Holocene dune swales (see threatened ecological communities above), buffer at Paganoni Swamp and buffer at Black Swan Lake. Rail reserve in Kwinana Freeway adjoins and traverses Swan River conservation category wetland. Potential to impact on wetland hydrology and water quality.	Water and Rivers Commission expressed concern over the possible subsidence of fill near wetlands. The Peel Preservation Group and the Water and Rivers Commission were concerned about the potential for altering local groundwater that recharges wetlands. The Town of Kwinana was concerned that the rail operation would introduce contaminants such as oil in stormwater that may degrade areas such as Pickle Swamp. The alignment of the railway in close proximity to parts of Paganoni Swamp and the Black Swan Lake was a cause for concern from the City of Mandurah, Water and Rivers Commission, Conservation Council of Western Australia, Peel Preservation Group and a private submission. The Water and Rivers Commission, the Conservation Council of Western Australia and an individual requested mitigation for loss of wetland and wetland buffer areas. The Water and Rivers Commission and the Peel Preservation Group sought a comprehensive wetland monitoring program with monitoring of wetlands before construction works so a comparison can be made. The City of Perth considered that the assessment needs to address the wetlands in the Narrows Interchange and former wetlands such as Lake Irwin and Kingsford. Submissions from individuals, a group and the City of Perth considered that the environmental impacts of Mt Henry bridge needed to be further considered, and that bridge works should not adversely affect the foreshore and remnant bushland. Submissions relevant to the Waikiki Station site are outlined under the factor heading "Vegetation – TECs", above. Submissions on surface water and groundwater impacts are outlined under the heading "Surface water and groundwater", below.	"Wetlands" considered to be a relevant environmental factor.
Fauna	Potential construction impacts include: Reduction in area of fauna habitat. Reduction of habitat quality through edge effects. Direct mortality of individuals during vegetation clearance. Severance and fragmentation of habitats by fenced rail reserve. Loss of some small populations of mammals in isolated habitats. Obstruction of movement across the rail reserve by most reptile, mammal and some bird species.	Submissions raised concern that the railway will be a barrier to much fauna eg reptiles, amphibians, mammals and some species of birds. (Town of Kwinana, Peel Preservation Group, Conservation Council of Western Australia) Fauna underpasses and the preservation of vegetation on both sides of the track were sought by the Town of Kwinana. The City of Mandurah was concerned about long-necked tortoises that may not be able to access higher breeding ground near Paganoni Swamp and Black Swan Lake. More research on fauna underpasses to address fragmentation, was sought by the Peel Preservation Group. Also the Conservation Council of Western Australia and a private submission sought consideration of fauna underpasses at such locations as the Lake Cooloongup area near Dixon Road and Leda. Rail kill was an issue for the Town of Kwinana.	"Fauna" considered to be a relevant environmental factor

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
	Restriction of movement of Kangaroos and Wallabies. Isolation of populations of Quendas, reptiles and amphibians. Obstruction of seasonal breeding movements of several duck species and Long-necked Tortoises adjacent to wetlands. Operational impacts include: Degradation of wetlands by contaminants in stormwater runoff. Direct rail kills of animals that gain entry to the rail reserve. Significant species have the potential to be impacted.	Other concerns related to the proximity of the railway to wetlands and impacts on frogs and long-necked tortoises (Peel Preservation Group submissions), seasonal clearing affecting nesting period (City of Mandurah), the impact of electrification on birds such ass pelicans and migratory waders in the South Perth foreshore (private submissions), impacts on migratory birds at the Milyu Nature Reserve from noise and vibration (City of South Perth, and migratory birds using the Black Swan Swamp (Peel Preservation Group). Private submissions sought compensatory mechanisms for affects on fauna including nesting boxes to replace hollows in large trees, contributions to threatened fauna breeding programs, bird hides, and acquisition of wetlands with bird breeding habitat.	
Surface water and groundwater	Potential impacts include: Obstruction of natural surface water flow paths. Siltation of watercourses during construction phase. Pollution of groundwater and watercourses through contamination of runoff with hydrocarbons or spillage of hazardous or toxic materials. Reduced groundwater recharge at interchanges and car parks. Drawdown of groundwater near wetlands and groundwater-dependent vegetation during dewatering for railway construction. Contamination of well head protection zones or wetland environmental management areas. Acidification of groundwater through dewatering of peat or estuarine/wetland sediments in Perth CBD and Elanora Drive Rockingham. Pollution of surface waters by sediment, nutrients or other contaminants resulting from discharge of water abstracted for	Drainage from and across the railway reserve was of concern to the Peel Preservation Group, the local governments of Perth, South Perth, Melville, Kwinana and Mandurah and the Water and Rivers Commission. Ensuring effective pollution traps on drainage systems prior to discharge into waterways was a concern of the Cities of Melville and South Perth. The City of Mandurah sought to provide comment on the detailed management plans to ensure wetlands were protected and that drainage is handled in a manner that assists in the creation of a native corridor along the rail reserve. Some local governments were concerned about the potential for oil injection onto rail tracks to effect soil and water quality. The Water and Rivers Commission sought a wetland mitigation strategy consistent with the WRC wetland mitigation hierarchy and criteria, and an adequate wetland monitoring program. Stormwater should be managed at source and not by drainage basins. The WRC raised the issue of potential interference of groundwater flow paths in the area of the Safety Bat Mound, and generation of acidic groundwater. Concerns were raised in several submissions about drainage management near Paganoni and Black Swan Lakes The Peel Preservation Group expressed concern about groundwater contamination in the Serpentine River catchment area, impacts on shallow aquifers, and the potential for effects on the Stakehill Mound.	"Surface water and groundwater quality" considered to be a relevant environmental factor

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
	dewatering purposes.	Water Corporation had no objection to the proposal but requested coordination with the Corporation in respect to any excavation and dewatering to ensure minimal disruption to bores. The Water Corporation sought that works in the Jandakot UWPCA Wellhead Protection Zone are coordinated with the Water Corporation prior to construction, and that no incompatible uses are made of protection areas in the construction phase. The Swan River Trust reminded that approvals from the Trust are required for any drainage into the Swan or Canning Rivers and for any dewatering process that has the potential to impact on, or enter, the Swan or Canning Rivers.	
Noise and vibration - operations phase	Excessive noise may cause nuisance at nearby residences and other sensitive receptors. Recommended noise criteria may be exceeded at a number of locations. Excessive vibration from trains may cause nuisance to nearby residents and affect buildings. Recommended vibration criteria may be exceeded at a number of locations.	Submissions on the issue of noise and vibration during the operations phase were received from individuals and from the Town of Kwinana and the Cities of Perth, Mandurah, Rockingham, Melville and South Perth. Issues raised included impacts from passing trains on existing and future residential and commercial developments, the need for more information to be provided, and the need for more consultation with Local Governments and land owners. Additional noise modelling was sought by the Town of Kwinana for future residential areas. The City of South Perth was concerned about the interaction between noise barriers, the visual amenity of residents and safety. The City of South Perth was also concerned about high noise level predictions, freeway noise, and with impacts on the Old Mill (Shentons Mill). The City of Rockingham was concerned with impacts from acute noise events (horns, braking, cornering and PA systems at stations). The City of Rockingham wanted discussion on the cumulative effects of road and rail noise, more information on vibration, and more certainty that noise mitigation measures will be built for locations where Criteria 2 is exceeded. The City of Perth was concerned about the impact of noise and vibration in tunnels (regenerated noise) on buildings and land uses in the Perth City area. A supplementary assessment for the City Rail Development Project was sought. An individual submission recommended that a maximum noise level should apply, given the nature of train noise. Main Roads Western Australia submitted that the noise from realigned roads was a relevant consideration.	"Noise and vibration – operations phase" considered to be a relevant environmental factor

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Noise and vibration - construction phase	Noise from earthmoving machinery, trucks, soil compaction, and rail installation may cause nuisance to nearby residents and land users. Vibration from tunneling and installation of bridge piles could cause nuisance to residents and others, and structural damage to buildings.	The City of Perth was concerned with the impacts of construction noise and vibration from the proposed tunnel construction on the uses within buildings, and the structures themselves. The City of Perth considered that EMPs should be prepared for the CRD project area. The City of South Perth requested a separate PER for construction impacts, particularly noise and vibration management during construction. The Heritage Council considered that there is an increased relative risk for the heritage building stock along the proposed alignment from vibration impact arising during construction, and recommended detailed structural and heritage assessments be conducted, particularly in the Central Perth area.	Local Governments may require construction noise and vibration management plans. Provisions of the *Environmental Protection (Noise) Regulations 1997* require the preparation of a management plan where construction noise and vibration is proposed outside specified hours (Regulation 13). The proponent's response to issues raised is in Appendix 5. Having regard for the processes available to manage this factor, it is not considered to require assessment by the EPA.
Contaminated sites	Areas requiring further assessment for possible soil contamination identified at Perth City Rail Reserve, Perth foreshore, market gardens and former piggery in Stakehill, Paganoni Road market garden, former infiltration basins at Mandurah WWTP, former landfill and disused road reserve in Mandurah.	The Peel Preservation Group were concerned about possible groundwater contamination in the Serpentine River catchment. Issues were raised about the treatment of drainage waters, and the impacts of oil injection onto rail tracks (see section on "surface water and groundwater" above).	The proponent has committed to the preparation and implementation of a Contamination Assessment and Management Plan, on advice of the Land and Water Quality Branch, DoE. Not considered to be a factor requiring assessment by the EPA.
Visual amenity	Clearing of vegetation, cuttings, embankments and construction of fences will affect views in bushland areas. New stations and parking areas may affect views.	The Cities of Melville, Perth and South Perth considered that visual impacts and amenity are of high concern, including the impacts of overhead equipment and other railway infrastructure, impacts on the foreshore environment, and impacts on views from the City and Kings Park. MRWA raised the issue of visual impacts and privacy or screening along portions of Ennis Avenue and Mandurah Road. The City of Melville was concerned about visual pollution associated with the widening of Mt Henry Bridge. The City considered a reduction in poles by combining light standards with the rail standards would alleviate some clutter. One of the key issues for the City of Rockingham was the possible intrusion of privacy from pedestrian bridges. The City recommended consultation on this issue. DCLM was concerned that the railway would detract from scenic travel routes including views of the Rockingham Regional Park from Ennis Avenue.	"Visual amenity" considered to be a relevant environmental factor

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Traffic management	Reduced number of lanes on the Kwinana Freeway between Mt Henry and The Narrows. Changed traffic flows and detours in Narrows interchange, William St, Mounts Bay Rd, The Esplanade. Reduced number of lanes on Wellington St. Temporary partial closure of freeway shoulders at Glen Iris, South St and Leach Hwy. Impacts on roads south of the Kwinana Freeway.	The City of Perth expressed concerns about traffic management and impacts on the Freeway interchange. A private submission expressed concern about potential disruption to the entrance to Jarvis Road (near Stakehill Station).	Having regard to other processes for managing traffic, this is not considered to be a factor requiring assessment by the EPA. The proponent's response to the issues raised is in Appendix 5.
Public risk and safety	Risk of collision between trains and cars or trucks at crossings or when running parallel on Freeway. Potential for risk associated with railway crossing over the Dampier-Bunbury Natural Gas Pipeline in Leda.	Public risk, safety and emergency management were issues raised by the Cities of Perth and South Perth.	The proponent has addressed these issues through the project design and its commitment to the preparation and implementation of environmental management plans. Other processes also apply. Not considered to be a factor requiring assessment by the EPA..
Bushfire management	Risk of bushfire during construction from sparks from welding and cutting, cigarette butts, vehicle exhausts, burning of cleared vegetation, vandals using access tracks. Increased bushfire risk due to increased weed growth in disturbed areas. Reduced access across alignment for fire fighting vehicles.	The Conservation Council sought upgraded Fire Management Plans to counter the extra risk from trains and the public, and the locating of fire hydrants to serve both station and bushland values.	The proponent has committed to the preparation and implementation of Construction Management Plans, a Bushland Management Access Plan, and a Visual Amenity, Rehabilitation and Landscape Management Plan that addresses bushfire management. Not considered to be a factor requiring detailed assessment by the EPA.
Aboriginal heritage	Approvals under the *Aboriginal Heritage Act 1972* have been sought. Previously undiscovered archaeological material may be uncovered during earthworks.	The Cities of Perth and South Perth reminded the proponent of approvals and clearances in relation to Aboriginal Heritage issues.	Approvals under the *Aboriginal Heritage Act 1972* have been sought. The proponent has committed to prepare and implement Construction Management Plans that address Aboriginal heritage. Not considered to be a factor requiring detailed assessment by the EPA.

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
European Heritage	The Narrows Bridge is protected under the *Heritage of Western Australia Act 1990* (Register of Heritage Places). Advice must be sought from the Heritage Council of WA before work on the Narrows Bridge is authorised. The alignment passes close to or crosses several buildings, reserves and natural features listed on other heritage databases including municipal heritage registers, Register of the National Estate, National Trust register. Heritage buildings above the railway tunnels in the Perth CBD could be affected by vibration or dewatering and subsidence during tunnel construction, or railway operation.	The submission from the Cities of Perth requested that there be provision for the possible finding of artefacts of European heritage. The City of South submitted that consideration should be given to the heritage aspects and impacts on the Narrows Bridge and Shentons Mill. A structural survey for the heritage buildings likely to be impacted in the Perth City area and a heritage impact study were recommended by the Heritage Council.	The proponent has addressed these issues through the project design and its commitments. Other processes also apply. The proponent's response to the issues raised is in Appendix 5. Not considered to be a factor requiring detailed assessment by the EPA.
Dust, lightspill and other pollution and construction management factors	Potential impacts include: Dust nuisance from exposed ground and soil stockpiles. Light spill into residential areas may cause nuisance during construction. Lightspill may cause nuisance at stations.	Issues raised included dewatering activities (Cities of Mandurah, Perth, Private and Water Corp.); and consultation on Construction Management Plans (Cities of Perth, South Perth, Melville and Rockingham, Private, DCLM and Private). The City of Perth expressed concerns on impact of dewatering and tunnel construction on the Mt. Eliza Escarpment, spoil removal plan, structural assessment of buildings, hours of construction operations. DCLM raised the issue of possible unexploded ordnance in the area, including the railway alignment, around Rockingham/Waikiki. Water Corporation opposed the proposed station at Gordon Road, Mandurah, near its water treatment plant.	The proponent has addressed construction issues through the project design and its commitment to the preparation and implementation of Construction Management Plans, with advice from a range of agencies. The proponent has committed to prepare and implement a Vegetation Management Plan for Unexploded Ordnance Search Areas. The Gordon Road station has been withdrawn from this proposal. See proponent's response to the issues raised in Appendix 5. These factors are not considered to require detailed assessment by the EPA.
Ecologically Sustainable Development Green house gases		Three submissions (DCLM, City of Rockingham, Conservation Council) dealt with the advantages of integration of pedestrian and cycleways with and between Stations and the "Travelsmart" initiatives. The City of South Perth considered that the issue of Ecologically Sustainable Development	See proponent's response to submissions in Appendix 5. While it is expected that the proponent will pursue environmentally sustainable

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Other		should be discussed in the context of the draft State Sustainability Strategy rather than the National Strategy. A private submission recommended that a more detailed discussion should have been prepared including reuse of concrete, timber, plastics and cleared large trees for furniture manufacture. A private submission found that greenhouse gases may severely rise as a consequence of this project. A private submission queried why the railway had to leave the Mandurah Road and go through the high ridge of tuarts in the Stakehill area only to go back to the Mandurah Road.	development principles as far as practicable, these issues are not considered to require detailed assessment in this EPA report.

Appendix 4

Recommended Environmental Conditions and Proponent's Consolidated Commitments

Statement No.

RECOMMENDED CONDITIONS AND PROCEDURES

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

SOUTH WEST METROPOLITAN RAILWAY,
PERTH TO MANDURAH

Proposal: The construction and operation of a passenger railway service between Perth and Mandurah, as documented in schedule 1 of this statement.

Proponent: Commissioner of Railways

Proponent Address: Westrail Centre, West Parade, East Perth WA 6004

Assessment Number: 1395

Report of the Environmental Protection Authority: Bulletin 1102

The proposal referred to above may be implemented by the proponent subject to the following conditions and procedures:

Procedural conditions

1 Implementation and Changes

1-1 The proponent shall implement the proposal as documented in schedule 1 of this statement subject to the conditions of this statement.

1-2 Where the proponent seeks to change any aspect of the proposal as documented in schedule 1 of this statement in any way that the Minister for the Environment and Heritage determines, on advice of the Environmental Protection Authority, is substantial, the proponent shall refer the matter to the Environmental Protection Authority.

1-3 Where the proponent seeks to change any aspect of the proposal as documented in schedule 1 of this statement in any way that the Minister for the Environment and Heritage determines on advice of the Environmental Protection Authority, is

not substantial, the proponent may implement those changes upon receipt of written advice.

2 Proponent Commitments

2-1 The proponent shall implement the environmental management commitments documented in schedule 2 of this statement.

2-2 The proponent shall implement subsequent environmental management commitments which the proponent makes as part of fulfilment of the conditions in this statement.

3 Proponent Nomination and Contact Details

3-1 The proponent for the time being nominated by the Minister for the Environment and Heritage under section 38(6) or (7) of the *Environmental Protection Act 1986* is responsible for the implementation of the proposal until such time as the Minister for the Environment and Heritage has exercised the Minister's power under section 38(7) of the Act to revoke the nomination of that proponent and nominate another person as the proponent for the proposal.

3-2 If the proponent wishes to relinquish the nomination, the proponent shall apply for the transfer of proponent and provide a letter with a copy of this statement endorsed by the proposed replacement proponent that the proposal will be carried out in accordance with this statement. Contact details and appropriate documentation on the capability of the proposed replacement proponent to carry out the proposal shall also be provided.

3-3 The nominated proponent shall notify the Department of Environmental Protection of any change of contact name and address within 60 days of such change.

4 Commencement and Time Limit of Approval

4-1 The proponent shall substantially commence the proposal within five years of the date of this statement or the approval granted in this statement shall lapse and be void.

Note: The Minister for the Environment and Heritage will determine any dispute as to whether the proposal has been substantially commenced.

4-2 The proponent shall make application for any extension of approval for the substantial commencement of the proposal beyond five years from the date of this statement to the Minister for the Environment and Heritage, prior to the expiration of the five-year period referred to in condition 4-1.

The application shall demonstrate that:

1 the environmental factors of the proposal have not changed significantly;

2 new, significant, environmental issues have not arisen; and

3 all relevant government authorities have been consulted.

Note: The Minister for the Environment and Heritage may consider the grant of an extension of the time limit of approval not exceeding five years for the substantial commencement of the proposal.

Environmental conditions

5 Compliance Audit and Performance Review

5-1 The proponent shall have in place an audit program and submit compliance reports to the Department of Environmental Protection which address:

1 the status of implementation of the proposal described in schedule 1 of this statement;

2 evidence of compliance with the conditions and commitments; and

3 the performance of the environmental management plans and programs.

Note: Under sections 48(1) and 47(2) of the *Environmental Protection Act 1986*, the Chief Executive Officer of the Department of Environmental Protection is empowered to audit the compliance of the proponent with the statement and should directly receive the compliance documentation, including environmental management plans, related to the conditions, procedures and commitments contained in this statement.

5-2 The proponent shall submit a performance review report every five years after the start of the operations phase, to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority, which addresses:

1 the major environmental issues associated with the project; the targets for those issues; the methodologies used to achieve these; and the key indicators of environmental performance measured against those targets;

2 the level of progress in the achievement of sound environmental performance, including industry benchmarking, and the use of best available technology where practicable;

3 significant improvements gained in environmental management, including the use of external peer reviews;

4 stakeholder and community consultation about environmental performance and the outcomes of that consultation, including a report of any on-going concerns being expressed; and

5 the proposed environmental targets over the next five years, including improvements in technology and management processes.

Procedures

1 Where a condition states "to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority", the Chief Executive Officer of the Department of Environmental Protection will obtain that advice for the preparation of written advice to the proponent.

2 The Environmental Protection Authority may seek advice from other agencies, as required, in order to provide its advice to the Chief Executive Officer of the Department of Environmental Protection.

Notes

1 The Minister for the Environment and Heritage will determine any dispute between the proponent and the Environmental Protection Authority or the Department of Environmental Protection over the fulfilment of the requirements of the conditions.

Schedule 1

The Proposal (Assessment No. 1395)

The proposal is to construct and operate the South West Metropolitan Railway from Perth to Mandurah within the footprint depicted in Figures 1 and 2. The main characteristics of the proposal are summarised in Table 1 below.

Table 1: Key Proposal Characteristics

Element	Description
Proposal description	Construction and operation of rail infrastructure from Perth to Mandurah within the footprint depicted in Figures 1 and 2. The proposal includes construction of the railway line, stations, vehicular and pedestrian areas and access ways associated with the railway, drainage facilities, road/rail intersections, bridges, tunnels, facilities to accommodate power and other services, signals, lighting, noise barriers, fauna and service vehicle underpasses, fencing, landscaping, signage, and associated earthworks.
Length of railway	Approximately 72 kilometres
Typical cross-section and corridor to be cleared for railway line	Embankments and cuttings generally with a slope of 1 in 2 on both sides of railway, 6 metres for fencing and access track on one side, 12 metres for two tracks on ballast, 2 metres for fencing on other side to access track. The typical width of the corridor to be cleared ranges from 25 to 40 metres, of which all but 20 metres is to be landscaped.
Stations	In the short term, approximately 11 as follows: William Street The Esplanade Canning Bridge Leach Highway South Street Thomsons Lake Thomas Road Leda Rockingham Waikiki Mandurah
Future Stations	In the longer term approximately 7 as follows: Success Mandogalup Anketell South Parmelia Stakehill

	Karnup Lakelands
River crossings	Narrows Bridge – bridge between existing Freeway bridges. Mt Henry Bridge - widening and strengthening of existing bridge to accommodate railway. Bridgeworks require additional piers and footings in the river bodies.
Tunnels	From Narrows Interchange to Perth Station yard Anketell Tunnel (existing) Fremantle Road Tunnel, Mandurah
Grade separations/intersections	*Road bridges over rail: –* Road Bridges over the Kwinana Freeway from Mill Point Road, South Perth to Anketell Road, inclusive (existing) Thomas Road, Bertram Challenger Avenue, Parmelia Wellard Road, Wellard Elanora Drive, Rockingham Safety Bay Road, Waikiki (existing) Stakehill Road, Baldivis Gordon Road, Greenfields *Rail bridges over road: –* Mandurah Road, Hillman (also rail bridge over rail) Mandurah Road, Baldivis Paganoni Road, Karnup *Rail bridge over rail: -* Glen Iris, Jandakot (existing) Provision for up to two occupational crossings at Lakelands.
Underpasses for service vehicles	Northern end of Leda Nature Reserve, and at Paganoni Bushland approximately 350 metres north of Metropolitan Region Scheme boundary.
General standard of design and construction	Design speed 140 kilometres per hour for track infrastructure.
Rail cars	Electric Multiple Units, 25kV a.c. supply, coupled as three-car sets, running at a maximum service speed of 130 kilometres per hour. The existing two-car sets may be used from time to time between Thomsons Lake and Perth.
Construction material source	Local cut and fill, all materials (ballast and rails etc) sourced by construction contractor from approved sources and suppliers.

Figures (attached)

Figure 1 – Overview of the South West Metropolitan Railway alignment

Figure 2 – Land within which the South West Metropolitan Railway will be located

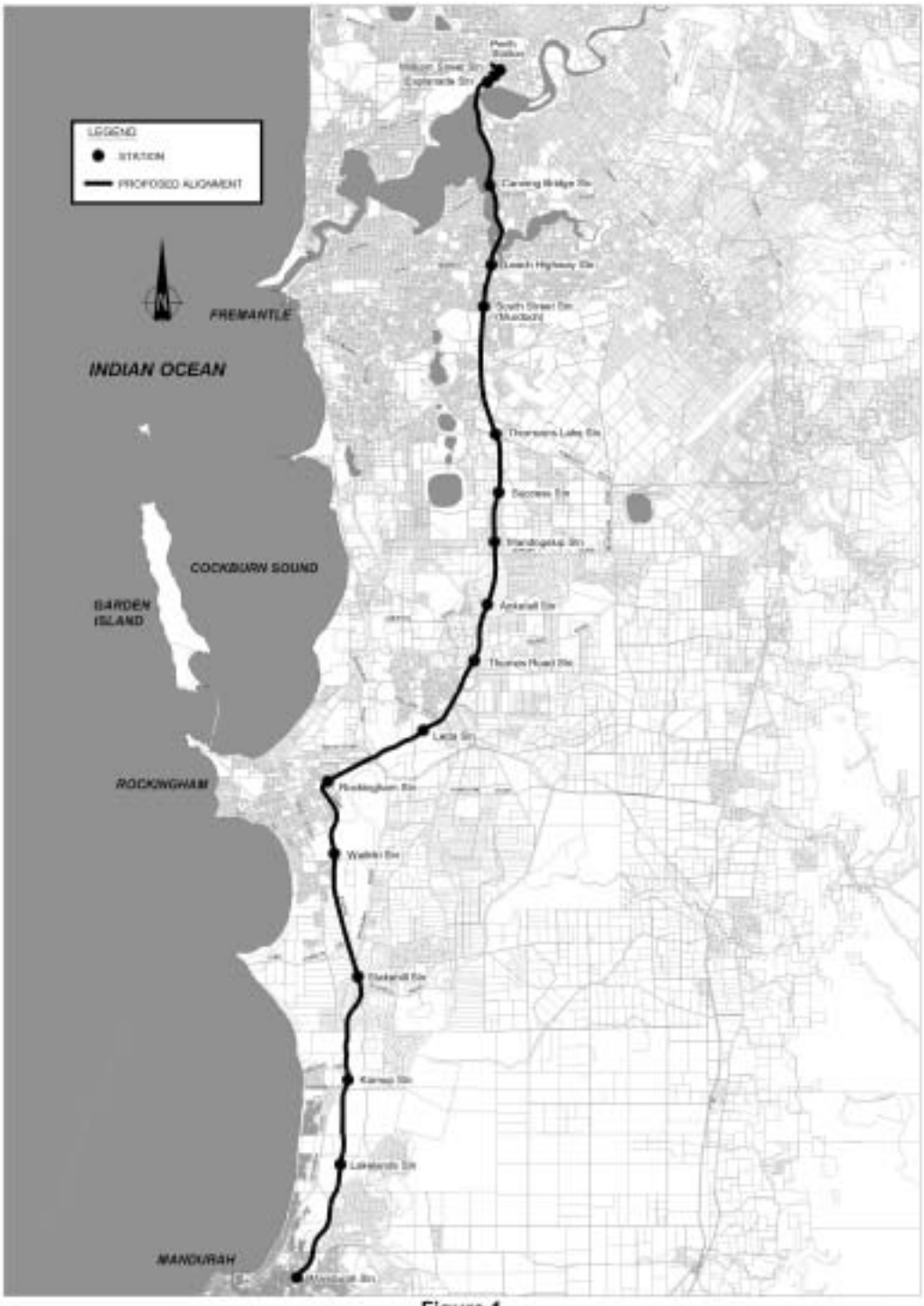

Figure 1
Overview of South West Metropolitan Railway Alignment

Figure 2(a)

Land Within Which the
South West Metropolitan Railway is Located

Figure created by Bowman Bishaw Gorham

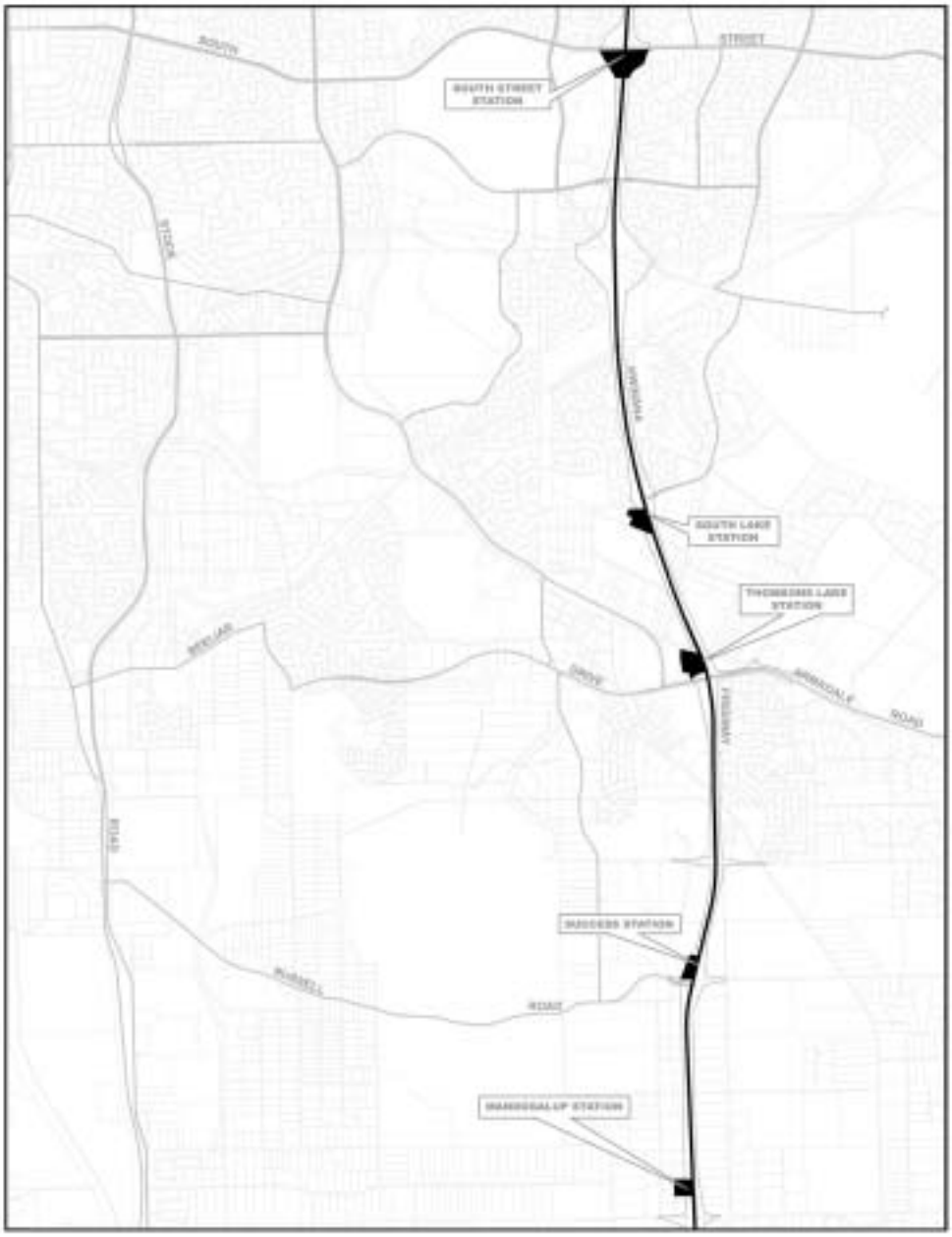

Figure 2(b)

Land Within Which the South West Metropolitan Railway is Located

Figure created by Bowman Bishaw Gorham

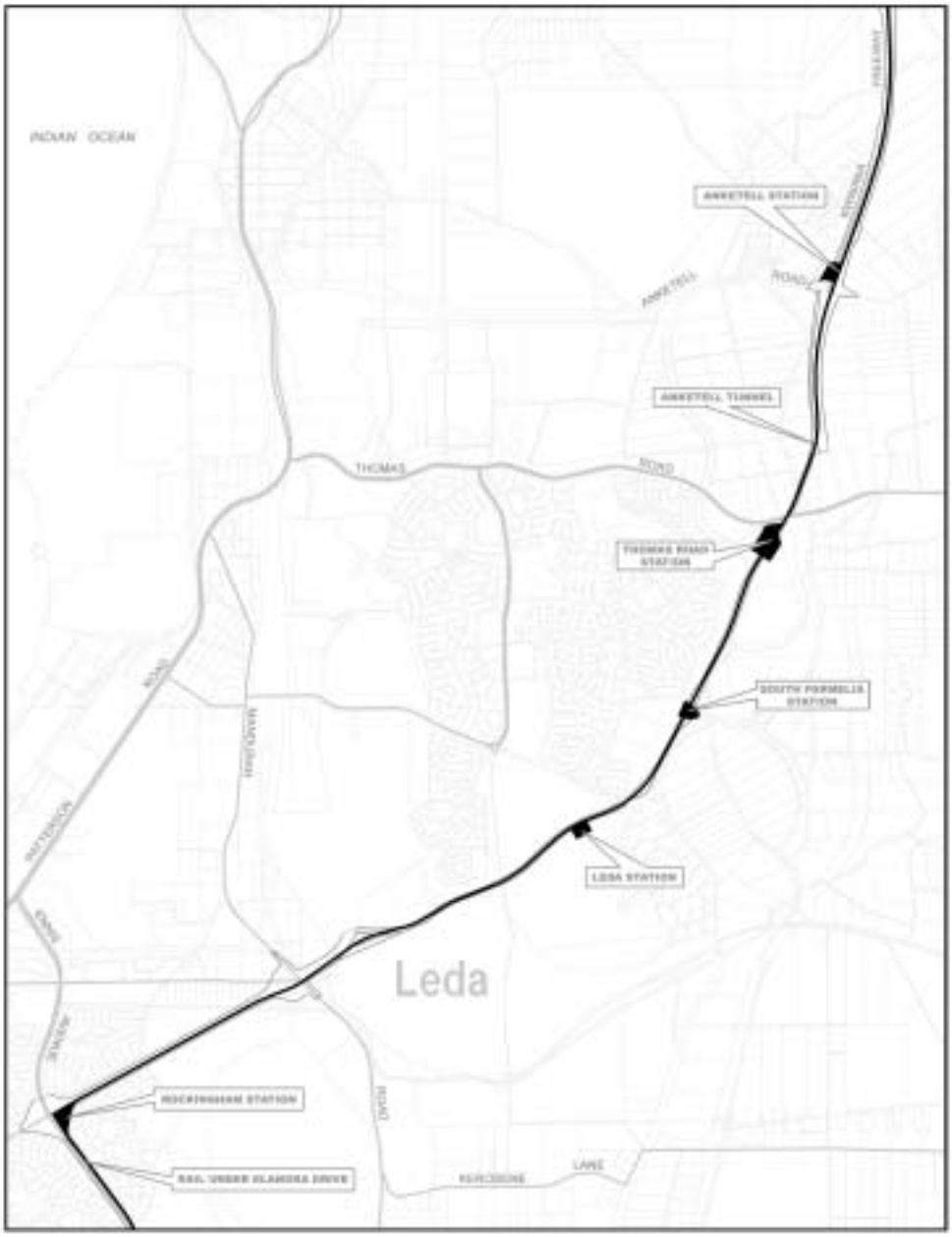

Figure 2(c)

Land Within Which the South West Metropolitan Railway is Located

Figure created by Bowman Bishaw Gorham

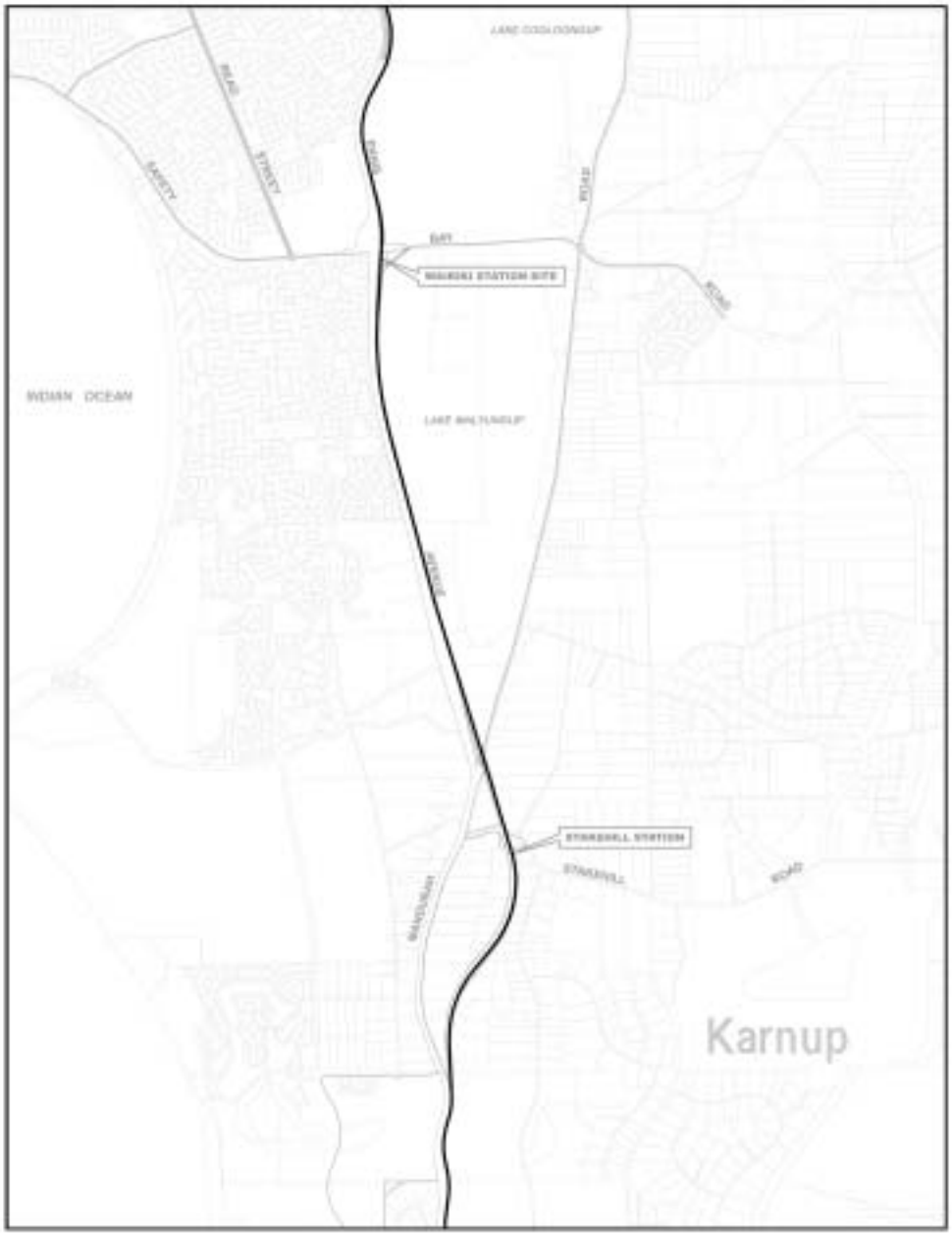

Figure 2(d)

Land Within Which the South West Metropolitan Railway is Located

Figure created by Bowman Bishaw Gorham

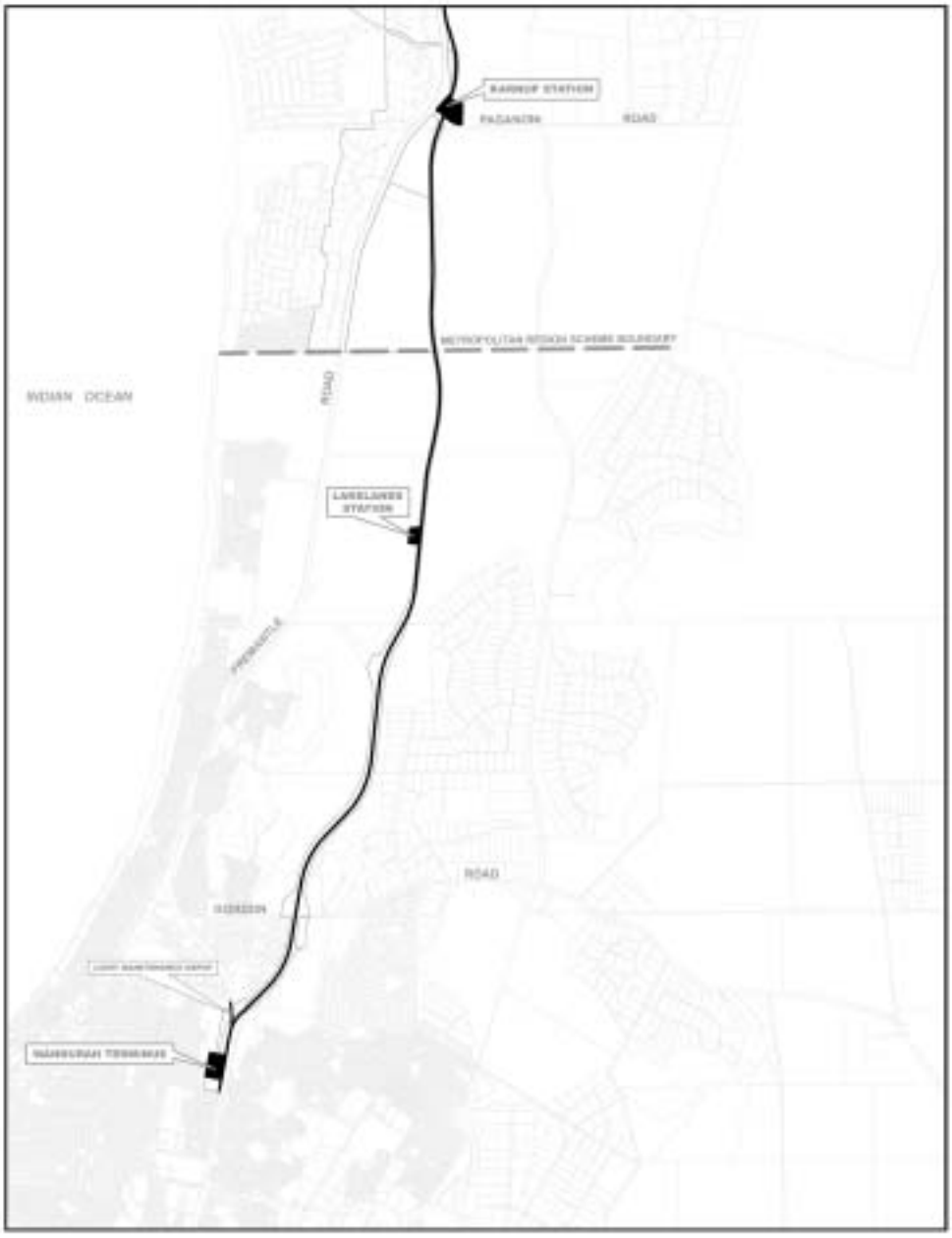

Figure 2(e)

Land Within Which the South West Metropolitan Railway is Located

Figure created by Bowman Bishaw Gorham

Schedule 2

Proponent's Environmental Management Commitments

South West Metropolitan Railway,
Perth to Mandurah

(Assessment No. 1395)

Commissioner of Railways

Proponent's Environmental Management Commitments

South West Metropolitan Railway (Assessment No. 1395)

Note: The term "commitment" as used in this schedule includes the entire row of the table and its six separate parts as follows:

- a commitment number;
- a commitment topic;
- the 'action' to be undertaken by the proponent;
- the objective of the commitment;
- the timing requirements of the commitment; and
- the body/agency to provide technical advice to the Department of Environmental Protection.

No.	*Topic*	*Action*	*Objective*	*Timing*	*Advice*
1.0	Construction Management Plan – Perth to Mandurah	Prepare a Construction Management Plan which addresses: • A schedule for the preparation and implementation of each phase of construction (see also commitments 2.0 to 6.0) • Implementation at the appropriate time of actions specified in other environmental management plans in these commitments that are relevant to the construction phase, including actions in the Stakeholder Consultation Strategy, the Biodiversity and Wetlands Mitigation Plan, the Fauna Management Plan, the Wetlands Hydrology and Drainage Management Plan and the Contamination Assessment and Management Plan • Measures to limit clearing • Delineation and protection of environmentally significant areas • Measures to minimise and manage impacts on fauna • Protection of declared rare and priority flora and other flora of conservation significance, including detailed investigation of entire route • Protection of Threatened Ecological Communities • Hygiene measures to minimise the spread of disease and weeds • Water quality, erosion and sedimentation control	Ensure that construction impacts (direct and indirect) on flora, fauna, wetlands, Bush Forever sites and other environmentally significant places, surface water and groundwater, and the community, are minimised.	Prior to site preparation work commencing	DIA, WRC, SRT, DCLM, FESA, DPI, Heritage Council, Local Governments Perth to Mandurah

		• Aboriginal and European heritage • Dust management • Fire management • Access during construction • Construction lay-down sites • Fencing • Light spill • Hours of construction • Public liaison and information • Procedures for response to complaints and issues raised by the public on construction matters of an environmental nature, including establishment of an independent body to determine and advise on the appropriate response by the proponent • Registers of waste materials/contamination, monitoring and site audit sheets • Movement, storage and refuelling of machinery during construction • Storage and handling procedures for all construction materials and hazardous chemicals • Hazardous spill contingency plan • Contamination contingency plan including measures for acid sulphate soils • Works in the vicinity of high pressure gas pipelines • Dewatering near environmentally significant areas and water supply • Description of environmental standards, safeguards and emergency responses • Schedules for corrective action and verifications • Licensing requirements and approvals • Management structure and reporting • Environmental briefing, training and induction of personnel • Monitoring • Progress and compliance reporting Note: Construction noise and vibration to be managed by processes outside the Statement of conditions for the South West Metropolitan Railway			
2.0	Construction Management Plan – Perth to Mandurah	Implement the Construction Management Plan required by Commitment 1.0, except for actions the subject of commitments 4.0 and 6.0..	Achieve the objectives of Commitment 1.0	During Construction	WRC, DCLM, DIA, DPI, FESA, SRT, Heritage

					Council, Local Governments Perth to Mandurah
3.0	Construction Management Plan - Northern end Narrows Bridge to the freight railway at Jandakot	Prepare a Construction Management Plan which addresses the actions outlined in Commitment No. 1.0, as relevant to the Northern end Narrows Bridge to the freight railway at Jandakot.	Ensure that construction impacts (direct and indirect) on flora, fauna, wetlands, Bush Forever sites and other environmentally significant places, surface water and groundwater, and the community, are minimised	Prior to site preparation work commencing	DIA, WRC, SRT, DCLM, FESA, DPI, Heritage Council, Local Governments South Perth to Cockburn
4.0	Construction Management Plan - Northern end Narrows Bridge to the freight railway at Jandakot	Implement the Construction Management Plan as required by Commitment 3.0.	Achieve the objectives of Commitment 3.0	During Construction	WRC, DCLM, DIA, FESA, DPI, SRT, Heritage Council, Local Governments South Perth to Cockburn
5.0	Construction Management Plan – Northern End of Narrows Bridge to Perth Station	Prepare a Construction Management Plan which addresses the actions outlined in Commitment No. 1.0, as relevant to the Northern end Narrows Bridge to Perth Station.	Ensure that construction impacts (direct and indirect) on flora, fauna, wetlands and other environmentally significant places, surface water and groundwater, and the community, are minimised	Prior to site preparation work commencing	DIA, WRC, SRT, DCLM, FESA, DPI, Heritage Council, Local Government Perth

6.0	Construction Management Plan – Northern End of Narrows Bridge to Perth Station	Implement the Construction Management Plan as required by Commitment 5.0.	Achieve the objectives of Commitment 5.0	During Construction	DIA, WRC, SRT, DCLM, FESA, DPI, Heritage Council, Local Government Perth
7.0	Stakeholder Consultation Strategy	Prepare a Stakeholder Consultation Strategy that: • Identifies relevant stakeholders including nearby residents, community groups, environmental groups, local governments and government agencies • Describes stakeholder consultation measures having regard for the Government's consultation strategy • Requires stakeholder input into the Plans and Strategies required to be prepared by these commitments	To ensure consultation with stakeholders continues and outcomes are incorporated into the management of the proposal to achieve the objectives and criteria established by the Environmental Protection Authority (Bulletin X).	Prior to commencement of siteworks	
8.0	Stakeholder Consultation Strategy	Implement the Stakeholder Consultation Strategy required by Commitment 7.0.	Achieve the objectives of Commitment 7.0	On-going	

9.0	Biodiversity and Wetland Mitigation Plan	9.1 Prepare a Biodiversity and Wetland Mitigation Plan to provide mitigation measures as replacement for the environmental values of the following areas of land that are to be cleared or are otherwise required for railways purposes: • Portions of Pickle Swamp and the buffer of Pickle Swamp in the Leda Nature Reserve and Gilmore Avenue Road reserve • Areas of threatened ecological community 19b in the Garden Island Highway reserve north of Lake Cooloongup • Land outside the existing gazetted Railways reserve and the previous cleared alignment of Safety Bay Road that is required for the Waikiki Station Site, including portions of threatened ecological community 19b and floristic community type 24 • Portions of land within the 50 metre buffer of Paganoni Swamp and Black Swan Lake (Fremantle Road sumpland) • Land containing floristic community type 24 in the Peel Region Scheme area north of Gordon Road, Mandurah • Any other land adjustments required from Bush Forever site or significant wetlands and their buffers that are additional to the above and are not in the gazetted Railways reservation, subject to the following: o the area is in excess of that which will be returned to the conservation estate in the general vicinity o the land is to be used for purposes other than an unfenced access track used by a number of agencies.	Mitigate the effects of clearing and disturbance of regionally significant bushland, wetlands and wetland buffers and achieve the objective of no net loss of regional biodiversity and wetland values and functions, in relation to areas for which mitigation is required	Design	WRC, DPI, DCLM, relevant local governments

		The Biodiversity and Wetland Mitigation Plan will contain the following: • Demonstration that each area of land for which mitigation is required (see above) is minimised as far as practicable • Detailed delineation of the areas for which mitigation is required • Detailed identification of the biodiversity and wetland values and functions of land for which mitigation is required • Specification of detailed mitigation measures including areas to be acquired or managed, and other measures, to meet the objectives for this commitment • Where appropriate, an Environmental Management Plan for mitigation measures that involve a specific area of land • Mitigation to be by the acquisition of natural areas rather than rehabilitation or other natural area management measures, where practicable • Where acquisition is not considered practicable, demonstration that acquisition has been reasonably explored, and the reasons why it is not practicable • Where rehabilitation is proposed, an area of land the equivalent of at least twice the area of that for which mitigation is required, will be rehabilitated, and rehabilitation will meet completion criteria specified in the relevant Environmental Management Plan • Details on vesting, maintenance and long term management responsibility in relation to each mitigation measure. 9.2 An Environmental Management Plan will be prepared for the Waikiki Station site and the land within the triangle bound by the station site and the two alignments of Safety Bay Road. 9.3 Land purchased for the railway comprising 7.4 ha of land adjoining the southern tip of Stakehill Swamp, will be transferred to the conservation estate. 9.4 Land purchased for the railway comprising 6.7 ha of land adjoining the north west tip of Anstey Swamp will be transferred to the conservation estate. 9.5 The proponent will pursue the transfer to the conservation estate of land reserved for Railways purposes that is surplus to requirements and has the potential to be added to the adjoining conservation estate, in consultation with stakeholders. Note: Procedures to protect Declared Rare and Priority Flora are addressed in the Construction Management Plans.			

10.0	Biodiversity and Wetland Mitigation Plan	Implement the Biodiversity and Wetland Mitigation Plan and actions required by Commitment 9.0.	Achieve the objectives of Commitment 9.0	Design to post-construction	WRC, DPI, DCLM, relevant local governments
11.0	Visual Amenity, Rehabilitation and Landscape Management Plan	Prepare a Visual Amenity, Rehabilitation and Landscape Management Plan which addresses: • Visual amenity of railway corridor in relation to landscaping and infrastructure in the rail corridor • Protection of significant flora and ecological communities • Plant/seed selection • Plant/seed/landscaping materials source and propagation methods including the use of local provenance where practicable • Provision of fauna habitat as appropriate • Soil stabilisation and topsoil management, including the identification of suitable areas for topsoil and mulch stock pile locations. • Weed control • Dieback and disease management • Bushfire management • Erosion control • Fencing • Rehabilitation/landscaping criteria for clearance of this Commitment	Ensure that the post-construction landscape is stable and self-sustaining, ecological functions are retained or reinstated where possible and that visual amenity is maximised.	Design	DCLM, DPI, WRC, Local Governments
12.0	Visual Amenity, Rehabilitation and Landscape Management Plan	Implement the Visual Amenity, Rehabilitation and Landscape Management Plan required by Commitment 11.0.	Achieve the objectives of Commitment 11.0	Construction stage until landscaping/rehabilitation criteria met	DCLM, DPI, WRC, Local Governments

13.0	Fauna Management Plan	Prepare a Fauna Management Plan which addresses: • Identification and replacement, in the locality, of significant fauna habitat elements • Survey before construction for targeted species including the Masked Owl (*Tyto novaehollandiae novaehollandiae*) and sampling of groundwater for stygofauna • Identification of significant fauna movements that may be impacted by the rail corridor • Actions to limit impacts on fauna including measures to accommodate fauna movement, and relocation of fauna, as appropriate • Monitoring of impacts on fauna	Minimise impacts on native fauna	Design	DCLM, Local Governments
14.0	Fauna Management Plan	Implement the Fauna Management Plan required by Commitment 13.0	Achieve the objectives of Commitment 13.0.	During construction and post-construction	DCLM, Local Governments
15.0	Wetlands, Hydrology and Drainage Management Plan	Prepare a Wetlands, Hydrology and Drainage Management Plan which addresses: • Potential pollutants • Drainage design and management maximising on-site infiltration • Dewatering impacts on environmentally sensitive areas • Wetland and groundwater monitoring • Minimising loss of wetland dependant vegetation and buffer vegetation • Corrective action to local resident water supplies (if required) • Site specific drainage management actions, with special attention to environmentally significant areas	Minimise impacts on wetlands, surface water and groundwater.	Design	WRC, SRT, DCLM, Local Governments
16.0	Wetlands, Hydrology and Drainage Management Plan	Implement the Wetlands, Hydrology and Drainage Management Plan required by Commitment 15.0.	Achieve the objectives of Commitment 15.0.	During construction and post-construction	WRC, SRT, DCLM, Local Governments

17.0	Operations Noise and Vibration Management Plan - Northern end Narrows Bridge to Perth Station	Prepare an Operations Noise and Vibration Management Plan: A) to meet the following criteria: • Noise criteria: o Criterion 1: Noise mitigation will be provided to ensure that noise levels caused by rail operations do not exceed L_{Aeq}(daytime)60 dB(A), L_{Aeq}(night-time)55 dB(A) and an $L_{A\ max}$ of 80 dB(A), at a distance of 1 metre from a building with a noise sensitive use on noise sensitive premises[+] o Criterion 2: Noise mitigation will be considered where the noise level is at or above L_{Aeq}(daytime)55 dB(A), L_{Aeq}(night-time)50 dB(A) and an $L_{A\ max}$ of 75 dB(A), at a distance of 1 metre from a building with a noise sensitive use on noise sensitive premises[+] o Criterion 3: Noise levels will be managed to as low as reasonably practicable • Vibration criteria: o Criterion 1: vibration isolation measures will be provided where the predicted or actual vibration is Curve 2 (109 dB) or greater, as defined in AS 2670.2 o Criterion 2: the proposal will be designed to meet Curve 1.4 (106 dB), as defined in AS 2670.2 o Isolation measures will be considered at the design stage where vibration is predicted to be between Criterion 1 and Criterion 2 o Vibration will be managed to as low as reasonably practicable • Regenerated noise from ground-borne vibration: o Noise mitigation will be provided to ensure that regenerated noise levels caused by underground rail operations do not exceed the following criteria at the receivers listed: Receiver — $L_{A\ max*}$ Noise Level Auditorium/performing arts — 30 dBA Residential-private dwellings — 35 dBA Residential-hotels — 40 dBA Place of worship — 35 dBA	1. Achieve noise criterion 1, vibration criterion 1, and the regenerated noise criteria specified in column 3. 2. Minimise noise and vibration impacts on sensitive locations during operations to as low as reasonably practicable	Design	City of Perth, Heritage Council

		Cinema 35 dBA Office 40 dBA Library/Educational 40 dBA Specialty Retail 45 dBA# + "Noise sensitive premises" has the meaning given in the *Environmental Protection (Noise) Regulations 1997* *$L_{A\ max}$ "Fast" response noise level (interpreted as applicable to the 95th percentile train passby event) # Based on AS 2107 recommendation for Specialty Retail. B) to address the following: • Potential sources and impacts of noise and vibration • Location and sensitivity of premises and public places that may receive noise, including heritage places • Noise and vibration level predictions and further studies for targeted areas • Regenerated noise (tunnels and bridges) and criteria to complement those to Part A above, including further criteria for ground-borne noise if additional sensitive occupancies may be affected • Minimisation of vibration annoyance to people and impacts on buildings • Management of noise and vibration from maintenance activities • Measures to manage noise and vibration attributable to the railway and associated infrastructure eg stations • Monitoring and reporting program • Response to community issues including provision of information and complaint response system • A procedure for review of this Plan should operating conditions change that may affect noise and/or vibration.			
18.0	Operations Noise and Vibration Management Plan - Northern end Narrows Bridge to Perth Station	Implement the Operations Noise and Vibration Management Plans required by Commitment 17.0	Achieve the objectives of Commitment 17.0.	During construction and on-going	City of Perth, Heritage Council

19.0	Operations Noise and Vibration Management Plan - Plan - Northern end Narrows Bridge to Mandurah	Prepare an Operations Noise and Vibration Management Plan: A) to meet the following criteria: • Noise criteria: o Criterion 1: Noise mitigation will be provided to ensure that noise levels caused by rail operations do not exceed L_{Aeq}(daytime)60 dB(A), L_{Aeq}(night-time)55 dB(A) and an $L_{A\ max}$ of 80 dB(A), at a distance of 1 metre from a building with a noise sensitive use on noise sensitive premises[+] o Criterion 2: Noise mitigation will be considered where the noise level is at or above L_{Aeq}(daytime)55 dB(A), L_{Aeq}(night-time)50 dB(A) and an $L_{A\ max}$ of 75 dB(A), at a distance of 1 metre from a building with a noise sensitive use on noise sensitive premises[+] o Criterion 3: Noise levels will be managed to as low as reasonably practicable • Vibration criteria: o Criterion 1: vibration isolation measures will be provided where the predicted or actual vibration is Curve 2 (109 dB) or greater, as defined in AS 2670.2 o Criterion 2: the proposal will be designed to meet Curve 1.4 (106 dB), as defined in AS 2670.2 o Isolation measures will be considered at the design stage where vibration is predicted to be between Criterion 1 and Criterion 2 o Vibration will be managed to as low as reasonably practicable • Regenerated noise from ground-borne vibration: o Noise mitigation will be provided to ensure that regenerated noise levels caused by underground rail operations do not exceed the following criteria at the receivers listed: Receiver — $L_{A\ max*}$ Noise Level Auditorium/performing arts — 30 dBA Residential-private dwellings — 35 dBA Residential-hotels — 40 dBA Place of worship — 35 dBA Cinema — 35 dBA	1. Achieve noise criterion 1, vibration criterion 1, and the regenerated noise criteria specified in column 3. 2. Minimise noise and vibration impacts on sensitive locations during operations to as low as reasonably practicable	Design	Local Governments

		Office 40 dBA Library/Educational 40 dBA Specialty Retail 45 dBA# + "Noise sensitive premises" has the meaning given in the *Environmental Protection (Noise) Regulations 1997* *$L_{A\ max}$ "Fast" response noise level (interpreted as applicable to the 95th percentile train passby event) # Based on AS 2107 recommendation for Specialty Retail. B) to address the following: • Location and sensitivity of premises, public places and future land uses that may receive noise • Sources of noise attributable to the railway and associated infrastructure • Noise management in areas of low ambient noise, and areas experiencing cumulative noise from the railway and other prominent noise sources eg roads • Noise and vibration level predictions and further studies for targeted areas • Regenerated noise (tunnels and bridges) and criteria to complement those to Part A above, including further criteria for ground-borne noise if additional sensitive occupancies may be affected • Management of noise and vibration from maintenance activities • Measures to manage noise and vibration attributable to the railway and associated infrastructure • Monitoring and reporting program • Response to community issues including provision of community information and complaint response system • A procedure for review of this Plan should operating conditions change that may affect noise and/or vibration.			
20.0	Operations Noise and Vibration Management Plan - Northern end Narrows Bridge to Mandurah	Implement the Operations Noise and Vibration Management Plans required by Commitment 19.0	Achieve the objectives of Commitment 19.0.	During construction and on-going	Local Governments

21.0	Bushland Access Management Plan	Prepare a Bushland Access Management Plan to address bushland management access in environmentally significant areas.	Minimise the impact of the railway on bushland and significant environments	Design	DCLM, DPI, FESA, Local Governments
22.0	Bushland Access Management Plan	Implement the Access Management Plan required by Commitment 21.0.	Achieve the objectives of Commitment 21.0.	During construction and operation	DCLM, DPI, FESA, Local Governments
23.0	Contamination Assessment and Management Plan	Prepare a Contamination Assessment and Management Plan which addresses: • Soil and groundwater quality at sites requiring further investigation as identified in the Public Environmental Review and by the Land and Water Quality Branch, DoE • Investigations and procedures where there is a risk of disturbing acid sulphate soils • Management/remediation	Ensure the soil and groundwater quality are appropriate for the intended land use and acceptable standards are maintained.	Design	Land and Water Quality Branch, DoE
24.0	Contamination Assessment and Management Plan	Implement the Contamination Assessment and Management Plan required by Commitment 23.0.	Achieve the objectives of Commitment 23.0.	Design	Land and Water Quality Branch, DoE
25.0	Vegetation Management Plan for Unexploded Ordnance Search Areas	Prepare a Vegetation Management Plan for Unexploded Ordnance Search Areas which addresses: • Potential impacts on native vegetation • Delineation of search areas • Measures to minimise impacts on native vegetation • Management of disturbed areas to promote repair where disturbance is outside area to be cleared for rail construction purposes.	Minimise impacts on native vegetation	Before commencement of siteworks in areas where unexploded ordnance search required by FESA	FESA, DCLM, relevant Local Governments
26.0	Vegetation Management Plan for Unexploded Ordnance Search Areas	Implement the Vegetation Management Plan for Unexploded Ordnance Search Areas required by Commitment 25.0.	Achieve the objectives of Commitment 25. 0.	Before construction in areas where unexploded ordnance search required by FESA	FESA, DCLM, relevant Local Governments

27.0	Public comment on plans that overlap with requirements of Statement 368	The following Plans that overlap with the requirements of Ministerial Statement No. 368 published 11 October 1994 will be released for public review for four weeks: • Construction Management Plan – Perth to Mandurah • Visual Amenity, Rehabilitation and Landscape Management Plan • Fauna Management Plan • Wetlands, Hydrology and Drainage Management Plan • Access Management Plan		Prior to submission of the relevant Plans to DoE for clearance	

DCLM Department of Conservation and Land Management, DIA Department of Indigenous Affairs, DoE Department of Environment
FESA Fire and Emergency Services Authority, DPI Department for Planning and Infrastructure MRWA Main Roads Western Australia
WRC Water and Rivers Commission, SRT Swan River Trust

Appendix 5

Summary of Submissions and
Proponent's Response to Submissions

SWMR PER Submissions

Response to Submissions

Index **Page**

The Proposal

General

1. (C of P) Submission that the environmental assessment procedure for the City Rail Development project be done as a discrete exercise **and**
It is not apparent from reading the PER whether it was prepared for the purpose of assessment under Part IV of the Environmental Protection Act 1986 (EP Act). No Decision Making Authority ('DMA') is specifically identified for the purposes of Part IV. This is significant, because without a DMA within the meaning of the Act, Part IV is incapable of applying to the

project. Similarly, the issue of the enforcement of conditions is also of relevance. Furthermore the PER does not make it clear that an application for the SWMR and the CRD project have been made to the EPA for formal assessment and approval **and**
(C of SP) A similar submission querying the legal status of the PER, the proponent and the Decision Making Authority.

In response to these submissions the proponent notes that Page 1 of the PER states:

"Perth Urban Rail Development (PURD), on behalf of the Commissioner of Railways, proposes the construction and operation of the South West Metropolitan Railway (SWMR) from Perth to Mandurah. Through establishment of the SWMR the Government seeks to address public transport requirements in the rapidly expanding south-west corridor of the Perth Metropolitan Region.

The proposal includes establishment of rail infrastructure between Perth and Mandurah, with the first section of the line running from the Central Business District (CBD) to Kwinana along the Freeway, then via the eastern side of Rockingham to Allnutt Street in Mandurah.

The project has been referred to the EPA under Section 38 of the Environmental Protection Act 1986, which has determined that the proposal should be assessed at the Public Environmental Review (PER) level. This PER examines the potential environmental impacts of railway construction and operation and has been prepared in accordance with guidelines issued by the EPA. The structure and content of the review addresses guidelines provided by the EPA, which are attached in Appendix A."

Therefore it is clear that the proposal was for the entire South West Metropolitan Railway from Perth to Mandurah via the Kwinana Freeway; it was referred to the EPA under Section 38 of Part IV of the EP Act, and the proponent was identified as the Commissioner of Railways, a Decision Making Authority under the Railways Act 1904. The EPA has advised the proponent accordingly.

2. (C of P) In 2002 the State Government decided to handle the Central Perth section of the SWMR project separately because of its unique challenges. This has resulted in the City Rail Development (CRD) project with its own administration. The same should be done in terms of environmental assessment.

For the purposes of this proposal and environmental assessment, the City Rail Development is an integral part of the South West Metropolitan Railway project and not a separate entity. The possibility of separating the City area from the SWMR was informally canvassed with the DEP and the EPA, when it was realised that there could be significant delays to the project in responding to widespread criticism of the foreshore impacts associated with the "direct" route into Perth. Advice was received from the EPA that the community would expect the proposal to be assessed as a complete project, for without the Perth component, the project could not be viable, similarly for the component south of the Narrows Bridge.

In support of further clarification, an excerpt from the City Rail Development Project Plan (October, 2002) states: "In August, 2002, the Minister for Planning and Infrastructure announced the establishment of an advisory committee (the "City Rail Development Committee") to assist in the planning delivery of the Perth city section of the SWMR. This section of the railway was defined as the "City Rail Development Project"

The SWMR Supplementary Master Plan, incorporating the Direct route and recommended Central Option within the City of Perth, was endorsed by Government in August, 2002.

Also in August, 2002, Enabling Legislation recognising the adoption of the Direct Route was introduced to Parliament. This Legislation, the Railway (Jandakot to Perth) Act 2002, was passed by Parliament in November, 2002."

3. (C of P) The PER falls short in its assessment of the central city area Hereafter called the CRD project area) in three (3) related ways:

- Many of the environmental conditions along the CRD route are not described in the PER
- Many of the potential impacts of the SWMR project on the CRD project area environment have not been adequately assessed by the PER.
- Adequate management issues have not been identified
- Alternatives for the SWMR within the City of Perth are not adequately discussed. This includes but not limited to lengthening the rail tunnel at Northbridge and improved horizontal and vertical alignments for the selected route.

Further details are provided below. It is understood that the CRD office is currently addressing many of these issues which may result in changes to the proponent's proposal. However this is not covered in the PER.

The proponent acknowledges that the PER does not provide a complete description of the possible environmental factors along the CRD project area. However, sufficient work was undertaken by the Perth City Rail Advisory Committee between November, 2001 and May, 2002 to confirm that the recommended route, in tunnel along the foreshore and bored under William Street, with new stations at the Esplanade and William Street linking with the existing Perth station, could be achieved with acceptable environmental impacts and disruption.

To facilitate planning tasks and general project management activities, a City Rail Development Committee was formed by Government, comprising members selected on the basis of their specialist expertise and experience, together with representatives of key stakeholder Agencies. The City of Perth has representation on this Committee. The committee will oversee the implementation of the Project by a specially formed City Rail Development Office (CRD Office) established within WAGRC, under the control of a Project Director.

As stated in this submission, the CRD has since addressed in detail many of the outstanding issues in consultation with key Stakeholders City of Perth, Main Roads WA, Department for Planning and Infrastructure, Heritage Council, relevant Aboriginal groups and landowners and business interests along the route. A list of works undertaken by the CRD Office include:

- *Disruption Management Plans for tunnels;*
- *Geotechnical investigations;*
- *Baseline ground and building vibration measurements;*
- *Heritage advice;*
- *Landscaping improvements;*
- *Pedestrian management plans;*
- *Drainage, sewerage and water study;*

- *Geotechnical and Hydrological Investigations*
- *Aboriginal Heritage consultations*

Work is currently in progress to assess the impact of possible contamination of the sites at the Esplanade and the Northbridge rail yard for acid sulfate soil potential.

An internationally recognised acoustic consultant has been commissioned to provide a noise and vibration assessment and management plan for the construction and operation of the railway through the Perth city area.

4. (C of P) The issues raised in this submission could result in significant changes to the CRD portion of the SWMR project. Consequently it would appear inappropriate that approval should be given to the CRD section of the SWMR project based on the current PER. To this end it is considered that a supplementary PER should be prepared for the CRD project. Alternatively robust Environmental Management Plans should be prepared for all elements within the CRD project area.

*As stated in a previous Submission (see **3.**, above), the proponent has been actively engaged in addressing many of the issues which require additional information, studies and surveys to adequately prepare Environmental Management Plans for the construction and operation of the railway in the Perth City area. Before construction commences the proponent will, as part of commitments given, prepare or require the constructing contactor to prepare all environmental management plans that meet the requirements of key stakeholders and the EPA.*

5. (C of SP) The City of South Perth is concerned that an EMS that covers the entire rail network may not be sufficient for the purposes of managing the new railway. There is simply not enough information in the PER regarding the yet to be developed EMS. Advice is provided that the EMS will conform to ISO 14001, but that is not enough information. Further detail is required in relation to the detailed scope of the EMS this issue is to be more closely examined. **and** Within the framework of this EMS, PURD or DOT will prepare Environmental Management Plans ("EMPs")... "covering all aspects of the construction and operation of the SWMR project. The EMPs will be prepared to the satisfaction of relevant agencies before the commencement of each phase of the project." (PER page 97). The City of South Perth requests that formal consultative arrangements be established with the City in undertaking the preparation of the EMS and that this aspect of the project be overseen by the DEP.

The proponent has prepared an Environmental Management System (EMS) document to underpin the environmental management practices and procedures of railways owned and operated by the WAGRC. This EMS will form the basis for development of specific Environmental Management Plans (EMPs) by Consultants and Contractors engaged to construct the SWMR, and for WAGRC to use in the operation of its railways. All key stakeholders in this proposal will be consulted on the preparation and approval of the required EMPs. This will include requirements for any Construction Management Plans.

6. (C of SP) The Town Planning and Development Act and the Metropolitan Region Scheme ('MRS') are not mentioned. The PER does state that MRS Amendment 937/33 and 938/33 approvals have been received to date for the project. These approvals are not attached to the

PER, so it is difficult to comment on the completeness of these approvals. The MRS is also dealt with under heading 1.8.4 (key approvals). Again, the document is confusing because development applications are mentioned in this context although it is suggested that the applications be made to 'local government authorities', terminology which is outdated, as applications would be made through the WAPC in most instances.

MRS Amendments 937/33 and 938/3 were completed and incorporated in the MRS in 1994. They established the rapid transport route south of Forrest Road (Beeliar Drive), Jandakot to the southern boundary of the MRS, just above Mandurah. This SWMR proposal uses a significant portion of the rapid transport reserve, both above and below Rockingham, as the alignment for the railway. There is a Ministerial Condition for this reserve, that the proponent must prepare a Environmental Management Programme to the satisfaction of the Minister for the Environment before commencing construction of the railway.

Development Applications are required for the construction of any railway in a road reserve, Bush Forever site and at railway station sites in the MRS. Railway infrastructure does not require a Development Application in the Peel Region Scheme area. Development Applications are submitted to the relevant Local Government, to be forwarded to the WAPC, with any comments, for action under the WAPC Act 1985.

It should be noted that, in support of this proposal, the proponent has engaged in extensive consultation with all areas of the community from individuals, environmental and residential groups to Local Governments, Ministers and Parliamentary groups. A copy of the proponent's Briefing Register is available on request.

7. (C of SP) The City of South Perth requests the EPA require to PURD to provide a detailed examination of the decision to delay the construction of the South Perth Station. The City is of the view that the delayed construction will impact significantly on existing freeway operations and the future railway operations due to the need to realign the Freeway and Railway to accommodate the South Perth Station.

The proponent advises that construction of the South Perth Station does not form part of the current SWMR proposal. When this Station is proposed for construction, a Development Application will be lodged in accordance with established procedure.

8. (Private) Greenhouse gas emissions have been identified to severely rise as a consequence of this project, rather than reduce **and** the adopted project will be an environmental worst case outcome **and** my submission identifies other concerns in the areas of:

- Risk to Swan River pelican colonies;
- The emission of the majority of pollutants in the sensitive Kwinana air pollution zone;
- The failure to recognise that most energy will be natural gas derived and not coal derived;
- As such, the gas fuelled energy is subject to higher greenhouse penalties that acknowledged in the submission;
- Severe jeopardy of moves towards sustainable development through:

    - Exceptionally high capital commitment on a project of limited public benefit
    - Unacknowledged cross subsidies in the future

- Unidentified increases in bus fleet operations and pollution at virtually zero increase in revenue

The proponent has carefully examined this comprehensive submission and the criteria and assumptions associated with the calculations and conclusions reached. There are so many differences between basic data used in this submission and the data derived from reliable sources, as used in this proposal, that the proponent can only agree to disagree with the conclusions reached.

Although the impacts from greenhouse gas emissions are of concern to the State and have national and global implications for the environment and humanity, this proposal is perhaps more important for its effect on Perth's air quality in the future. The replacement of road vehicles with electric train travel will have an immediate beneficial effect by reducing atmospheric pollutants from vehicles, such as oxides of nitrogen and sulphur, unburnt hydrocarbons, carbon monoxide and exhaust particulate matter, all currently emitted into the air of the Perth metropolitan area.

Response to the issue of risk to Swan River pelicans is to be found under the **Fauna** *section.*

9. (Private) With regard to the PER, I would like to make the following comment – the fifth paragraph of Clause 1.6.2.3 states the following:- *"The estimated travel time savings compared to the alignment via Kenwick are:-*

- *Mandurah to Perth* *20%*
- *Rockingham to Perth* *26%*
- Thomsons Lake to Perth 42%

No explanation or discussion is given on how these time savings are or have been achieved.

The journey times quoted are calculated from computerised simulations of trains operating over the new routes. The major inputs are, firstly; the proposed track alignment, curvature, gradients, maximum line speeds and station sites for each route and, secondly; the physical and performance characteristics of the new railcars, ie weight, acceleration and braking rates, and maximum operating speeds. The international rail consultants Halcrow Rail and the railcar manufacturers EDI-Bombardier have separately undertaken these simulations. It should be noted that these companies ran their own simulations completely independently of each other and produced results which were within 0.02%.

The major reasons for the journey time difference between Kenwick and Direct routes are:

- *The greater distance between Thomsons Lake and Perth via Kenwick, and;*
- *The requirement to integrate the South West Metropolitan Railway (SWMR) services with those existing services on the Armadale line, under the Kenwick proposal.*

At present there are two Armadale line trains in each direction every 15 minutes during the peak hours. This effectively limits the number of trains to/from the SWMR to three trains in every 15 minutes – a total of five trains every 15 minutes (ie one train every three minutes) is the maximum capacity of any one track on the Armadale line. This limit would have been reached from Day 1 of operation of the SWMR services.

The implications are very significant for the journey time aspects of the via Kenwick route. The Armadale line is a two track railway; one track accommodates the Perth to Armadale trains and the other accommodates the Armadale to Perth trains. If a track is operating at full capacity, which it would with the SWMR services, then the speed of all trains would be governed by the speed of the slowest train on the track; there is no choice in the matter – the trains will be only three minutes apart hence each train will be closely following the one in front.

The Armadale line timetable shows that the slowest train in the morning peak hours is the 'all stations' train which takes 19 minutes to travel between Cannington and Perth. If this train were to continue then all the following trains would have to take 19 minutes between Cannington and Perth. This drawback was fully acknowledged within the SWMR Master Plan where a number of alternatives such as dividing up and distributing the intermediate station stops over all the trains on the route and/or station closures were considered. By these means it would be possible to speed up the slowest train and thereby all the other trains, so that a journey time of 14 minutes could be achieved between Cannington and Perth. The position was summarised as follows:

Cannington – Perth: Service Option	*Cannington to Perth Fastest Journey Time*
Current Situation – No SWMR Services	*14 mins*
Introduce SWMR services – no change to current services	*19 mins*
Skip stop at Claisebrook/McIver & closure of Lathlain and Welshpool	*17 mins*
As above combined with changed stopping pattern for all services	*14 mins*

From this, it can be stated that the quickest conceivable journey time for SWMR services between Cannington and Perth would be 14 minutes and the slowest would be 19 minutes, with either outcome being dependent upon the ability or otherwise to vary stopping patterns and effect station closures.

The combination of the simulated operation of the new routes plus the foregoing relative to the Cannington - Perth section of the via Kenwick route, provided the following results:

Peak Journey Times by Route (Minutes)

	Via Kenwick with station closures and changed stopping patterns Perth – Cannington	*Via Kenwick with no alterations to Armadale Line*	*Direct Route*	*Direct Route 'all stations' service.*

Cannington – Perth	*14*	*19*	*N/A*	*N/A*
Thomsons Lake – Cannington[1]	*15*	*15*	*N/A*	*N/A*
Thomsons Lake – Perth	*N/A*	*N/A*	*15.6*[2]	*17*[3]
Mandurah – Thomsons Lake[4]	*31*	*31*	*31*	*31*
Total Journey Time	***60***	***65***	***46.6***	***48***

[1] Trains stopping at Canning Vale, Nicholson Road and Thornlie
[2] Trains stopping at South Street, Leach highway, Esplanade and William street
[3] Trains stopping at South Street, Leach Highway, Canning Bridge, Esplanade and William Street
[4] Trains stopping at Waikiki, Rockingham, Leda, Thomas Road and Thomsons Lake

It should be noted that 30 seconds dwell time has been included at each station stop.

As can be appreciated, there is a range of journey time savings which can be attributed to the Direct Route; the percentage difference being entirely dependent upon what you choose to compare.

Ecologically Sustainable Development

1. (CALM) The Department notes that there has apparently been no attempt to identify potential ways of facilitating pedestrian and bicycle access to and from stations, nor has any attempt been made to develop links to existing pedestrian and cycle transport networks. A potential link between the proposed Waikiki Station and the existing shared path terminus at the intersection of Mandurah and Safety Bay Roads, for example, would encourage rail users residing in growing urban areas east of Mandurah Road to cycle or walk to and from Waikiki Station. It is suggested that the proponent should have acknowledged the potential for development of shared paths that integrate pedestrian, cycle and rail transit networks; **and**
(Conservation Council) Cycle ways are appropriate to link with stations and also in the Perth City precinct in land used for the rail corridor; **and**
(C of R) The EPA should make a recommendation that the proponent work with Local Governments in the region to develop Travel Smart related projects aimed at increasing patronage, and that funds are provided for these programmes as part of the proposal.

The proponent acknowledges the importance of integrated transport initiatives such as Travel Smart and the use of Principal Shared Paths (PSPs) as alternatives to car use. Station designs and construction will provide links for existing PSPs to access the stations. However this proposal does not incorporate specific design or funding for new construction of PSPs and is therefore outside the approved scope of works. These issues are being managed by the Department for Planning and Infrastructure and Local Governments.

2. (C of SP) This section on Environmentally Sustainable Development (ESD) is terminologically and possibly conceptually inaccurate. It does not adopt the conceptual framework used in the draft of the 'State sustainability strategy' as set out in the document entitled "Focus on the Future of the West Australian Strategy Consultation Draft, Government of Western Australia, September, 2002".....The City of South Perth requests that that further analysis of ESD in regard to the PER be undertaken that takes into account the full range of social, environmental and economic factors as outlined in the State Sustainability Strategy.

As this submission points out, the State Sustainability Strategy was released as a draft for consultation in September, 2002. As this Strategy paper was a consultation draft only and had been received only a short time before the PER was to be submitted to the EPA, the proponent did not consider it either appropriate or timely to use this document. Instead, the discussion on ESD referenced the Commonwealth document "National Strategy for Ecologically Sustainable Development" as recommended by the EPA in their Guidelines for this proposal.

3. (Private) The section on sustainability (pp 16-19) is very short and inadequate. Many more issues, such as waste reduction, Extended Producer Responsibility and waste recycling, should have been discussed and adopted as required by the PER guidelines. Opportunities to reduce virgin raw material consumption in construction of bridges, sleepers, car parks and ballast should have been discussed and adopted. Opportunities to reuse previously used materials such as concrete (for ballast), timber (for any formwork) and plastic (in barriers or other structural items) should have been discussed and adopted. Specifications and tenders should reflect the desire to avoid and reuse waste, both from on- and off-site. Opportunities to productively use large Tuart, Jarrah or Marri logs felled during clearing for furniture or feature items, rather than for mulch, should have been discussed and adopted.

This submission must recognise that the proposal is constrained by strict specifications of the materials of construction relating to constructional and operational safety and the long-term durability of the products used. Using recycled materials that require constant replacement would be counter-productive; for example, to use recycled rail from another railway would be an unsafe practice, as rail is generally removed on the basis of the number of surface flaws per linear metre found after a certain period of service. To introduce rail that is already flawed would put passengers and operators at an unacceptable risk.

The use of crushed concrete would fail to meet international criteria for ballast and put the stability of the track at risk. Other uses of waste concrete would be considered, however it is unlikely that significant quantities will be generated The constructing contractor will use any recyclable material that proves to be engineeringly effective.

One of the key aims of this proposal is to construct a railway that has the minimum maintenance requirements consistent with safe operations. Any recycled materials must conform to this edict.

Fauna

1. **(T of K)** The railway will be a considerable barrier for most non-flying animals such as reptiles, amphibians and mammals, and some species of birds.

It is recognised that there will be some unavoidable severance of traditional pathways and feeding corridors with the introduction of the railway. There are two issues being addressed; ensuring that the rail corridor is a barrier to fauna that might get in and be injured or killed by passing trains and at the same time introducing appropriate fauna underpasses in selected areas. The proponent has been working with the Department of Conservation and Land Management (DCLM) in this regard. Fauna underpasses are proposed for the Leda area and in identified locations within the Rockingham Regional Park. It is worth noting that the location of the SWMR in the Freeway median avoids this problem for a substantial part of the route.

2. (T of K) Rail kill is also an issue, (particularly if artificial lighting is used attracting insects which could then attract nocturnal predators).

The railway will not be using artificial lighting on the railway tracks between stations. Lighting will, however, be provided at Stations and at other areas such as carparks and paths. Security fencing for the railway will provide an adequate barrier for most fauna and, in addition, fencing in nature reserve areas will be provided with fauna exclusion skirting. It is expected that these measures and the relatively infrequent passage of trains will result in much less fauna kills than would be experienced on roads. Since the railway, in many areas, will be between the existing roads and nature reserves, fauna may therefore also be protected from straying into roadways.

3. (T of K) It is important that these (Greenway) corridors are connected through adequate fauna underpasses and preservation of vegetation on both sides of the track; **and**
(C of Mandurah) It is noted that no fauna culverts or similar structures are proposed for Pagonini or Black Swan swamps. It is believed that long-necked tortoises live in and around these wetlands and therefore they will be restricted by the railway fencing and will not be able to move to higher ground to lay their eggs. This should be considered in detail and effective management practices undertaken to ensure that this does not impact on their breeding capabilities; **and**
(Peel Preservation Group) We need more research on fauna underpasses, as fragmentation of habitat and the physical barrier of the Railway will be a major problem. It may be that more are required; **and**
(Conservation Council) The severing of the Lake Cooloongup area at Dixon road from the Regional Park appears unavoidable given the rail alignment but consideration should be given to fauna and pedestrian underpasses to mitigate this. If these underpasses were made larger they could also be used for emergency vehicles and fire response; **and**
(Private) Fauna underpasses should be constructed where required and incorporated into emergency vehicle underpasses at areas such as in Lake Cooloongup, Anstey Swamp and Leda.

The proponent has been working with the DCLM to identify areas where new fauna underpasses would be installed and has committed to re-establishing any existing underpasses blocked by railway construction. However, the actual value of fauna underpasses is a controversial issue. There is anecdotal evidence that underpass entrances provide predatory feral animals with a natural trap for native fauna and that the underpasses are most frequently used by feral animals to get from one area to another in their search for prey. Most underpasses do not seem to be used by native fauna, even when there are regular light wells in the construction. Some success has been noted where there is an aquatic link.

Nevertheless the proponent will liaise with conservation estate administrators to provide suitable fauna links between areas isolated by the railway. Emergency vehicle underpasses have been considered for adaptation also as fauna underpasses, however their suitability for both uses may detract from the primary role of allowing heavy vehicles access across the railway for management and emergency response.

In regard to the provision of fauna underpasses at Pagononi Swamp and Black Swan Lake, the area of higher ground immediately to the west of the railway is zoned for urban development and already residential development proposals are in advanced stages. It would not seem reasonable to provide underpasses to areas that are substantially changed from the original area and which then could pose a real danger if used by fauna &/or feral animals.

4. (C of Mandurah) The City requests that if spring clearing is necessary, that a fauna relocation program is undertaken.....However it is vastly preferable that clearing be undertaken outside of the nesting period (as recommended in the fauna management plan) as the capture, care, rehabilitation and release of these species cause them undue stress and can be very expensive. On this basis, the City would like to be involved in fauna management plans.

The proponent agrees with this submission. Wherever possible, clearing in these areas will be avoided over this period of the year. Local Governments will be consulted on relevant contractors' environmental management plans that are to be prepared to the satisfaction of the proponent and the EPA on advice from respective Government agencies. It is intended to instigate regular meetings between the proponent and Local Government officers and the community, to facilitate information exchange and address any concerns both before & during construction.

5. (C of P) In addition the following issues have not been adequately covered in the PER:

- The potential for the proposed tunnels to harbour rodents and other vermin, with an assessment of implications.

The proposed railway tunnels will be actively maintained under operating management plans to be prepared by the proponent. This will include proper vermin control should this be found to be necessary.

6. (C of SP) It should be noted that, although the SWMR route is contained within the Freeway MRS Reserve, there is one particular site, the Milyu Nature Reserve, adjacent to the Freeway (located along the Swan River foreshore in the vicinity between Judd Street and Comer Street) where migratory waders find habitat. An examination of any possible impacts including the frequency of the pitch of the noise emissions and impacts of vibration should be included as a condition of an approval should one be granted, **and**
(Private) What impact will the electrification of the line along the South Perth foreshore have on pelicans and international migratory waders which frequent the mud flats **and**
(Private) I do not see reference to the Swan River pelican colonies. Individual birds of these colonies are often seen perched on freeway lamps. The proponents need to demonstrate that the prospect of electrocution is absent, if these local birds opt to use railway stanchions as a sitting post in preference to the safe freeway lamp posts.

Generally birds do not seem to be affected by noise or vibration from electric railway operations. Parrots, seagulls, magpies, yellow wattle birds, honeyeaters and pied mudlarks

have all been seen in and around operating railway stations and tracks. A similar location exists on the route of the electrified railway to the northern suburbs, where the line, although in the median of the Mitchell Freeway, passes in close proximity to Lake Monger. There is no evidence to indicate that waders and other aquatic birds are being directly affected by the railway. Anecdotal evidence suggests that the Freeway operations pose a far greater risk to wildlife.

The noise from railcar operations will, in most instances, be overcome by the constant noise from the Freeway on both sides of the rail alignment. Birds are also known to rapidly acclimatise to noise, as evidenced by vain attempts to scare away unwanted bird populations in areas such as electrical sub-stations and aerodromes.

The electrified territory (25 KV, 50 Hz) around the catenary of the railway is also similar to the electrical supply (22 KV, 50 Hz) seen in many residential streets of the metropolitan area and which has no apparent detrimental effects on the bird populations.

Pelicans prefer and (as large birds) require a reasonably large regular surface area on which to sit. It is very doubtful whether any railway overhead electrified structure would be sufficiently large and regular to induce Pelicans to desert their preferred platform on light standards.

7. (Peel Preservation Group Inc) It is obvious that the fauna present in the section below MRS boundary will be severely impacted on, both with the Railway reserve running too close to the Pagononi wetlands and by fragmentation caused by the rail line and the loss of habitat for all those species listed. This demonstrates the inadequacy of the present buffer.

The current railway reservation in the Peel Region Scheme (PRS) has been determined after extensive public advertising and consultation for the draft Inner Peel Region Scheme Structure Plan, the review of the Mandurah Town Planning Scheme and the Peel Region Scheme. In addition, key stakeholders including the aboriginal community, were directly consulted at the time the route was being considered for inclusion in the MRS in 1994. Any one of these Schemes could have promoted changes to the railway alignment.

The EPA has stated in Bulletin 994 of August, 2000 that "The proposed reservation for the Rapid Transit Route is environmentally acceptable, however the EPA advises that the alignment should be reviewed in an effort to provide a wider environmental buffer to Paganoni Swamp. It is recommended that the assessment of vegetation, wetlands, noise and vibration be deferred so that the EPA can assess these issues in more detail at a later stage of planning."

The land to the west of the railway reserve below the MRS southern boundary has been zoned in the PRS as urban/future urban, with some extractive licences for basic raw materials granted. Extensive grazing has removed all but the most durable of native vegetation and trees in these areas, leaving little useful habitat areas. To the east of the railway reserve, there are two areas of the Pagononi swamps where the railway reserve passes to within 35 metres of the wetlands, otherwise the buffer is generally greater than 50 metres. This land between the railway and the swamps has also been extensively grazed and the remnant vegetation is in very poor condition. Railway construction will be confined to the railway reserve which contains little or no original fringing vegetation.

With land to the west in private hands and earmarked for urban development, to acquire sufficient land to shift the railway alignment to a minimum of 50 metres from the wetland areas would incur significant cost. The proponent believes that the implementation of a comprehensive rehabilitation plan to reintroduce compatible fringe vegetation to the wetlands would be a better use of environmental values and add valuable areas for future fauna habitation. It should be noted that the railway, with its security fence, will provide an effective protection for the western boundary of the Pagononi swamps that will also encourage natural regeneration of the swamp fringes. The proponent has committed to the rehabilitation of this area.

8. (Private) Where large trees with actual or potential nesting hollows are cleared, or fragmented, such as at Leda and Pagononi swamp and Fremantle Road sumpland, PURD should erect a sufficient number of suitable nesting boxes of various appropriate sizes to replace those lost.

The proponent agrees with this submission. Before construction commences in these areas, a survey will be undertaken to determine the trees that may be affected and the type and size of nesting boxes required to replace any lost nesting sites. Every effort will be made to preserve as many trees as possible, however there must be some loss of trees and habitat.

9. (Private) Additional and on-going compensatory mechanisms should be sought. These could include the following:

- Contribution to threatened fauna (including bird, especially duck) breeding programs similar to the Water Corporation's Cockatoo Care Program and Western Power's Threatened Orchid program;
- Bird hides or lookouts in areas of high scenic quality such as along the South Perth foreshore, either associated with Station buildings (e.g. on the roof) or in adjacent wetlands;
- Wetlands with bird breeding habitat and cycle tracks or paths at the Perth Esplanade adjacent to the Esplanade Station.

The proponent notes this submission. It is preferable to consider off-set contributions in consultation with and on the advice of DCLM and other organisations involved in existing and future programs along the railway alignment.

The issue of bird hides in bird breeding habitats that are readily available to the public, is one where the safety & security of the bird population must be an over-riding concern. Similarly areas on Station roofs that could be in the areas near 25 KV power lines must also be considered to have unacceptable risks to both the public and the railway operators.

A series of paths and tracks are planned by the City of Perth, linking the Esplanade Railway Station with the Esplanade.

Noise and Vibration

Construction

1. (C of P) The impact of vibration and noise from the proposed tunnel construction is not adequately addressed, particularly as the planned tunnel is very close to existing buildings and

noise/vibration sensitive premises; impacts on the uses within the buildings and the structures themselves need to be assessed.

The proponent agrees with this submission. It has been recognised that, now more detailed planning for the tunnels has been prepared, further assessment of the impacts of noise and vibration from the tunnels on the surrounding infrastructure of the City centre will be required. An internationally recognised acoustic expert has been engaged by the proponent to conduct these assessments and prepare a suitable management plan. Regular meetings are held between representatives of New MetroRail (formerly PURD) and the City of Perth, providing a venue for exchange of information and other requirements of the proposal.

2. (C of SP) The PER document provides very limited information regarding construction impacts. At this stage little or no information other has been provided to the City of South Perth in relation to (in part):

- Noise Management

The City requests that the EPA require further detailed information be provided regarding the construction impacts in the form of a separate Public Environmental Review for this aspect of the project; **and**

The City also requests the EPA require a detailed study to enable an assessment of the likely impact of vibration and requiring the proponent to manage and mitigate the impact of vibration during construction.

The proponent will require the constructing contractor to prepare and implement, before construction commences, a construction management plan to the satisfaction of the proponent, the relevant Local Governments and other relevant Government Agencies. The plan will include construction noise and vibration management, dust control, hazardous and waste materials handling, after-hours working and light spill management. This management plan will form an integral part of the legally binding contract between the contractor and the proponent and, as such, the provisions of the contract are themselves legally enforceable.

3. (Heritage Council) It is considered that there is an increased relative risk for the heritage building stock along the proposed alignment from vibration impact arising during construction. This is particularly relevant for the buildings along the east side of William Street between Murray and Wellington Streets, beneath which the new William Street Station will be constructed, but also the Perth Railway Station and the Horseshoe Bridge. It is considered that these buildings and structures in particular will require detailed structural assessment to enable appropriate measures to be implemented to protect the fabric against dilapidation.

The proponent acknowledges these legitimate concerns in respect of heritage values. Whilst vibration effects arising from bored tunnelling below the buildings in question is expected to be negligible, there is a risk of damage to structures as a result of ground movement. The constructing contractor will be required to limit damage to nominated structures to a specified, maximum allowable level. For heritage features, the specified level of damage will recognise the particular sensitivity of those structures. The contractor will be required to submit detailed plans describing the measures to be used to monitor building and ground movement, as well as any necessary protection works. These plans require approval by the proponent and other stakeholders prior to commencing any construction activity.

In view of the recorded heritage interests in this area, consultants were engaged to undertake an assessment of heritage implications arising from the proposed Station development. The consultant concludes that the Wellington building and some facades along the streets are of some considerable significance and should be retained. The heritage issues are being addressed in consultation with the Heritage Council. The best planning outcome should achieve a balance between all aspects under consideration to ensure the result is responsible and sensitive to the overall interests of the community.

Operation

1. (T of K) A number of future residential areas adjacent to the railway have yet to be included in the noise modelling, these are at South East Parmelia, Northern Bertram, West Bertram and Leda/Wellard. It is requested that the EPA require this modelling to be carried out; **also** given the rural nature of this (Spectacles) area and the low background noise levels, the Spectacles area should be given a Criteria 1 (noise) status where noise mitigation measures must be provided; **and**
(City of Mandurah) The City is concerned that the interface between the rail reserve and the adjacent future land uses (residential) may not have been fully resolved at this stage. Unless this interface is resolved appropriately, there will be long-term management, monitoring issues which will need to be addressed by the City and the State Government. The City expects that, as the local authority, we would be involved in the plans which are prepared for this interface. This should also occur in consultation with the adjoining landowners.

The proponent undertakes to continue noise modelling to cover the assessment of railway operating noise in future residential areas and will ensure that impacts arising from implementation of the SWMR are properly addressed.

However, the responsibility of managing noise impacts from transport corridors is considered to be a joint responsibility, not only of the transport proponent, but of the Department for Planning and Infrastructure, Local Governments, developers, builders & architects. As the SWMR is a beneficial asset of the State, supplying a fast efficient public transport service that will enhance future developments, the management of noise (and vibration) must be undertaken by all concerned to ensure that future residents, commerce and industries are not subject to sub-standard conditions. The proponent will do its part; others responsible must do theirs.

With regard to the specific area at Spectacles Drive, one residence has been purchased for demolition by the proponent as it in the railway reserve. As a result of detailed design, the alignment itself will now be lowered some 8 metres in a cutting through the area near existing residences, reducing the noise from the railway to levels below Criteria 2. There is one residence where the noise level is between Criteria 1 and 2 and further assessment of the noise amenity will be made at this location before construction commences.

The proponent undertakes to consult fully with the DOE, relevant Local Government(s) and landowners to arrive at acceptable noise management measures.

2. (T of K) Predictive vibration modelling should be taken as indicative only and these sites will be properly assessed through specific vibration analysis prior to construction. These sites include receivers on Spectacles Drive; **and**
(C of R) More information is required on vibration; **and**
(C of SP) The vibration study undertaken by Lloyd Acoustics does not contain sufficient detailed information to enable the City of South Perth to assess the impact of vibration.

The proponent generally agrees with these submissions. Predictive vibration analysis can be further refined at specific sites where vibrations from passing trains are likely to result in objectionable levels and suitable attenuations measures implemented. However specific vibration analysis cannot be done until there is vibration present for measurement and analysis.

It should be noted that vibrations from passing trains have never been measured at levels sufficient to cause structural damage to buildings of sound construction. The railcars being purchased for this project are of a design that will minimise vibration, and are expected to produce vibrations significantly lower than the existing railcar fleet. The proponent commits to further specific vibration studies undertaken in consultation with relevant Local Governments and DOE.

3. (City of Melville) As the railway is being constructed through developed residential areas, it is important that noise management is considered from the earliest stages. Any noise walls should be constructed first to minimise the noise of construction to residents. Noise measurements need to be taken prior to construction, during construction and after commencement of operations. Consideration should also be given to noise attenuation for residents backing onto the southeast quadrant of South Street; **and**
(C of R) More concrete assurances are sought that noise mitigation measures will be built for locations adjacent to the railway where Criteria 2 is exceeded or nearly exceeded which are not already subject to excessive road noise.

Wherever possible, the proponent commits to noise mitigation treatments to be put in place prior to construction of the railway. However, in many instances, construction earthworks must come first to provide a platform for the noise treatment. These areas will be managed to minimise, as much as possible, the noise of construction.

Although predicted noise levels from rail operations at the south eastern quadrant of South Street/Kwinana intersection are below Criteria 2 and certainly below that from the Freeway, the proponent has committed to the construction of a masonry wall at the rear of these properties. This is to attenuate noise from the road re-alignment of the south-bound Freeway on-ramp from South Street. This re-alignment is required to accommodate a station car park to be constructed in this quadrant. Further investigative planning and community consultation is to be undertaken to determine the most effective and acceptable location of the future on-ramp.

Noise measurements may be taken, as part of the commitments given in the construction management plan, should there be reason to suspect noise levels are unacceptably high. Operational noise measurements will also form part of commitments to confirm the predicted noise levels in the noise management plan. Should noise levels exceed predictions, the proponent will apply remedial action to reduce these levels.

In areas of low ambient noise, noise mitigation measures will be applied to any areas where noise predictions indicate levels above Criteria 2, in any case the principle of as low as reasonably practicable will be applied.

4. (City of Melville) Concern has also been raised by residents about reflected noise along the riverfront. The City of Melville asks that this be considered in all noise measurements and impact statements.

Agreed for railway noise. Assessments of the impacts of railway noise in this area have been undertaken and will be analysed and any impacts detected from reflected noise will be managed.

5. (C of P) The central rail tunnel will pass close to and in some instances, pass directly below some existing buildings in the central city. Stations will also be placed close to existing buildings. The PER statements do not provide evidence that regenerated noise or vibration will not be a problem in the central city, which does have many noise and vibration sensitive premises. Noise and vibration issues need to be further investigated.

The issues of regenerated noise and vibration from railway activities in the central city area is fundamental to the scope of investigations required of the acoustic consultant engaged to conduct assessments and prepare a noise and vibration management plan for the City area. This plan will identify recommended treatments (such as vibration-absorbing rail and track mountings) where required to mitigate noise and vibration effects. Regular consultations between the proponent and the City of Perth will be maintained.

6. (C of R) More detail and assessment about the impacts of cumulative of traffic (road) and trains.

Road traffic noise and noise from railway operations are quite different in their impact on receivers. Generally they are assessed separately and, should either or both be found to exceed relevant noise criteria, suitable remedial measures will be implemented. Road traffic noise is recognised as a regular, relatively uniform noise, while train noise is intermittent and rises from very low to a peak with each passing train. Each is individually recognised and assessed by the receivers (people) in terms of their relative impacts. Unless the frequency of train movements is so great that the passing noise ceases to be intermittent, assessments of noise impacts from road and rail and any remedial treatments should be separate rather than cumulative. The proponent will work with the City of Rockingham and the community to achieve best outcomes.

7. (C of R) More information is required on acute noise events, with the latter especially near stations, to see if additional noise mitigation measures are needed. Acute noise events (train horns, braking, PA systems and cornering) could be more significant, particularly at nightime.

Any noise of an acute nature connected with the railway will be addressed, provided there is not any impact on safety and safe operations. The use of train horns is now limited and they are not sounded when entering or leaving stations unless an unsafe situation is perceived.

Noise from braking and cornering has received special attention to minimise their impact. The new railcars to be used on the SWMR services employ alternating current (ac) traction motors which will provide the ability to brake by regeneration of electricity (i.e. the traction

motors will also act as generators during stopping sequences, converting the inertial energy of forward movement into electrical energy to go back into the power grid). Axle-mounted disc brakes will be used in conjunction with regenerative braking to stop the train at the required location. As the disc brakes are usually the source of brake "squeal", the diminished role of the disc brakes should result in little or no objectionable noise.

Cornering on tight bends or at speed will be addressed by a regime of grease lubrication of the interface between the rail and the wheel flange. A minute quantity of a special grease is applied to this interface by a specially adapted railcar during its normal service, perhaps only once per day. This applied lubrication allows a certain amount of wheel flange slip to occur, thus minimising or eliminating the curve squeal. The lubricant itself contains solid lubricants such as graphite to increase effectiveness and minimise the oil content. The application of grease by this method will be restricted to relatively small, localised sections along the route.

The Station public address systems will be designed to control and minimise sound levels and noise spill. Station transit guards will announce the messages on an as-required basis, and pre-recorded, unnecessary announcements will not be broadcast. Special attention will be given to minimising night-time announcements.

8. (C of SP) It should be noted by the EPA that the modelling undertaken by Lloyd Acoustics examines results based on an incorrect track configuration. The City of South Perth understands that the section of track with the City's boundaries (from the Narrows to Mt Henry Bridges) will be constructed as a rigid, track slab. The noise assessment prepared by Lloyd Acoustics (particularly in the section between Canning Bridge and Mt Henry Bridge) has been prepared on the basis of a track placed on ballast.
Also, it is noted that 41 noise-monitoring points were established within the boundaries of the City for the purpose of assessing predicted noise levels. The City of South Perth is concerned that the results of this assessment indicate that the sound level predictions **exceed** the measurement criteria at many of the 41 locations.

The noise assessments and predictive modelling prepared by Lloyd Acoustics for this proposal included a number of options related to track structure. However, the base model on which the noise level predictions was based, assumes slab track from the Narrows Bridge to Canning Bridge and ballast track from Canning Bridge to Mt. Henry Bridge. It is now proposed that the track <u>will</u> be on ballast from Canning Bridge to Mt Henry Bridge. There will be no adverse impacts stemming from this change.

Predicted noise levels at the 41 noise monitoring points between The Narrows Bridge and Mt Henry Bridge are generally between the daytime levels of Criteria 1 and 2, and within the night-time levels of Criteria 2. This is considered acceptable for an area with high ambient levels derived principally from Freeway road traffic, which is consistently well above Criteria 1 noise levels.

These predictions assume that the concrete safety barriers have an in-fill, to the height of the guard rails now in place on the barriers in areas along the Freeway. This increase in height will impact upon visual amenity along the South Perth foreshore.

It is now proposed to reduce the train speed between the Narrows and Mt. Henry Bridges from 130 kph to 100 kph. This will maintain visual amenity and daytime train noise levels between Criteria 1 and 2 and nightime noise levels near or just above Criteria 2.

9. (C of SP) Modification of the existing Busway barriers to increase their height and effectiveness as a noise barrier, suggested in the Lloyd Acoustics report, is of significant concern, **and** it should be noted by the EPA that the purpose of the existing structures is to provide a barrier against collision, rather than sound, **and** indeed the City of South Perth strongly lobbied MRWA to reduce the height of the barrier to enable a visual connection with the Swan River to be maintained.

Previous comment in this submission expressed concern that the sound level predictions exceed the Criteria 1 levels. As stated, the existing Busway concrete barriers are primarily required for risk management and safety against collision accidents. To reduce the height of the barrier to enable visual connection with the Swan River to be maintained, may put Freeway users at an unacceptably high risk. The proponent is committed to maintain a suitable level of safety as part of the principle of duty of care and discharge of responsibility to the travelling public and all who use the railway and the Freeway. The reduction of train speed from 130 kph to 100 kph between the Mt Henry and Narrows Bridges will provide acceptable safety with an estimated annual individual fatality risk factor in the order of 2 x 10^{-7} with the existing barriers

Further risk assessment studies for the railway in the Freeway are being undertaken to determine the optimum size, shape and configuration of safety barriers required to confirm an acceptable level of safety for the Freeway. These issues are being addressed by the proponent in order of importance as firstly safety, secondly visual amenity and thirdly noise.

The proponent will consult with relevant stakeholders on the outcomes of these studies and the final recommendations.

10. (C of SP) The City of South Perth requests that noise attenuation relating to the SWMR proposals should also consider areas where noise attenuation may be required as a result of the Freeway noise.

This submission is outside the scope of this proposal. Where noise attenuation may be required as a result of the Freeway noise, this issue should be referred to Main Roads W.A..

11. (C of SP) A condition regarding the impact of vibration on properties and a requirement for the proponent to undertake remedial action and repair should be incorporated in the event an approval is issued (for the proposal).

The proponent agrees with this submission, where the impacts of vibration relate directly to railway construction and operation. These requirements will be included in the Construction Management Plan prepared by the constructing contractor. In terms of railway operations and experience with the existing suburban railway network, vibration measurements have never reached the level where structural damage to buildings would be likely. The operation of the SWMR is predicted to result in lower vibration levels than the existing services.

12. (Private) I believe that both an average and a maximum noise level criteria should be developed for both daytime and night-time conditions, as the peak instantaneous noise which

will cause annoyance as much as the average noise. Further, considering that the peak noise is associated with a relatively short period of train passage, a low L_{AEq} could be associated with a relatively small number of noisy events. Thus, where train movements are few, there would be little incentive or need to control or reduce noise if the only criterion was average noise levels; **and**
Given that the (railcar) manufacturer has guaranteed a pass-by sound pressure level of 85 dB(A) at a distance of 15 metres at maximum speed, it should not be unreasonable to set a maximum acceptable noise at a receiver of 10 dB(A) lower i.e. 75 dB(A), rather than the 80 db(A) which is proposed with little justification or reference; **and**
Noise impacts are considerably greater in currently rural or semirural areas. Noise attenuation measures should thus definitely be provided at locations where maximum levels exceed 80 dB(A), and probably also where they exceed 75 dB(A).

It is accepted that L_{AEq} alone does not tell the full story of noise impacts in transportation corridors. One of the advantages of electric railcars and this proposal in particular, is that the maximum train pass-by noise level will be consistent; there will be no absolutely quiet events but no very noisy events. The railcars to be used are virtually identical with each other in respect to their noise emissions. In comparison, L_{max} noise levels from roads may vary significantly depending on the type and condition of the vehicle making the noise e.g. new cars and cars with modified exhausts, motorbikes without mufflers or heavy trucks with modified, high tailpipe exhausts. Many pass-by events by road vehicles on the Freeway are known to regularly exceed 80 dB(A) at the receivers.

The L_{Max} noise level of 80 dB(A) has been selected as representative of maximum noise levels set in Australia for transport noise, from a study, "Investigation and Assessment of Transport Infrastructure Noise Management Strategies", conducted by Lloyd Acoustics for the Infrastructure Coordinating Committee Working Group of the WA Planning Commission. This level should not be exceeded and every effort will be made to reduce predicted maximum noise to 80dB(A) or below. In practice, the maximum train pass-by noise levels are likely to achieve 75 dB(A) in almost all areas. At all times the principle of as low as reasonably practicable will apply.

13. (C of SP) A further issue relating to the Old Mill is the impact of noise on this site and the request that noise protection measures should be provided to provide protection for visitors and users of this significant site.

Since the predominant noise by far will be that now existing from the Freeway, it is unlikely that this proposal could provide any significant noise protection measures that would be effective.

Other Construction Impacts

1. (T of K) During construction, appropriate dieback hygiene measures should be taken and soil disturbance minimised. Fencing of construction areas would also prevent contractors from driving through bushland areas. Any bushland and wetland areas damaged in construction should be rehabilitated and maintained alongside the railway; **and**
(C of Melville) The City of Melville requests that the clearing of bush areas and regeneration areas on the Freeway and railway reserve be kept to a minimum required for construction.

Agreed and will be implemented during construction by requiring the constructing contractor to comply with an approved Construction Management Plan that will include dieback hygiene measures and adherence to designated clearance requirements within the railway reserve. Should the contractor clear or damage any areas outside the reserve, the proponent will require the contractor to rehabilitate these areas to the satisfaction of the relevant Statutory Authority and Local Government.

2. (C of Mandurah) The City notes that dewatering is proposed to occur at Gordon Road in Mandurah. From the City's experience, dewatering can and has affected the bores of local residents. As such, the City would request that we be involved in the preparation of a detailed dewatering management plan; **and**
(Private) There is very little discussion on the management of de-watering activities; **and**
(C of P) In relation to the potential impacts on ground water, the PER states only that the impact is "Effects of dewatering". This clearly is not adequate, particularly in central Perth where dewatering could have very major impacts on natural features, properties, buildings and other elements; **and**
(Water Corporation) The Corporation reaffirms that any excavations and associated dewatering should be coordinated with the Corporation to ensure minimum disruption to bores.

The proponent agrees that the issue of dewatering during construction requires carefully management. Reports and advice from geotechnical consultants engaged by the proponent to study the effects of construction on ground and groundwater are being reviewed. Where dewatering is required, the constructing contractor will be required to prepare and implement an Environmental Management Plan that includes provision for the management of any dewatering activities, to the satisfaction of the proponent and all stakeholders.

Within the City of Perth, a maximum allowable groundwater drawdown of one metre will be specified to ensure there is minimal potential for adverse impacts from dewatering.

It should be noted that the most recent planning for the railway at Gordon Road has been able to eliminate all dewatering requirements at Gordon Road.

3. (C of Mandurah) The City would not support the use of water from the wetlands as part of the construction process.

Agreed. The proponent will ensure that this condition will form part of the conditions of contract for the constructing contractor. Regular audits and site inspections by the site superintendent will ensure that the contractor adheres to this requirement.

4. (C of Melville) We ask that adequate warning of the scope of works be provided to residents and Council prior to the commencement of construction.

All stakeholders will be advised accordingly in writing and by public notice. This will be a requirement of the contract between the proponent and the constructing contractor and will be enforced.

5. (C of Melville) Dust from earthworks and construction should be limited so as not to impact on the surrounding residents; **and**

(C of R) The PER proposes that a series of management plans be developed to cover construction impacts such as noise, dust, light overspill and traffic, in consultation with the key stakeholders, including Local Government. It is recommended that the City is liaised with at all times during the development and implementation of the proposed management plans. Dust may be of a particular concern and there is a need for consistency with council's policy of no clearing for development works during the summer months; **and**

(DCLM) The Department of Conservation and Land Management should be called upon to provide advice regarding Commitment 2, implementation of the Construction Management Plan, as well as DOE and Local Governments; **and**

(Conservation Council) Conditions need to be set for a transparent and public process for the monitoring of clearing, dust and noise and revegetation **and**

(Private) Dust management during earthworks is typically poor, primarily because the ground is not wetted before disturbance. A more innovative way needs to be found that both controls dust and minimises the use of water.

The proponent will require the constructing contractor to prepare and implement a construction management plan that will include, but not be limited to the management of construction dust, noise, light spill, clearing, traffic management and complaints response. The construction management plan will require the approval of all key stakeholders and liaison will be maintained between the proponent and the relevant stakeholders both through the constructing contractor and directly with the proponent.

6. (C of P) The impacts of open cut and tunnel boring on the natural and man-made environment are not known, as the PER contains no assessment of the geotechnical conditions.

It is acknowledged that, at the time the PER was released, only a broad geotechnical investigation had been completed. It was concluded that, on the available evidence, the proposal was technically feasible. Since then more detailed knowledge of the geological formations and groundwater regimes in the project area has been obtained that confirm that, with proper technical controls, the construction of the tunnels can be undertaken with minimal impact on the surrounding environment. Details of this work will be made available, through a Development Application, to the key stakeholders for their consideration, prior to construction.

7. (C of P) Impacts on Mt. Elisa Escarpment of dewatering and tunnel construction are not known.

It is extremely unlikely, in view of the distance between the Mt Eliza escarpment and the construction sites and current geotechnical information, that there will be any impact. However, the constructing contractor will be required to regularly inspect the areas surrounding the construction site for signs of adverse impacts. Regular audits by the proponent's site representative will also occur to confirm the contractor's actions in this regard. As noted previously, groundwater drawdown will also be restricted.

8. (C of P) Traffic management plan for the part closure of Wellington Street needs to be included and approved by the City. All full and part road closures need the approval of the City.

Noted and agreed. All traffic management plans will be submitted for the approval of the City prior to commencement of construction.

9. (C of P) A spoil removal management plan is required.

Agreed. Prior to commencement of construction an approved spoil removal management plan will be prepared, in consultation with key stakeholders. This requirement will form part of the Construction Management Plan for this site.

10. (C of P) The PER says, on page 138, that PURD will offer free structural assessment of building prior to construction to facilitate assessment of impacts. It does not however spell out the process or responsibilities beyond that point.

A pre-existing condition survey will be conducted of structures and buildings likely to be in the zone of influence of tunnel construction. Buildings and structures identified as being in the critical zone will be subject to real-time condition monitoring as tunnelling progresses. If any settlement/movement is found to be outside predicted limits, a predetermined specific building protection management plan will be put into effect for remedial action. The proponent accepts responsibility for building damage and restitution that occurs as a direct result of construction works.

11. (C of P) The hours of operation for the construction phase mentioned in the PER are suitable for residential areas but not for the central City area and need to be reviewed.

Agreed. The tunnelling machinery works best if engaged on a 24 hour/7 day per week basis. Stopping and starting this process is likely to incur more damage than continuous operation. The proponent will require the constructing contractor to prepare and implement a working timetable to the satisfaction of the Local Government and DOE.

12. (C of P) Insufficient assessment is provided on construction impacts on Freeway interchange (such as movement of construction vehicles, construction lights during evening hours).

The construction and traffic management plans required to be prepared and implemented by the constructing contractor will address these issues to the satisfaction of Local Government, Main Roads WA and DOE.

13. (C of SP) The PER documentation provides very limited information regarding construction impacts. At this stage little or no information other has been provided to the City in relation to site access, contractor work or storage area requirements, impact on vegetation & foreshore environments, dust, noise and traffic management. The City requests that the EPA require further detailed information be provided regarding the construction impacts in the form of a further, separate Public environmental Review for this aspect of the proposal.

At this stage, a constructing contractor has not been contracted to undertake this work. However, as indicated previously, a Construction Management Plan embracing these issues will be required to be prepared and implemented by the contractor to the satisfaction of relevant Authorities. The provisions of this Plan will be strictly enforced by the proponent.

14. (Private) The insert map (at Stakehill) gives no indication of any disruption to Jarvis Road entrance, we must insist that there is proper access at all times and as little disruption as possible.

Agreed. The proponent will instruct the constructing contractor to maintain proper access to Jarvis Road at all time during construction.

15. (DCLM) There is no mention in the PER of unexploded ordinance (UXO), however UXO is known to be an issue in the southern part of the Lake Cooloongup reserve in Rockingham Lakes Regional Park.

The proponent is committed to a 100% UXO search in the areas of the railway alignment identified as having never previously been searched. A Tender has now been prepared for a properly qualified and experienced Company to undertake this work in the area identified as likely to contain UXOs, being the railway reserve between Willmott Drive, Rockingham and the junction of Ennis Avenue and Mandurah Road, Baldivis,. Because a 100% search requires substantial cutting of vegetation, this work will not be commenced until the proposal has received Ministerial consent and clearance of any conditions.

16. (DCLM) The PER should state that DCLM is to be consulted regarding any clearing that may be required if proposed management access tracks can not be confined to the MRS reserve.

Agreed. Where, in some areas the management access track cannot be confined to the MRS reserve, DCLM will be consulted for agreement before any work is commenced.

17. (DCLM) The stated requirement for the contractor to fence the rail reserve prior to the commencement of construction activities (p.104), as requested by the Department, is noted. Physical demarcation of the reserve is likely to significantly reduce the risk of accidental damage to vegetation outside the reserve during construction.

Agreed. It is intended that the reserve required for railway construction will be fenced with a temporary and easily identified fence prior to construction. The constructing contractor will be required stay at all time between these boundary fences. Subsequent to clearing, a permanent security fence will be erected to demark the railway alignment and exclude trespassers and fauna. All contracts will include legally enforceable clauses to ensure that the contractor will be required to apply suitable restitution to any breaches of clearing.

18. (Peel Preservation Group) Include railway construction impacts below the MRS to Mandurah to be considered just as important as above the great divide!!

Noted by the proponent.

19. (Water Corporation) The proposed Gordon Road Train Station is in conflict with the environmental constraints imposed by odour and, as such, is unsuitable to be developed within the odour buffer of the Gordon road Wastewater Treatment Plant.

The Gordon Road Station is identified as a future Station, the construction of which is in doubt because of the proximity to Mandurah Station and its patronage catchment area. It will be suggested to the EPA that this Station site be withdrawn from the proposal and, should the

Station be considered for construction in the future, a separate referral would be made to the EPA at that time.

20. (DCLM) There is no mention (in the PER) of surface water management in relation to the proposed stations.

Surface water drainage designs and plans for each Station will be developed by expert hydrologists under architects engaged by the proponent, in consultation with relevant Local Government, DCLM and Water and Rivers Commission representatives as appropriate. Many of the Stations are at the concept stage and have not, as yet, been subject to the preparation of detailed drainage design. This process will also form an essential part of Development Applications required for all Stations.

Public Risk and Safety

1. (C of P) Traffic management planning should include emergency vehicle access.

Agreed. It would be logical to include emergency management as an essential part of any traffic management plan. This will be required by the proponent.

2. (C of P) The PER does not adequately cover disaster planning and the safety and security issues particularly at new railway stations and during evening hours.

New railway stations comprehend the requirements for adequate management of safety and emergency events in their planning and design.

The existing suburban passenger railway system has prepared and implemented a number of management plans designed to cover all credible emergency risks, referenced or contained in an overarching document "Emergency Management, Urban Electrified Rail System". Topics such as Emergency Response, Security, Emergency Evacuation and Anti-terrorism and Disaster Planning are fully covered. Special plans have been developed for areas where access and egress are difficult e.g. underground stations. These comprehensive plans are regularly tested to confirm their validity. The proponent shall extend their coverage to include the new railways once they are operational and will prepare specific plans for locations and situations not covered by existing plans.

All stations of the South West Metropolitan Railway are to be manned full-time by Transit Guards. Station operations, including security will be integrated with the existing management system. Stations are to be manned at night and covered by the security communications network to allow quick response by mobile transit guards and Police in the event of any emergency.

3. (C of SP) The information on public risk and safety provided in the PER is scant and does not detail any particular measures (apart from the presence of the existing concrete barriers) that will address these issues. This is inadequate for any assessment to be made. The risk of collisions may be minimised by the concrete barriers, however it is noted that the barriers will not prevent debris, fallen loads etc. from entering the track. No strategy or advice is provided that addresses this issue or any other issue associated with emergency or crisis situations. The City of South Perth is not satisfied that this aspect of the project has been addressed by the

proponent given the level of risk involved and the potential amenity impact that physical measures required to mitigate risk may have for residents of the City (See also comment under **Other Construction Impacts**).

The proponent recognised the legitimate risks of foreign material entering the railway reserve, particularly where the railway is in the Freeway median at locations with constrained clearances between road and rail..
Emergency management procedures will cover the required response. It should be noted that all trains are in constant radio communication with the railway Train Control Centre and in any emergency response Train Control will act as the communications centre.

The proponent has also commissioned Det Norske Veritas (DNV) to conduct a risk assessment of railway operations in the railway alignment where it is the median of the Kwinana Freeway, to determine the level of risk associated with a vehicle or debris entering the rail reserve. A draft report of the investigation has identified that, assuming existing barriers, or their equivalents, in place along the entire alignment, the overall individual risk for passengers is broadly estimated to be 2 x 10 $^{-7}$ (c.f. EPA requirement of lower than 1 x 10^{-6}) per year. DNV noted that this estimate only includes the individual risk for the passengers relating to the stated events; railway accidents emerging from other causes such as train derailments and fires, environmental impact, accidents during embarkation/disembarkation are not included. However, DNV also observed that, given the configuration of the Perth-Mandurah railway track, it is expected that vehicles or debris entering the railway reserve will be main contributors to the overall risk level. The proponent will make the final report publicly available.

It is not expected that there will be any long-term physical measures required to mitigate risk that may impact on the amenity of the City's residents.

4. (Private) In the design of bridge support protection, it is not uncommon to consider that the impact to be resisted is from a glancing blow from a vehicle approaching the support generally in the direction of a normally approaching vehicle, with the vehicle in an orientation that would allow the impact to be deflected from the line of approach threatening the support.

For such incidents (where a train derailment directly strikes a bridge support) it is unlikely that the bridge support would be protected against catastrophic failure if the protection is designed for the notional glancing blow.

New bridges on the Kwinana Freeway have been designed for possible train collision impact in accordance with the Austroads Bridge Design Code, and not the notional glancing blow. Future bridges will be designed and constructed to, or greater than, that Code standard. If required, pier protection will be applied to all existing bridges.

In the area of Canning Bridge to the Narrows Bridge, the railway track will be on concrete slab that provides maximum support and stability, minimising the likelihood of derailment. Points and crossings, a source of possible train derailment, will be absent from this section.

Soil and Groundwater Contamination

1. (C of SP) The City would expect the installation of Continuous Deflection Separators (Gross Pollutant) traps in the section from Cloister Avenue to Mt Henry Bridge to collect run-off from the Freeway and SWMR prior to discharge into the wetlands; **and**
(C of Melville) Drainage both during and after the construction phase, should be treated by filtering through pollution traps before being returned to watercourses, or alternately considered for uses such as recycling for reticulation, water features etc..

The issue of installing gross pollutant traps as required to the drainage systems in the construction and operation of the railway in the Freeway median has been dealt with during a number of meetings between Council officers from both South Perth and Melville and representatives of the proponent. Agreement has been reached on the disposition and structure of the modifications required to the Freeway drainage systems, including the installation of continuous deflection separators (GP) traps where required on the river outfalls.

2. (C of SP) The City has noted in assessing the noise reports and in discussions with PURD officers, the proposal for the railcars to include a system of oil injection onto the rail tracks in order to minimise noise impacts. From the information provided the City has been unable to assess the impact this oil treatment may have over the long term on soil and groundwater contamination or how residual oils will be prevented from entering the river system or groundwater. Further investigation of this item is required.

In train operations, high frequency noise from wheel and rail interaction manifests itself as tread and flange squeal, particularly going through tight curves. Cornering on tight bends or at speed will be addressed by a regime of grease lubrication of the interface between the rail and the wheel flange. A minute quantity of grease is applied to this interface by a specially adapted railcar during its normal service, perhaps only once per day. This applied lubrication allows a certain amount of wheel flange slip to occur, thus eliminating or minimising the curve squeal. The lubricant itself contains solid lubricants such as graphite to increase effectiveness and minimise the oil content. This system is essentially non-migratory and is not expected to enter either the river or the groundwater and, if it did, would be in such small quantities that the impact would be negligible. The existing passenger railway has used this form of lubrication for many years with no adverse environmental impacts.

3. (Peel Preservation Group) With reference to dewatering in Gordon Road, Mandurah, what impact will this have on surrounding vegetation, underground water and the Serpentine River? Also in recognition of the potential sites for contamination, we are concerned about possible groundwater contamination in the Serpentine River catchment.

Any dewatering required during construction of the railway will be subject to strict controls under a Construction Management Plan approved by the proponent, Local Government and DOE. The environmental impacts from this process are expected to be manageable and minimal. Any disposal of water will be carefully managed to prevent groundwater contamination. With specific reference to dewatering at Gordon Road, the final design of the railway has eliminated the requirement to dewater at this location.

4. (Water Authority) Care should be taken in the construction phase to ensure no incompatible uses are made of the protection areas which may expose the groundwater to contamination.

Agreed. The constructing contractor will be required by the proponent to implement a Construction Management Plan to prevent such contamination.

Vegetation

1. (T of K) The railway severs the Crown Tramway reserve which it runs parallel to for approximately a kilometre. The tramways trail, a regionally significant recreational trail and vegetation corridor is proposed for this reserve, with connecting sections already begun in the City of Rockingham. Thus, the rail impacts need to be addressed, with options such as bridges or underpasses and retention of vegetation adjoining the railway explored in consultation with the Tramways Steering Committee and Friends of the Tramways Nature Trail.

The SWMR alignment meets the Tramway reserve in only one place, at Thomas Road where the Railway passes under Thomas Road, just west of Johnson Road; at this point the Tramway reserve passes over Thomas Road. The railway thus has no direct impact on the tramways trail, as the existing link over Thomas Road is still available and can be used to traverse the railway at this point.

2. (C of Melville) It is also requested that re-vegetation of areas is carried out in consultation with the City to ensure continuity and compatibility with surrounding areas. Mature trees should be retained where possible.

Agreed. The proponent will consult with all affected Local Governments on plans for revegetation in their respective areas.

3. (C of R) The PER should refer to the conservation benefits of using the Garden Island Highway Reserve for the railway (through the northwest section of Lake Cooloongup Reserve) - the vegetation on the previous alignment will now not be cleared and there will now be only one significant infrastructure corridor passing through the Reserve. This represents a net "gain" for the environment; **and** The EPA should also note that this re-alignment is part of broader transport planning for the area that also includes:

- The Bus Transitway;
- The widening of Dixon Road;
- Council possibly giving up two local Road Reserves within the Lake Cooloongup Reserve - Road to be included into the Regional Park; and
- Council already giving up some of the Road Reserve areas along Mandurah Road to be included in the Regional Park.

These should be seen and assessed as a "package" that delivers a net environmental gain. In this context, any loss of regionally significant vegetation caused by the widening of Dixon road is well and truly offset by the net gains of the other proposals.

As part of the planning review of the entire proposal and in consultation with officers from DOE, the proponent was able to develop an alternative railway route into and through

Rockingham. This route uses the reservation for the Garden Island Highway from Mandurah Road, running south west into the intersection of Ennis Avenue and Rae Road, Rockingham. This has the effect of consolidating the railway, the future bus transitway and any roads into the one corridor, with a major railway station at the Ennis Avenue junction.

A direct result of this initiative is to minimise the need for the original MRS rapid transport reservation between Leda and Waikiki. These reserves cut through environmentally sensitive areas of the Leda Nature Reserve and the Rockingham Regional Park at Lake Cooloongup, that with adoption of the proposed route, will no longer be required for the railway. This process has already been initiated and the WA Planning Commission advised via a submission to the Hearings Committee for the MRS Amendment 1032/33 "South West Metropolitan Transit Route".

The original transit route from the point where it crosses Gilmore Avenue in Leda, to the point where the route joins Ennis Avenue in northern Waikiki, has been assessed to contain at least 33 hectares of native vegetation of varying quality. The proposed route along the Garden Island Highway reserve will require the clearing of approximately 13 hectares of similar vegetation. This represents a net "gain" of some 20 hectares of land containing native vegetation, much of which is in nature reserves and regional parks.

Regionally Significant Vegetation

1. (Private) Pickle Swamp. Even though the alignment has been changed to reduce the impact on Pickle Swamp, it is possible that further innovation would allow the route to enter the road reserve of Gilmore Avenue earlier or further to the north., or it should be possible to move the railway and Gilmore Avenue further west (as part of the railway construction rather than later), thereby further avoiding Pickle Swamp; **and**
(T of K) The northern section of Pickle Swamp is planned to be filled in order to "maintain a suitable railway curve". Detailed design of drainage structures should be required to minimise the likelihood of contamination of the remaining wetland; **and**
(Private) The rail reserve is proposed to clear part of Pickle Swamp, south of Gilmore Avenue. There is an existing road reserve adjoining the proposed rail reserve clearing that has been cleared for Gilmore Avenue and for potential future use as a dual carriageway for Gilmore Avenue. To save clearing of Pickle Swamp for the rail reserve, I suggest that part of the road reserve be used for the rail reserve, even if this means extending the road reserve to the north and realigning Gilmore Avenue; **and**
(Conservation Council) We oppose any clearing of Pickle Swamp. Gilmore Avenue should be moved further north and the rail placed in the existing road reserve.

The proponent has carefully examined and costed a number of design options for the realignment of the railway in this area to avoid, as much as possible, the north western corner of Pickle Swamp. Any rail alignment is constrained by the ruling grade and radius of curvature set for the operation of trains, being no greater than 3% and 1200 metre minimum respectively to meet the required train speed and operating timetable.

It has been determined that to completely avoid Pickle Swamp, Gilmore Avenue would have to be moved to the west below Leda and the intersection of Gilmore Avenue, Mandurah Road, Mundijong-Kwinana railway and Dixon Road also realigned west. The fact that this section

of Gilmore Avenue is a near-new (1999) road and the destruction of such an asset could lead to trenchant public criticism must also be a factor to consider.

The current alignment design has been optimised for the railway to minimise impacts on Pickle Swamp and yet retain the existing road and intersection structures. A total of one (1) hectare of Pickle Swamp outside and inside the road reserve will be lost, with a further 1.9 hectares of vegetation cleared in the road reserve at the junction of Gilmore Avenue and the Mundijong-Kwinana freight railway, to allow the construction of the rail bridge over the freight railway and Mandurah Road. The proponent considers that agreed mitigation for the loss of this wetland would be the proper course of action and is preparing a Mitigation Plan for submission to the EPA.

2. (Private) The comment that it is not necessary to assess the loss of vegetation in some bush Forever sites because they have been assessed as part of the Bush Forever assessment process (p102) is not accepted. Bush Forever only listed constraints, it did not accept or condone them. Any opportunity to prevent impact on Bush Forever sites through negotiation, planning or legislation should be taken. Thus the EPA must assess areas where the rail alignment passes through Bush Forever sites to determine whether that is acceptable or better alternatives exist.

The reference on page 102 of the PER to the Bush Forever assessment process relates to the original work done for BushPlan, where the percentages of vegetation complexes to be reserved by the Plan were calculated. These calculations deliberately excluded the areas reserved for future roads and railways already in the MRS, as ultimately vegetation in these reserves will be lost by clearing for construction.

3. (Private) There is insufficient discussion regarding the impact of the proposed Thomsons Lake Station on the high conservation remnant vegetation remaining in the area; **and**
(DCLM) Regarding impacts on vegetation at station sites, the PER states "Vegetation will also be removed from Station sites as these are progressively constructed." (p.99). The retention of some existing trees at station sites should be possible and highly desirable. Station sites should be designed to retain as much existing vegetation as possible.

Thomsons Lake Station will ultimately form part of the much larger development of Thomsons Lake Regional Centre. The station site will require substantial ground height changes in the earthworks that are likely to preclude, to any extent, retention of existing vegetation. This applies to many of the station sites in this proposal. However, where possible, the proponent is committed to designs that will retain as much of the existing vegetation as possible. Landscaping plans are proposed to integrate revegetation with the surrounding environment.

4. (Private) In referring to Bushland Condition Rating of west of Pagononi Swamp and Fremantle Road sumpland (Black Swan), it states "sparse vegetation only" which has been the result of degradation through lack of fencing to protect the dry land buffer from stock grazing. However there are some mature Tuarts there and since these are becoming rare and endangered in Mandurah they should be preserved. There is a strong case for fencing off this buffer for protection and regeneration purposes.

The construction of the railway will effectively provide secure fencing for the western buffer zone of the Pagononi Swamp and Fremantle Road sumpland. This area will be targeted for wetland fringe rehabilitation by the proponent as part of the mitigation commitments for

vegetation and wetland loss to the proposal. Unfortunately, some large trees occurring in the railway reserve are likely to be lost as a result of earthworks required for the rail alignment. Every effort will be made to minimise loss of mature trees, consistent with the construction of the railway.

5. (Conservation Council) At the Spectacles adjacent to the drainage sump there is some 50 metres of land that should be returned to the regional park.

This land is no longer required for this proposal and will be returned to its original land use. There are a number of areas where land reserved in the MRS for the rapid transport route will be surplus to railway requirements. These will be returned to their original land use through the MRS process.

6. (Conservation Council) At Ennis Avenue the rail should be hard up against the carriageway, which would save further vegetation in the Regional Park.

Along Ennis Avenue the railway alignment is required to fit into the eastern road reserve as much as possible. This reserve is barely adequate for the railway infrastructure and will require the railway to be as close to Ennis Avenue as possible. In many areas only a safety barrier will separate rail from road.

7. (Private) The current proposal is to minimise the impact on Anstey Swamp by aligning the railway in the south-bound Mandurah road reserve, and shifting the road to the west. This will provide a good outcome for the swamp, but will result in a number of large, healthy Tuarts currently on the west side of Mandurah road being destroyed. Once these are removed, there will be very few Tuarts remaining on the west side of Mandurah road.

Unfortunately this will be the likely outcome of shifting the rail/road alignments to avoid environmental impacts on Anstey Swamp. However, the proponent will examine every practical option for the construction of the realigned Mandurah Road to minimise the environmental impacts.

Threatened Ecological Communities (TECs)

1. (Private) While PURD has proposed some changes to the layout to the Waikiki station which attempts to avoid the TEC19b, it is not clear from the PER what the revised proposal is and what other impacts it might have, such as on the viability of the preserved TEC, or on other remnant bushland to the south of the original station; **and**
(Private) I believe that the TEC19 that is proposed to be cleared for car parking at the Waikiki Station should not be cleared. We have worked with the station designers as part of ECCC (New Metrorail Environmental Community Consultative Committee) and have suggested a number of alternative lay-outs to preserve the TEC19; **and**
(DCLM) The Department (DCLM) awaits discussions on potential compensation for the loss of this area of TEC19; **and**
(Conservation Council) We support the retention of TEC19. It will remain rare even if they do find a few more. Any destruction of the TEC19 vegetation at the Waikiki Station is strongly opposed. We also oppose the taking of any land from Lake Walyungup or the regional park. We suggest car parking should not be at the expense of conservation land but instead should be located in the road reserve at Ennis Avenue; **and**

(W&RC) Consideration for the redesign of the Waikiki Station to avoid loss and impact on TEC19 is strongly supported.

The station design has been extensively reworked to provide retention of as much as possible of this TEC19b pocket, as was left after the realignment of Safety Bay Road.

The final station design was able to retain approximately 80% of the best vegetation, by reorienting the station site from a triangular to a rectangular shape and taking an equivalent area of land to the south, parallel to Ennis Avenue. This land is within the Lake Walyungup reserve, however it is considered to be of a lower environmental value and well represented in the reserve.

The location of the Station at the junction of Ennis Avenue and Safety Bay Road was considered to be vital to support patronage from growing residential areas, in the east and west districts surrounding Ennis Avenue and as far away as Baldivis. Not any alternative site could be found to serve as well.

The alternative sites considered included possible carparking facilities in the north west and north east quadrants of the junction of Ennis Avenue and Safety Bay Road. The NW area was found to be unsuitable because it is unable to accommodate any but the smallest of carparks, patrons would be required to walk up and over the Ennis Avenue bridge to get to the station and the relative isolation would likely encourage theft and vandalism.

The NE quadrant contains very good vegetation, including identified TEC19b, forming part of the Lake Cooloongup reserve, road access to parking would require a relatively large area to allow entrance from Ennis Avenue and patrons would be required to use the same tunnel as the train, or walk back along the entrance road. Isolation and theft/vandalism were also considerations. Neither of these options were therefore considered viable. A double or multiple story carpark facility was rejected as an unjustifiable cost, prone to theft and vandalism, and inconsistent with the general ambience of surrounding residences.

These options were considered in consultation with officers from the City of Rockingham and DCLM, together with representatives from community environmental groups. While there was a diversity of opinions and concerns, the general consensus was supportive of the final design.

The hydrology in the area of the TEC19b, after the realignment of Safety Bay Road, appears to be in favour of survival, and opinions support the continuing survival after the Waikiki station is built. The proponent commits to ongoing monitoring and management of the site in consultation with DCLM. Compensation for the removal of the portiion of TEC19 will also be discussed with officers from DCLM.

Declared Rare and Priority Flora (DRF) and Other Significant Flora

1. (Peel Preservation Group) Priority flora identified within and surrounding the proposed alignment. In reference to species *Jacksonia Sericea* and *Lasiopetalum Membranaceum*, it is hoped that seed collection and relocation of these species will take place. Any orchids found should be recorded and saved; **and**

(C of Mandurah) With respect to the Priority 3 species which are identified on page 109 of the PER, the City requests that all efforts be made to preserve the species including an assessment of the potential to be relocated. The City understands that *Lasiopetalum membranaceum* can be successfully relocated. The City notes on P24 of the vegetation and flora management plan that *Jacksonia Sericea* was locally common at the Mandurah Terminus site. The City requests that every effort be made to re-establish a *Jacksonia Sericea* community in an appropriate location close to this area (e.g. within the adjacent public open space area). This should be established if possible using seed from local plants. With respect to relocation of flora, consultation should occur with the City of Mandurah in order for the City to assist in this process.

Agreed. The proponent will conduct further surveys in these areas prior to construction to identify more accurately the numbers and locations of these species. Any specimens within the railway alignment under threat of clearing will be considered for transplantation, if possible, to a secure area. Seed collection is now under way along the entire length of the railway in areas that are currently vegetated. The proponent will consult with the City of Mandurah in any plans to relocate flora and the re-establishment of flora populations from seeds collected locally.

2. (Main Roads WA) Known sites for DRF such as the south-western quadrant of the intersection of Kwinana Freeway and South Street need to be addressed, and included if necessary, in any referral of the project under the EPBC Act; **and**
(Private) The PER is not explicit where areas are that may contain the DRF Grand Spider Orchid (*Caladenia Heugelii*) which is also endangered under the Commonwealth EPBC Act, nor whether any were found either during surveys for the SWMR, or at any other time. For example, there is no mention of the fact that the proposed South Street park-n-ride facility is in an area where the Grand Spider Orchid has previously been seen, but apparently not recently located. This is not unusual for orchids. There are other locations where the Grand Spider Orchid may occur, such as in the Thomsons Lake Station, Stakehill Station, Sicklemore Road, Anstey and Pagononi swamps, Pagononi Road and Freemantle Road Sumplands areas. All these areas need to be carefully searched for the Grand Spider Orchid and any other orchids each spring before construction. Any Grand Spider Orchids found should be avoided. Transplantation could be considered, but the success of transplantation is poor(<50%); **and**
(C of Melville) No mention is made of the Giant Spider Orchid, which is located within the Freeway reserve at Murdoch/South Street Intersection. Verbal acknowledgement has been made of its presence and the need to consider its present location under the revised plan for the station. The City of Melville supports the retention of the habitat of this orchid rather than its relocation.

Registered sites (in the DCLM Register of DRF) of the DRF Grand Spider Orchid (Caladenia Heugelii), in or near the SWMR alignment, occur at Thomsons Lake and at the junction of South Street and the Kwinana Freeway. The Thomsons Lake site was on the edge of the Beeliar Road reserve and was lost under the diversion road constructed as part of the Kwinana Freeway Interchange project.

The other site at South Street is in the south eastern quadrant of the junction. This area is destined as additional parking for patrons using the South Street (Murdoch) Railway Station. To provide this parking and station access for buses, the existing southbound on-ramp from South Street to the Freeway must be shifted to a more easterly location in the road reserve.

This new location is directly over the last known location of the Grand Spider Orchid. In an attempt to avoid the DRF site, a number of designs for the carpark and access roads have been examined without success. The orchid has not been sighted since 1998, and any markers have been removed or destroyed by fire. The proponent has applied to DCLM for permission to take for management purposes, but has undertaken to conduct spring surveys for the presence of the Orchid in this area. If found, a relocation program will be undertaken.

In respect of the presence of this DRF, the proponent will refer the project to Environment Australia under the Environmental Protection, Biodiversity and Conservation Act, 1999.

3. (Private) On a field visit to review the alignment through the Leda Nature Reserve, it was noted that there are a number of significant Tuart trees of very large diameter within the rail reserve, the majority of which could be preserved by moving the railway reserve some 30-40 metres to the north. I realise that this would result in an amendment to the MRS but considering that North and South of this area is all within the Leda Nature Reserve, it would be worth preserving these magnificent trees; **and**
(Private) The current route passes through good quality vegetation in the Wellard/Leda area. The current route contains many magnificent old Tuart trees in excellent condition, including possibly the best Tuarts in the Reserve, which would have to be removed. It is unfortunate that the route need to pass through this area of vegetation at all, but, as a minimum, the route alignment needs to be re-examined to avoid these trees.

There has been substantial design review of the alignment of the railway in this area and the proponent believes that the optimum route for environmental, construction and operational reasons has now been selected.

Moving the railway some 30-40 metres north in this area has repercussions over a substantial distance either side of the actual realignment that may have impacts on other vegetation of conservation value. It is unsure if this move would actually preserve the best number of mature Tuart trees in this area. The engineering considerations of this proposal are also complex and may result in unwelcome impacts between this area and Gilmore Avenue to the south. The proponent will undertake to survey the area, identify the location of these mature trees and examine all possibilities of preservation.

Wetlands and Watercourses

1. (Main Roads WA) It is also noted that vegetation and wetlands impacts associated with the realignment of Mandurah Road between Anstey Road and Dampier Avenue has not been addressed in the PER. Main roads considers that these should be included in the assessment of impacts, and in the proposed management plans.

Agreed. This realignment formed part of the outcome of MRS Amendment 937/33 and 938/33 in 1994. As such, this area has been previously assessed by the EPA. However there is a Ministerial Condition set as a result of these Amendments, requiring a Construction Management Programme to be prepared by the proponent. Management of the vegetation and any wetlands impacts associated with the construction of roads and railway at this location will be included in this management plan.

2. (W&RC) South of Thomas Street the proposed alignment comes in close proximity to many conservation category wetlands. As described in the PER, land will be filled in at many locations between Leda and Mandurah, in order to meet the required grades for the railway.
In areas where fill is required in close proximity to wetlands, there is a potential to fill over a peat/silt soil layer which could subside irregularly over time with the weight of compacted fill and presence of stations. How does the proponent propose to manage this issue?
Will the proponent propose to excavate and replace the peat/silt with a more stable material such as sand? If so, can the proponent demonstrate that changes to the surficial aquifer will not alter local groundwater flow paths that recharge the wetlands (e.g. in the area of the Safety Bay mound, where groundwater may flow east to lakes Cooloongup and Walyungup)?
If the proponent cannot demonstrate that groundwater flow paths will not be altered, will the proponent propose alternative construction techniques, mitigate for the impacts, or commit to corrective action to ensure that wetland water levels and regimes will not be altered?

The proponent has commissioned detailed geotechnical investigations of the railway alignment from the Glen Iris Estate, Jandakot to Mandurah. This survey has identified several areas where there is unstable soil not suitable as a base for railway construction.

These areas are of a silty/peat composition about 0.5 to 1.0 metres in depth near the ground surface. It is proposed to remove these layers and replace them with clean sandy fill. Advice has been received that the replacement sand will have water permeability at least equal to the soil removed and that the relatively shallow nature of the silty/peat deposits should not disturb the groundwater hydrology. More detailed investigations are being undertaken in these areas to confirm earlier finding and ensure remedial action will not adversely impact on the groundwater flow paths.

3. (T of K) Other impacts associated with rail operation include introduced contaminants (such as oil) in stormwater runoff degrading areas such as Pickle Swamp.

The operations of the electric passenger railcars are essentially oil-free. Any greases and oils used by the railcars are contained in sealed boxes. In areas of tight rail curvatures a small quantity of non-migratory grease may be used on the rail to prevent excessive noise. Based on the existing suburban rail passenger services, it is expected there will be negligible contamination to stormwater run-off from the railway reserve.

4. (C of Mandurah) The City of Mandurah would strongly request that the alignment of the rail reserve through Lot 1 Fremantle Road (the Lot immediately to the south of the MRS boundary) where it runs parallel to Pagononi Lake, be moved westward to ensure that no part of the rail reserve is within 50 metres of the wetland as an absolute minimum; **and**
(W&RC) The Water and Rivers Commission strongly supports and recommends the investigation into the possibility of moving the alignment further to the west at the northern end of Pagononi Swamp to increase the distance of the rail reserve from the wetland: **and**
(Private) The railway reserve is far too close (within 50 metres) to the edge of the wetland vegetation considering that this area is only now being developed. The proponent should rehabilitate to an acceptable standard the degraded vegetation from the eastern edge of the railway reserve to the wetland vegetation boundary to provide compensation for areas too close to the wetlands; **and**
(Conservation Council) The current proposed buffers at Pagononi and Black Swan swamps are not sufficient. Appropriate buffers need to be set; **and**

(Peel Preservation Group) Any alignment which passes within 35 metres of Pagononi and Black Swan wetlands, is totally inadequate to protect these two regionally significant wetlands and should be shifted further west to allow a minimum buffer of 50 metres between the Rail buffer and the wetlands.

The possibility and practicability of shifting the alignment to the west to be at least 50 metres from the edge of the Pagononi wetland was carefully reviewed, without a successful outcome. The response to a similar concern has been provided under **Fauna Item 7.,** *above, that more fully answers these statements.*

5. (Peel Preservation Group) (PER, p.71) Recharge through wetlands is a primary source of seasonal recharge to the shallow aquifer. We are concerned that the proximity of the railway to Pagononi Wetlands may affect the aquifer; **and** Groundwater levels are shallower adjacent to the wetland chain that runs parallel to the coastline and in the low-lying inter-dune swales. How will this impact on the wetland during and after construction?

The construction of the railway formation and track ballast is designed to allow water to flow through, it does not have an impermeable layer like a road surface (where concrete track slab is used between Canning Bridge and Perth City, special drainage requirements are implemented). The railway formation is above the water table in areas adjacent to wetlands. Outside of Perth City, only one area, at Elanora Drive/Ennis Avenue junction, is to be constructed to reach below the water table. At this location special attention will be given to the design and construction of the railway to ensure that there is no adverse impact on the underground flow of water. At all other areas there are not expected to be any adverse effects on underground water flows. Drainage of surface water will be managed through drainage systems designed in consultation with the Water and Rivers Commission, Swan River Trust and Local Governments.

6. (Peel Preservation Group) Design (referring to stormwater run-off) How will it be possible to construct linear vegetated swales where the railway buffer is only 35 metres from the wetland?

The railway reserve approaches the Pagononi Swamp wetland to a distance of 35 metres in only two points, otherwise the "buffer" is generally greater than 50 metres. Detailed drainage design has been prepared to allow suitable drainage management in these areas. The Local Government in this area and other Statutory Authorities will be consulted on suitable drainage design.

7. (Peel Preservation Group) In a wetland (including Black Swan) monitoring program for monitoring surface water quality, the surface water quality should be tested before construction begins so a comparison can be made.

All water quality monitoring programs include a baseline sampling protocol that establishes the "before" water conditions so that relative changes to water quality can be identified.

8. (C of Mandurah) The City is concerned that the proposed drainage scheme may not be best practice in terms of water sensitive design techniques. The City would like to provide comment on the detailed management plans to ensure no pollutants make their way into the wetlands and that the drainage is handled in a manner which assists in the creation of a "green (native) corridor" along the rail reserve.

Agreed. The design and management plans for the proposed drainage scheme will only be completed after consultation with the Water and Rivers Commission and Local Government input.

In terms of pollution, it is much more likely that pollutants in drainage will come from residential and road developments to the west of the railway reserve.

9. (C of P) Insufficient details and assessments have been made of wetlands in the Narrows Interchange and former (filled in) wetlands (for example former Lakes Irwin and Kingsford).

As the wetlands in the Narrows Interchange are not located in the railway alignment, they will not be directly impacted by the construction and therefore no assessment is required. However the effects of dewatering in the area as part of the tunnel construction will be closely monitored under an approved management plan prepared by the constructing contractor including monitoring of water levels and quality. As noted previously, drawdown will be restricted to minimise dewatering effects.

Geotechnical and hydrological investigations have been conducted in the Perth Station railway yard west of the Horseshoe Bridge (the sites of the former Lakes Kingsford and Irwin, filled in the 1850s) and the Esplanade area, land recovered from the Swan River. These surveys will be used to determine the substrate conditions and the most effective methods of tunnel construction with least environmental impact on surroundings and structures. These documents are available for examination from the proponent on request.

10. (W&RC) In the instance that the EPA determines that the loss of conservation category wetland area or wetland buffer is unavoidable, the Water & Rivers Commission would request that the EPA require equitable mitigation on behalf of the public of Western Australia, & in doing so maintain the precedent that has been established in regard to the mitigation for loss of valuable wetlands.

The proponent is preparing a wetlands/vegetation Mitigation Plan for submission to the EPA as amelioration for loss of environmentally valuable areas in the construction of the railway.

11. (W&RC) Recommends that action within Commitment 9.0 should be changed to: "Prepare a Wetlands, Hydrology and Drainage Management Plan which addresses....Wetland mitigation through a comprehensive strategy to mitigate for loss of wetland area and buffer, functions and environmental values, consistent with the Wetland Mitigation Hierarchy and the Criteria for Wetland Mitigation". W&RC (DOE) should be listed as an advisory/authorising agency for the Wetlands, Hydrology and Drainage Management Plan.

The proponent will prepare and submit a Wetlands and Vegetation Mitigation Plan to the EPA for consideration as an off-set for loss of wetlands, wetland buffer and significant vegetation areas as a result of the construction of the railway. Final planning and implementation of the Mitigation Plan will be undertaken in consultation with relevant Agencies including DOE, DCLM, W&RC and Local Governments.

12. (W&RC) The proposed Wetland Monitoring Program is inadequate. It is proposed to monitor surface water quality only and in selected wetlands only. The construction of the railway may have significant adverse impacts on wetland water levels and wetland water

regimes. This impact cannot be managed by the proponent if wetland water levels and regimes are not monitored, recorded and audited. It is recommended that the proponent develop a robust, sensitive and comprehensive monitoring program which will:
1. Enable the early detection of impacts, and
2. Allow the proponent to prove they are not having an impact on wetlands.

Based on railway construction and operations over the last century, construction of the railway is unlikely to have any significant adverse impacts on general wetland water levels, regimes or quality. The electrified passenger railway may be regarded as an unpaved road without the impact of hydrocarbon and other hazardous materials spills polluting the drainage run-off from the alignment.

Surface water will be directed across and through the railway track structures to match, as far as possible, the flows achieved before the construction of the railway. Groundwater flows are only likely to be affected where the railway track structures are at or below the groundwater level. These areas are few, being at Elanora Drive/Ennis Avenue intersection at Rockingham and within the Perth City area. The proponent will put in place specific control and management regimes to ensure minimal impact on groundwater during and after construction, in consultation with the Local Government and W&RC.

Groundwater

1. (Water Corporation) It is noted that the predominant use of the train line will be for light rail, rather than for interstate or heavy rail, where the material transported, if released to the environment, may threaten an essential public drinking water source. The Corporation has therefore assessed the risk of the proposed alignment and raises no objection. However, the Corporation reaffirms that any excavations and associated dewatering in the Jandakot UWPCA Wellhead Protection Zone, should be coordinated with the Corporation to ensure minimal disruption to bores.

Agreed. Should there be excavations and associated dewatering activities required in the Jandakot UWPCA Wellhead Protection Zone during construction of the railway, the proponent undertakes to consult with the Water Corporation prior to commencement of construction.

2. (Peel Preservation Group) What impact will the rail alignment have as it crosses the south west corner of the crest of the Stakehill Mound?

Both the construction and operation of the railway are unlikely to have any impact on the Stakehill Mound. The railway track structures of track foundations and ballast are non-polluting and are constructed to allow infiltration of surface water. Rail operations of the electric trains are also essentially non-polluting. Construction will be managed under a construction management plan, requiring the constructing contractor to avoid any polluting activities in this area.

Visual Amenity

1. (C of Melville) Visual amenity is a prime concern for residents of the City of Melville. Concerns have been raised at several meetings about the visual impact along the foreshore and approaches to the river of the overhead wires and associated poles. Any reduction in poles by combining Light standards with the Rail standards would alleviate some the clutter.

This initiative has been seriously considered during the detailed planning stage of the project. Unfortunately the required spacings for the two standards have sufficient variance from each other to make this proposal unworkable. Visual impact will be addressed by the use of landscaping and placement of equipment in unobtrusive areas, where possible. Fences in areas of high visibility will be coloured to blend with surroundings.

2. (C of P) Insufficient details and assessments have been made of visual amenity, particularly between Wellington and Roe Streets; also visual impacts of the proposed overhead gantries, signals, switching stations, safety barriers and screens, acoustic walls, rail portals, ramps and other structures are not assessed; **and**
(C of SP) The discussion in the PER concludes that only those residents along Melville Parade will be most affected and the visual impacts are likely to be moderate when taken into the context of the existing Freeway. There is no discussion of how visual amenity was assessed, nor is there a full discussion of the management options. It is also not clear from the PER whether any consideration appears to have been given to the visual impact from a broader range of neighbouring users, from the City and Kings Park, in particular.

The railway between the William Street Station and the emergence of the tracks in the western section of the Perth Station rail yards will be essentially underground. This area will include the section of railway underground at Roe Street before it returns to the Perth rail yard.

In the area of the railway alignment between the northern Narrows Bridge interchange and the Perth Station rail yard the railway will be fully underground within a few hundred metres after leaving the Narrows interchange.

The statements provided in the PER regarding visual impacts were principally derived from a study and report, commissioned by the proponent, on visual impacts and amenity of the railway. The study assigned semi-quantitative values to the visual aspects to obtain some relativity between areas that are visually impacted by the railway.

Methodology used for this study included a number of visual impact assessment techniques advocated in published and unpublished documents such as The Landscape Institute and Institute of Environmental Assessment-Guidelines for Landscape and Visual Impact Assessment 1995. Consultation with officers from the Department for Planning and Infrastructure and other key stakeholders was also undertaken as part of the visual impact assessment process.

A number of visual amenity management recommendations were drawn from this study. These focussed on sympathetic use of landscaping and revegetation, particularly around stations, use of colours to break up and blend sharp outlines of the railway infrastructure and minimising clearing of native vegetation. The proponent will address these mitigation measures by preparing and implementing a Landscape Management Plan and by suitable design and colour schemes for buildings and infrastructure, where practicable.

The City of Perth and New MetroRail have jointly undertaken a "Foreshore Design Development Study" that has focused on identifying urban design opportunities associated with construction of the railway in the Perth Foreshore area. A key consideration in this study is visual amenity.

3. (C of R) The key issues from the City of Rockingham viewpoint are:
- the possible intrusion of privacy caused by overlooking into people's properties from users of the pedestrian bridges near the stations, and
- light overspill from the stations/bridges.

Consultation with the City is recommended.

Rockingham Station, at the junction of Ennis Avenue and Rae Road, is most likely to be at risk with respect to the issues of light spill and intrusion of privacy affecting adjacent residents. The architectural consultants commissioned to design the station and surrounding carpark and bridge were provided with explicit instructions to eliminate or minimise these impacts. A consultative process is being developed to work with affected residents and the City of Rockingham for acceptable resolution of these concerns.

4. (DCLM) The PER's assessment of visual impacts from development of the railway seems only to consider impacts on residential population. Impacts on those using key travel routes will be significant and travel routes are an important factor in visual impact assessment methodologies. As a result, the PER understates potential visual impacts. The proponent should acknowledge the importance of Ennis Avenue (and similarly Mandurah Road) as a scenic travel route where it runs alongside Rockingham Lakes Regional Park, and acknowledge the likely loss of visual amenity to a large number of road users.

The proponent recognises the aesthetic and intrinsic values of the Rockingham Lakes Regional Park as a scenic travel route. It will be hoped that a significant proportion of the road users now travelling along Ennis Avenue and Mandurah Road will enjoy even better visual amenity as rail passengers. The South West Metropolitan Railway is also expected to be a drawcard for tourists and holiday makers drawn to Rockingham and Mandurah as seaside destinations.

Unfortunately, the railway infrastructure of track, masts and overhead wires is a necessity of the operating system, as are pavement, kerbing, signs, traffic light and light standards to road. There is little that can be done to effectively camouflage these items. The railcars themselves are of a streamlined, aesthetically pleasing appearance that will match the profile of any road vehicle of similar size.

It is considered that the railway itself will not unduly conflict with the visual amenity of the road users although it is acknowledged that there will be additional "hardware" between the road and the Regional Parks in many areas.

Aboriginal and European Heritage

Aboriginal Heritage

1. (C of P) The PER provides insufficient assessment and recommendations for the CRD project area on: impacts on heritage places, including the Esplanade Reserve.

Aboriginal Heritage Consultants have been commissioned to provide a comprehensive process of consultation with Aboriginal Groups having ancestral association with the Perth City area and the Swan River, including areas reclaimed from the Swan River and Lakes Kingsford and Irwin.

This process has now been completed with all Aboriginal Groups agreeing in principle to the proposal. A number of conditions and recommendations were proposed which are under consideration. Some of these are beyond the scope of this proposal and will be referred to the relevant Decision Making Authorities.

Sufficient planning and consultation has been completed in the Perth City area to support the submission of an application to work in a registered Aboriginal Site, under Section 18 of the Aboriginal Heritage Act 1972.

2. (C of SP) Construction associated with the Mount Henry and Narrows Bridges will require appropriate consultation, approvals and clearances in relation to Aboriginal Heritage issues.

Consent to work in the Mt. Henry Bridge site, under Section 18 of the Aboriginal Heritage Act 1972 has already been obtained. With respect to the Narrows Bridge, all required consultations with relevant Aboriginal Groups have been completed and a Section 18 application will now be made to the Department of Indigenous Affairs.

3. (DIA) It is noted that an adequate level of consultative ethnographic and archaeological surveys have been undertaken for this project. The proponent undertakes to comply with the provisions of the Aboriginal Heritage Act 1972.

Noted and confirmed by the proponent with respect to compliance with provisions of the Aboriginal Heritage Act, 1972.

European Heritage

1. (C of P) In addition to Aboriginal Heritage issues, European artefacts or archaeological items may be uncovered. This should be provided for.

The contract documentation for the City Rail Project recognises this possibility and will require the contractor to develop and implement an appropriate management plan to cover any possible European items that are unearthed during the construction process.

2. (C of SP) Impacts on the Old Mill should be more closely examined and the contractors required to undertake a full condition survey of the site prior to commencement of the works.... Once completed an on-going condition monitoring program should be undertaken, funded by the proponent.

Pre- and post-construction dilapidation reports will be commissioned by the proponent. During construction regular checks will be made to ensure there is not any deterioration of the existing structure.

In view of the multiple possible factors that may adversely affect this structure over time, including the impacts of age, insects, weather, earthquakes, Freeway traffic, accidents and works by the City of South Perth, it is not considered reasonable to ask that this proposal fund on-going condition monitoring.

3. (C of SP) The Narrows Bridge is also a site of Heritage significance both statewide and locally. Responding to a request from the Swan River Trust the City Council recommended (in part) that consideration be given to the amenity impacts of the rail bridge during its deliberations on this matter.

Noted. The proponent will await the outcome from the Development Application lodged with the Swan River Trust.

4. (Heritage Council) It is the Heritage Council's recommendation that a detailed structural survey be undertaken for the heritage buildings along the east side of William Street between Murray Street and Wellington Street, and for the Horseshoe Bridge and Perth Railway Station. The survey should be prepared in consultation with a heritage consultant and should identify any potential risks to significance fabric and make appropriate recommendations to protect the fabric against dilapidation **and**
(Heritage Council) It is the Heritage Council's recommendation that a comprehensive and independent Heritage Impact Study be commissioned as a matter of urgency. This study should attempt to identify the relative degree of significance of all heritage places along or adjacent to the proposed alignment, assess the physical and visual implications for these places and make appropriate recommendations for retaining or interpreting their heritage significance. Of particular importance is the Perth CBD area.

On advice from engineering and architectural consultants, the proponent has undertaken a detailed heritage study of buildings in the vicinity of the proposed William Street station, being the area directly impacted by railway construction. City Rail Development Officers have been working with officers from the Heritage Council to arrive at an acceptable resolution of heritage building retention and management.(See also Noise and Vibration - Construction, Item 3).

Buildings in the Perth City area along the proposed route of the railway tunnels, other than at the William Street station, are not expected to be affected from a heritage perspective. Heritage areas outside the Perth CBD are not expected to be significantly impacted.