

**Management of wetland impacts associated with
extension of the Kwinana Freeway (Forrest Road
to Thomas Road, Casuarina)**

Main Roads Department, Western Australia

**Report and recommendations
of the Environmental Protection Authority**

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Summary and recommendations

Main Roads Department has proposed to extend the Kwinana Freeway 2x2 lane, dual carriageway from Forrest Road to Thomas Road, with major on and off ramps at Russell/Gibbs Roads, Rowley Road, Hope Valley Road and Thomas Road. Provision for upgrading the freeway to a 2x3 lane dual carriageway has been included in the proposal. It has also been proposed to incorporate a dual use path within the freeway reserve, located to the west of the road surface.

The alignment of the Forrest Road to Thomas Road section of the Kwinana Freeway was approved as a major amendment to the Metropolitan Region Scheme by the Metropolitan Region Planning Authority in 1984. Several alternative routes for the freeway extension were examined at that time which included such considerations as land tenure, existing services, drainage and surface water, existing urban use, soil conditions, conservation areas and future land developments. Because of the extended period between approval and construction, and an increased awareness in the importance of wetlands in the intervening years, the project was submitted to the Environmental Protection Authority for an assessment of the **wetland impacts only**.

This is not an assessment of the Kwinana Freeway alignment but rather of the management of wetlands that would be affected by its construction.

The freeway extension will effect two lakes that are subject to regulations, introduced in March 1991, to protect wetlands while an Environmental Protection Policy for lakes was developed. Both the regulations and the policy are not intended to be retrospective. Consequently, these lakes are not protected from the impacts of the freeway extension under the regulations because of previous approvals granted by the Metropolitan Regional Planning Authority in 1984. The Environmental Protection Authority has recommended that the Main Roads Department investigate the feasibility of modifying the freeway reserve in order to avoid these impacts, or alternatively, that the functions of these, and other, wetland areas lost as a result of the freeway extension be replaced.

The project proposed by the Main Roads Department entails: minimal clearing within the road reserve; revegetation of degraded and cleared sections within the road reserve and a general enhancement of the visual amenity of the alignment; the provision of wildlife underpasses and fencing of the road reserve; the containment of road-runoff within the freeway reserve and the removal of a large proportion of contaminants contained in this runoff.

The Environmental Protection Authority has taken the view that, within the constraints of previous planning approval of the freeway reserve, the impacts on the wetlands should be minimized. The Environmental Protection Authority has therefore recommended that the Main Roads Department relocate and redesign a number of drainage basins as well as replacing the functions of the wetland habitat that will be lost as a consequence of construction. This will probably entail wetland rehabilitation, preservation or construction beyond the bounds of the freeway reserve, the details of which will be required in an Environmental Management Programme to be submitted to the Environmental Protection Authority within six months. It is likely that the environment can be best served by creating smaller, managed replacement wetlands that are of better environmental value than some of the degraded wetlands that will be lost.

This approach complements recent initiatives by the Water Authority of Western Australia to replace wetland functions lost as a consequence of developing the Jandakot Mound groundwater resource.

The freeway extension does not affect areas proposed for inclusion within the Jandakot Botanic Park.

The Environmental Protection Authority is satisfied that the environmental issues associated with the proposed extension of the Kwinana Freeway are manageable, provided the Main Roads Department adheres to its commitments and the Environmental Protection Authority's

recommendations contained in this report. The Environmental Protection Authority has recommended that the Main Roads Department should seek community input when formulating an Environmental Management Programme (to address wetland replacement and a wetland monitoring plan).

Key issues

Several major issues were raised by the public and the Environmental Protection Authority in response to this plan and these have been addressed either by the proponent or the Environmental Protection Authority as follows:

"What is the approximate area of wetland habitat to be lost as a result of the proposed freeway extension?"

- The Environmental Protection Authority estimates some 50 hectares of wetland habitat would be lost, of this about 20 hectares is conservation status wetland habitat. The Environmental Protection Authority has ascertained that there are no impacts likely on lakes proposed for protection under the Swan Coastal Plain Lakes Environmental Protection Policy, nor on any of the lakes currently protected under the associated Regulations.

"Will the Main Roads Department undertake compensatory action to replace the wetland functions that will be lost?"

- The Environmental Protection Authority has recommended that the Main Roads Department replace the functions of the wetland areas that will be lost as a result of the project.

"Is the number, design and location of the intended wildlife underpasses sufficient to permit the movement of fauna across the road reserve?"

- The Environmental Protection Authority has recommended that the number, design and location of the wildlife underpasses should meet the reasonable requirements of the Department of Conservation and Land Management, which has considerable experience relevant to this issue.

"Will the project compromise the proposed Jandakot Botanic Park?"

- The proposed Jandakot Botanic Park does not impinge upon, or abut, the freeway reserve.

Recommendation 1

The Environmental Protection Authority recognizes the Main Roads Department's desire to minimize the impacts of the Kwinana Freeway extension on the wetlands of the area and has recommended a process to ensure that wetland functions are replaced where these wetland impacts cannot be avoided. The Environmental Protection Authority notes the undertakings and commitments provided by the proponent (Appendices 1 and 3) and the recommendations in this report.

In reaching this conclusion, the Authority identified the following issues:

- adequacy of the number, design and location of the intended wildlife underpasses;
- conflict between wetland impacts and wetland management/conservation objectives;
- the ecological sustainability of residual wetland habitats following road construction;
- compensatory replacement of wetland habitat that would be lost as a result of the project;
- concern that the environmental impacts of the development may compromise the proposed Jandakot Botanic Park; and
- provisions for the long-term management of wetlands affected by construction of the freeway.

The Environmental Protection Authority notes that these environmental factors have been addressed adequately by the environmental management commitments given by the proponent, or by the Environmental Protection Authority's recommendations made in this report.

Recommendation 2

The Environmental Protection Authority recommends that, within six months of the commencement of the construction of the Forrest Road to Thomas Road extension of the freeway, the Main Roads Department prepares, with the benefit of community input, and submit an Environmental Management Programme addressing wetland replacement, wetland management, timing and which includes a wetland monitoring plan, to the Environmental Protection Authority.

Recommendation 3

The Environmental Protection Authority recommends that, prior to the commencement of construction of the Forrest Road to Thomas Road extension of the freeway, the Main Roads Department investigate and submit a report addressing the feasibility of modifying the Kwinana Freeway reserve (and hence the alignment of the freeway extension) so as to avoid, or reduce, the environmental impacts on Sandy Lake and Russell Road Wetland.

Recommendation 4

The Environmental Protection Authority recommends that the Main Roads Department replace the functions of the wetland areas that would be lost as a consequence of the freeway extension, and that where appropriate this replacement occur outside the road reserve. Furthermore, the replacement of conservation ('C') category wetland habitat should either occur within the conservation estate (Jandakot Botanic Park or the Beeliar Regional Park) or be otherwise secured for conservation, details of which are to be included in an Environmental Management Programme.

Recommendation 5

The Environmental Protection Authority recommends that the Main Roads Department design and construct the detention basins to reduce their visual impact (while maintaining their hydrological functions).

Recommendation 6

The Environmental Protection Authority recommends that, prior to the commencement of construction of the Forrest Road to Thomas Road extension of the Kwinana Freeway, the Main Roads Department should relocate the Sandy Lake (B6) and Mandogalup Swamp North (B4) detention basins in order to reduce the environmental impacts on these wetlands.

Recommendation 7

The Environmental Protection Authority recommends that the Main Roads Department construct wildlife underpasses and fencing in consultation with the Department of Conservation and Land Management.

1. Background

The alignment of the extension to the Kwinana Freeway, between Forrest Road and Thomas Road, was approved as a major amendment to the Metropolitan Region Scheme by the Metropolitan Region Planning Authority in 1984. Several alternative routes for the freeway extension were examined at the time which included such considerations as land tenure, existing services, drainage and surface water, existing urban use, soil conditions, conservation areas and future land developments.

Following discussions between the Environmental Protection Authority and the Main Roads Department it was agreed that, because of the extended period between approval and construction and an increased awareness in the importance of wetlands in the intervening years, the project would be submitted to the Environmental Protection Authority for assessment of the **wetland impacts only**.

2. The proposal

The Main Roads Department has proposed to extend the Kwinana Freeway 2x2 lane dual carriageway (two lanes in each direction) from Forrest Road to Thomas Road, with intersections at Russell/Gibbs Roads, Rowley Road, Hope Valley Road and Thomas Road. It is intended that these intersections would become interchanges when traffic volumes increased sufficiently. The earthworks associated with these interchanges would be confined to the Controlled Access Highway reservation defined in the Metropolitan Region Scheme.

Provision for upgrading the freeway to a 2x3 lane dual carriageway has been included in the current freeway reserve. Although only the environmental impacts of a 2x2 dual carriageway have been incorporated in the PER, the impacts of a 2x3 dual carriageway are not expected to be significantly different since the the outer laneways are constructed first. It has also been proposed to incorporate a dual use path within the freeway reserve, located to the west of the road surface.

Construction of this project is scheduled to commence in early 1993 and be completed by late 1994.

3. Public review

The Public Environmental Review was available for public comment between 13 July, 1992 and 7 September, 1992. During this time 12 submissions were received from members of the public, community groups and government instrumentalities. A detailed summary of these submissions is presented in Appendix 2. The proponent's responses to the issues and comments raised in the summary of submissions is included in Appendix 3.

The main environmental issues raised were:

- adequacy of the number, design and location of the intended wildlife underpasses;
- conflict between wetland impacts and wetland management/conservation objectives;
- the ecological sustainability of residual wetland habitats following road construction;
- compensatory replacement of wetland habitat that would be lost as a result of the project;
- concern that the environmental impacts of the development may compromise the proposed Jandakot Botanical Park; and
- provisions for the long-term management of wetlands affected by construction of the freeway.

4. Planning issues

4.1 Proposed Jandakot Botanic Park

The Hon Minister for Planning has recently granted approval to declare a Planning Control Area over a number of properties in the Jandakot area (Planning Control Area No. 23, gazetted 25 September 1992). The purpose of the Planning Control Area is to provide planning control in relation to land which may be required for parks and recreation purposes and intended to comprise the Jandakot Botanic Park with the specific objectives of:

- protecting some of the best remaining examples of banksia woodland and wetlands;
- protecting associated rare and endangered species of flora and fauna;
- establishing open space resources and recreational facilities for the growing population in the Jandakot area and the growing corridors of the south-west and south-east metropolitan corridors;
- protecting the underlying Jandakot Water Mound; and
- providing landscape variety to alleviate the monotony of the urban landscape.

Development in a Planning Control Area requires the prior approval of the State Planning Commission.

Concern was expressed in submissions about the possible implications of the proposal on areas to be included within the proposed Jandakot Botanic Park.

The Jandakot Land Use and Water Management Strategy indicates that the Kwinana Freeway extension does not affect areas identified for inclusion within the Botanic Park.

4.2 Jandakot Land Use and Water Management Strategy

The draft Jandakot Land Use and Water Management Strategy was released for public comment by the Department of Planning and Urban Development in October 1992. Its aim is to ensure that the use and management of land is compatible with protection of the Jandakot Mound water resource and conservation values of the area, including the wetland environments.

The draft Jandakot Land Use and Water Management Strategy advocates construction of the Kwinana Freeway extension because it is vital for the future urban development of the area.

4.3 Metroplan

In December 1990, the Government of Western Australia released Metroplan - a planning strategy for the Perth metropolitan area. Included in this plan was the intended alignment of the Kwinana Freeway extension, which had been previously approved by the Metropolitan Regional Planning Authority in 1984.

The proposed freeway extension, as described in Metroplan, provides a framework for the southern expansion of Perth. The Government of Western Australia is committed to construction of the Forrest Road to Thomas Road extension of the Kwinana Freeway and through the Main Roads Department, has acquired the land associated with the proposed alignment.

5. Environmental impacts and their management

Based on the Environmental Protection Authority's assessment of the proposal, additional information provided in the public submissions, the proponent's responses to the public submissions and further clarification of issues by the proponent and government agencies, the Authority recommends as follows:

Recommendation 1

The Environmental Protection Authority recognizes Main Roads Department desire to minimise the impacts of the Kwinana Freeway extension on the wetlands of the area and has recommended a process to ensure that wetland functions are replaced where these wetland impacts cannot be avoided. The Environmental Protection Authority notes the undertakings and commitments provided by the proponent (Appendices 1 and 3) and the recommendations in this report.

The environmental issues considered by the Environmental Protection Authority included:

5.1 Swan Coastal Plain Lakes Environmental Protection Policy

In 1991, the Environmental Protection Authority published the draft Swan Coastal Plain Lakes Environmental Protection Policy (Lakes EPP) for public comment. Regulations were also gazetted at this time to ensure that lakes identified in the draft Policy were protected in the interim. Under the draft Lakes EPP, lakes which express more than 1000 m² of surface water at the beginning of summer (December 1st) should not be filled, drained, excavated or polluted.

The Regulations and, upon proclamation, the Lakes EPP are not intended to be retrospective. Consequently, Sandy Lake and Mandogalup Swamp (south middle) (Figure 1b, wetlands 12 and 14) are not protected from the impacts of the freeway extension under the Regulations because of previous approvals granted by the Metropolitan Regional Planning Authority in 1984. The Environmental Protection Authority has recommended that the functions of these, and other, wetland areas lost as a result of the freeway extension be replaced (Recommendation 4).

The Environmental Protection Authority anticipates the impact of the project on other nearby lakes would be negligible because the majority of road runoff is proposed to be retained within the freeway reserve. Only under extremely wet conditions would discharges from the freeway reserve be likely (statistically, once in ten years). In environmentally sensitive areas the design criteria of the detention basins has been increased to once in 50 years.

5.2 Seasonal wetlands

The Jandakot Groundwater Mound is typified by a large number of seasonal wetlands which are surface expressions of the regional groundwater. As the groundwater levels decline over summer the seasonal wetlands recede, with many eventually drying out. Although these wetlands only contain water for a short period they support a high degree of biodiversity when compared with the permanent lakes of the area (for example, North Lake and Thomsons Lake; Balla and Davis, 1992). Collectively, the seasonal wetlands perform important ecological functions in the region.

A number of seasonal wetlands, which are not covered by the Lakes EPP, would be impacted by the proposed freeway construction. The Authority has recommended that the proponent replace any losses of wetland function that may occur as a result of the freeway construction through the construction or rehabilitation or preservation of wetland habitat. In addition, the proponent should be required to provide a mechanism for the long-term management of these wetlands, and any residual wetlands, that may arise as a result of the project. The objective is to ensure protection of wetland function in the long-term.

Recommendation 2

The Environmental Protection Authority recommends that, within six months of the commencement of the construction of the Forrest Road to Thomas Road extension of the freeway, the Main Roads Department prepares, with the benefit of community input, and submit an Environmental Management Programme addressing wetland replacement, wetland management, timing and which includes a wetland monitoring plan, to the Environmental Protection Authority.

5.2.1 Existing wetland values and management objectives

The seasonal wetlands of the Jandakot Mound have been classified in studies commissioned by the Water Authority of Western Australia (1992), Murdoch University (1990) and the Main Roads Department (1989) using "A Guide to Wetland Management in Perth" (EPA Bulletin 374). The Environmental Protection Authority has chosen to base its assessment on the Water Authority of Western Australia wetland mapping system (conducted by V & C Semenuik), in conjunction with the Water Authority of Western Australia wetland management plan for the Jandakot Mound (WAWA, 1992), because these information sources:

- cover the largest area;
- have been largely undertaken by one study team (minimizing systematic errors and variations);
- are most recent;
- recognise the latest rare and endangered flora and fauna declarations (including the recently included Southern Brown Bandicoot (*Isodon obselesus*) which is known to occur in the area); and
- depict 'core' wetland areas and identify wetland management objectives.

Accordingly, the Environmental Protection Authority has estimated the area and category of wetland habitat likely to be impacted by the proposed freeway extension (Table 1).

Table 1: Wetland areas and wetland categories likely to be effected by the proposed freeway extension

| Wetland (see figures 1a & 1b) | | Approx wetland habitat lost as a result of freeway construction (hectares) | | | | |
|----------------------------------|-----------------------------------|---|-----------------|-----------------|---------------|-------------------------------|
| No. | Name | 'M' category | 'C' category | 'R' category | Total area | % of core area effected |
| 1 | Solomon Road Wetland | | | 4 | 4 | Nil |
| 2 | Twin Bartram Swamp | | | 8 | 8 | Nil |
| 3 | Bartram south | 1 | | | 1 | 5% |
| 4 | Russell Road Swamp (Freeway west) | 1 | | | 1 | <5% |
| 5 | Russell Road Swamp (Freeway east) | 2 | | | 2 | 25% |
| 6 | Russell Road Swamp (Gibbs Road) | Not effected by this proposal, future feeder road impacts though | | | | |
| 7 | Russell Road Swamp (Proper) | | 9 | | 9 | 20% |
| 8 | Lyon Road (West) | | | 1 | 1 | 10% |
| 9 | Mandogalup Swamp (North) | | 10 | | 10 | 40% |
| 10 | Mandogalup Swamp (East) | Not effected by this proposal | | | | |
| 11 | Mandogalup Swamp (North middle) | | | 3 | 3 | 50% |
| 12* | Mandogalup Swamp (South middle) | 4 | | 3 | 7 | 30% |
| 13 | Lake Balmanup | 7 | | | 7 | <5% |
| 14* | Sandy Lake | | 1 | | 1 | <1% |
| Total | | 15 | 20 | 19 | 54 | |

* Included in the Lakes EPP

Where:

M = Multiple use, few natural attributes.

C = Conservation, high degree of naturalness.

R = Resource enhancement, where development may be the basis for improving the wetland function.

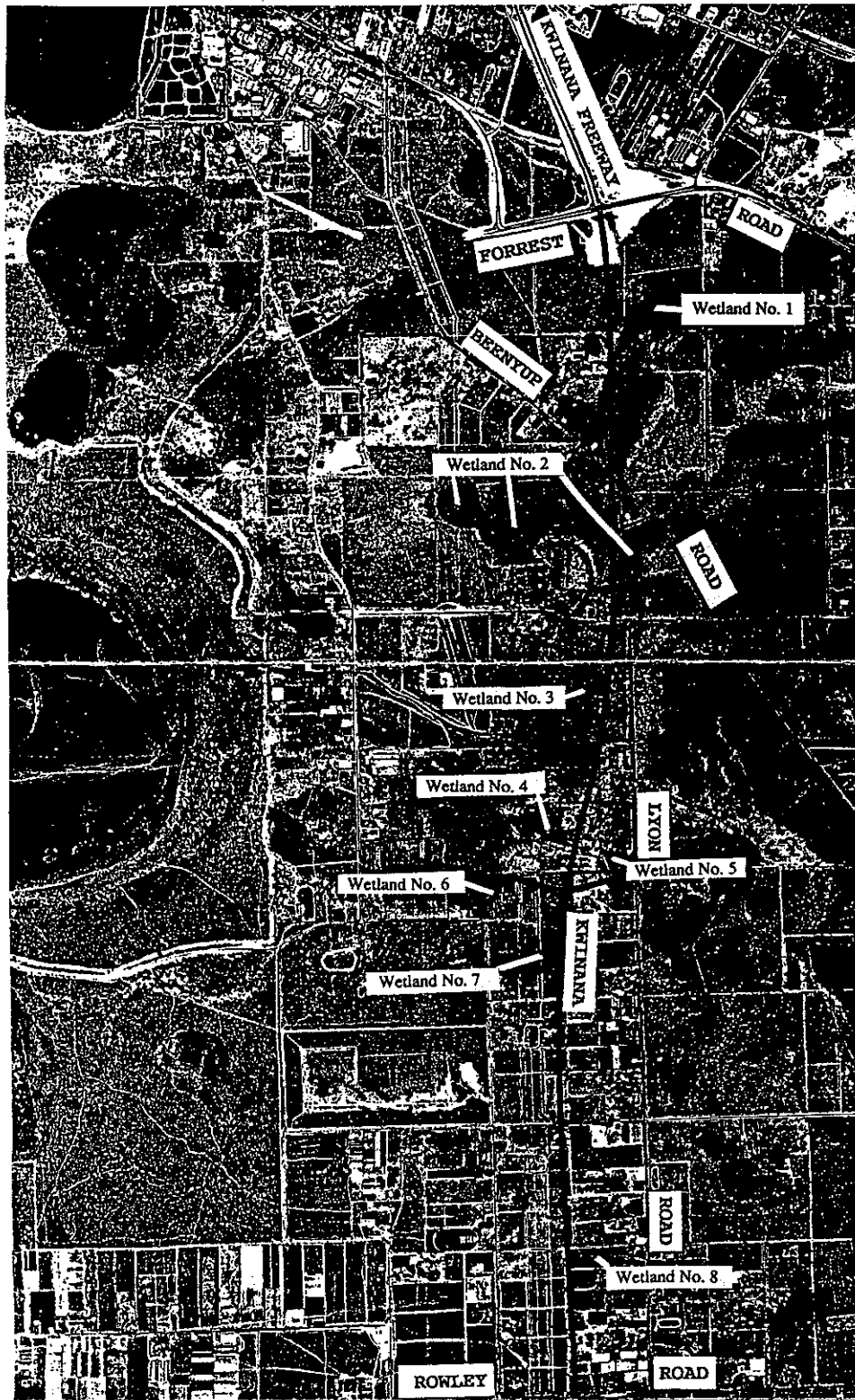


Figure 1a: Wetlands likely to be effected by the proposed freeway extension

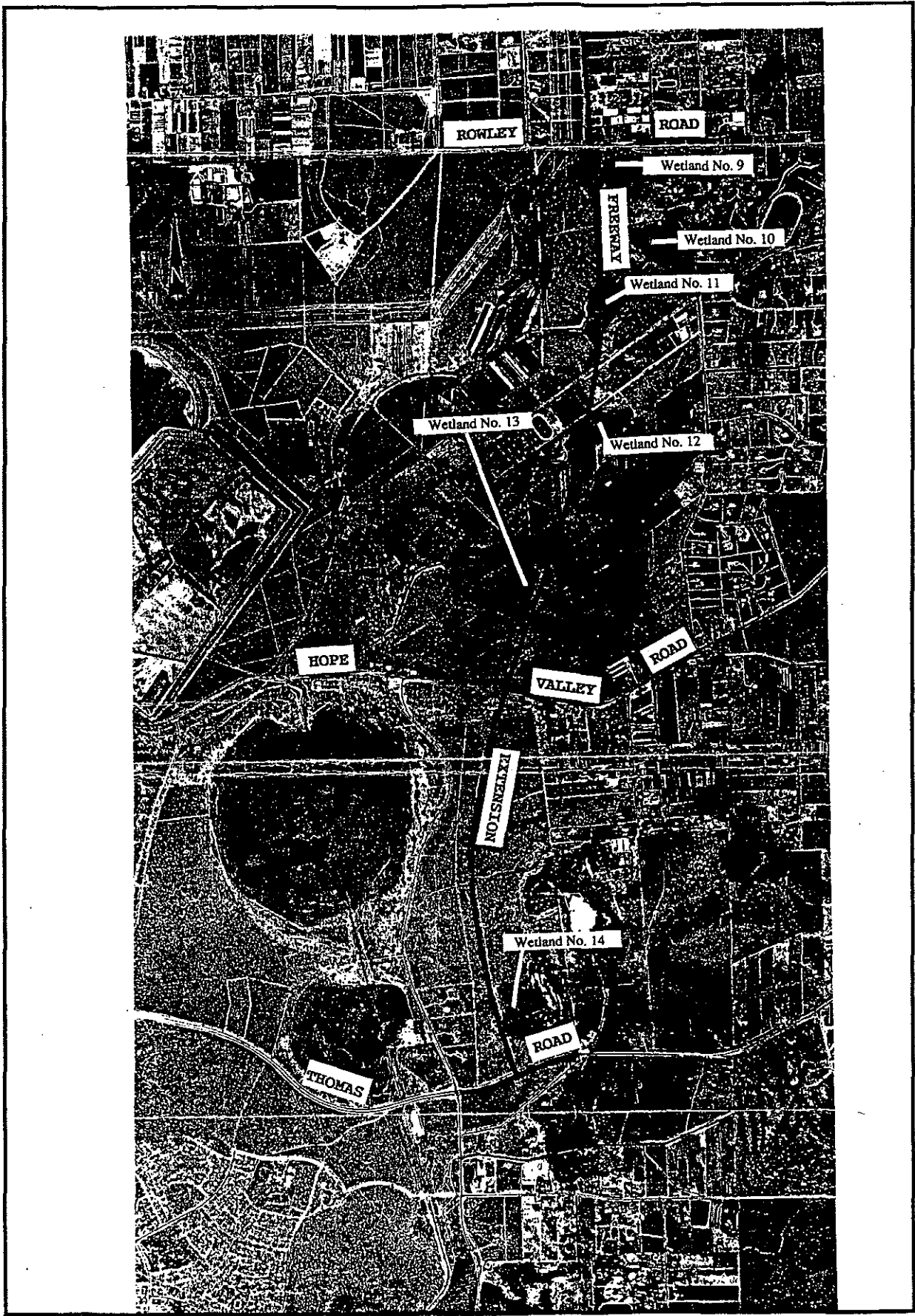


Figure 1b: Wetlands likely to be effected by the proposed freeway extension

5.3 Mitigation of wetland impacts

The Environmental Protection Authority has recently conducted an assessment of the Water Authority of Western Australia's Jandakot Groundwater Scheme Stage 2 project (EPA, 587; Water Authority, 1991). An environmental condition of approval for this project required the preparation of a Wetland Management Plan for the wetlands likely to be effected by abstraction (Water Authority, 1992). In this plan the Water Authority of Western Australia has provided a strategy to compensate and/or replace the areas of wetland that would be lost due to abstraction.

In keeping with this approach, the Environmental Protection Authority has recommended that the Main Roads Department should undertake to replace the functions of the wetland areas that would be lost as a consequence of the freeway construction (Recommendation 4).

The Environmental Protection Authority has developed a procedure for assessing individual wetlands and placing them into one of five categories according to their ecological, hydrological and social attributes (EPA Bulletin 374). As the management objectives for each category are defined, it is then possible to set appropriate management criteria. The wetlands impacted by the proposed extension of the Kwinana Freeway fall into three of these five categories:

5.3.1 Category 'M' wetlands (multiple use)

Wetlands in this category are significantly degraded and possess few natural attributes and are of limited human use. These wetlands are typified in the Jandakot area by 'summer pasture', or areas that are inundated during winter/spring but, upon drying, support agricultural enterprises during the summer months (due to the moisture-holding, peaty soils and shallow depth to groundwater).

Despite having few natural attributes, some of these wetlands may provide valuable waterbird habitat. Collectively, these wetlands support valuable ecological functions for the region, such as waterbird feeding habitat during the spring breeding period.

The Environmental Protection Authority considers category 'M' wetlands can be adequately replaced on a functional basis. Under this approach it is conceivable that an area of 'M' wetland could be replaced by the rehabilitation or construction of a smaller area of, say, 'R' wetland, or an even smaller area of 'C' wetland. That is, the area of replacement wetland may be smaller than the area of wetland lost as long as the ecological, hydrological and social functions of the replacement wetland either match, or exceed, those of the original wetland area.

The proposal is likely to adversely effect the functions of some 15 hectares of multiple use wetland habitat.

5.3.2 Category 'R' wetlands (resource enhancement)

These wetlands have been modified and do not have clearly recognised human uses in their urban or rural settings. Opportunities may exist for commercial developments to enhance the conservation values of wetlands in this category. Two classes of opportunity exist:

- the wetland function is retained as a result of the development; or
- an equivalent wetland of a similar type is constructed or rehabilitated to fulfil equivalent functions.

The proposal is likely to adversely effect the functions of some 19 hectares of resource enhancement category wetlands.

5.3.3 Category 'C' wetlands (conservation)

These wetlands possess a high degree of naturalness and should be managed in order to maintain and enhance their natural attributes and functions. Where this is not possible the objective is to replace the wetland functions that will be lost. In such cases, the replacement habitat (and functions) should be incorporated into the conservation estate to reflect the

management priorities for these wetlands (for example, Beeliar Regional Park and Jandakot Botanic Park).

The proposal is likely to adversely effect the functions of some 20 hectares of conservation category wetlands.

Russell Road Wetland

The Environmental Protection Authority, in recognition of the conservation values of the Russell Road Wetland (wetland No. 7), recommends the Main Roads Department investigate the feasibility of moving the freeway reserve (to the east) to avoid a direct impact on this wetland. The likely impacts on other nearby wetlands which would arise from such a change should also be addressed.

The Environmental Protection Authority also recommends that, in the event that the wetland impacts cannot be avoided by realigning the freeway, then the Main Roads Department should replace the values of the Russell Road Wetland that would be lost as a result of the development. In recognition of the 'C' category of this wetland, replacement habitat of similar value should be incorporated within the conservation estate (Beeliar Regional Park or Jandakot Botanic Park).

Sandy Lake

The Environmental Protection Authority, in recognition of the conservation values of Sandy Lake (wetland No. 14) and its inclusion in the draft Lakes EPP, recommends the Main Roads Department investigate the feasibility of moving the freeway reserve (to the west) to avoid a direct impact on this wetland. The implications of such a change on the Thomas Road interchange and nearby wetlands should also be addressed as part of this investigation.

The Environmental Protection Authority also recommends that, in the event that the wetland impacts cannot be avoided by realigning the freeway, then the Main Roads Department should replace the values of Sandy Lake that would be lost as a result of the development. In recognition of the 'C' category of this wetland, replacement habitat of similar value should be incorporated within the conservation estate (Beeliar Regional Park or Jandakot Botanic Park), or otherwise secured for conservation.

Recommendation 3

The Environmental Protection Authority recommends that, prior to the commencement of construction of the Forrest Road to Thomas Road extension of the freeway, the Main Roads Department investigate and submit a report addressing the feasibility of modifying the Kwinana Freeway reserve (and hence the alignment of the freeway extension) so as to avoid, or reduce, the environmental impacts on Sandy Lake and Russell Road Wetland.

Recommendation 4

The Environmental Protection Authority recommends that the Main Roads Department replace the functions of the wetland areas that would be lost as a consequence of the freeway extension, and that where appropriate this replacement occur outside the road reserve. Furthermore, the replacement of conservation ('C') category wetland habitat should either occur within the conservation estate (Jandakot Botanic Park or the Beeliar Regional Park) or be otherwise secured for conservation, details of which are to be included in an Environmental Management Programme.

5.4 Drainage management

The Main Roads Department has proposed to contain stormwater generally within the road reserve and to maintain the present network of artificial drains and the existing water level regimes of the wetlands. This entails retaining stormwater emanating from a one in ten year storm within the freeway reserve without overflowing. In environmentally sensitive areas (for example, in proximity to Sandy Lake) it is proposed to increase the capacity of the detention basins to contain and infiltrate a one in fifty year storm event.

These design criteria will not only reduce the likelihood of these basins overflowing, but would also reduce the levels of contaminants in overflows should they occur.

5.4.1 Drainage basins

Operation

The Environmental Protection Authority considers that the operational aspects of the intended drainage (or detention) basins is sound and would, in all likelihood, remove a significant proportion of contaminants emanating from the freeway. In addition, the generous size of the basins would minimize the risk of any road spills entering wetlands in the area before clean-up could occur.

Shape

The Environmental Protection Authority is concerned with the general shape of the drainage basins. It is realized that the dominant function of both the primary and secondary drainage basins is hydrological rather than ecological. However, rectangular drainage basins are in stark contrast to the irregular, but rounded, natural wetlands of the area and would adversely effect the landscape amenity of the area. The Authority believes it would be a relatively minor task to redesign the drainage basins in order to soften their visual impact, while still permitting routine maintenance to occur.

Recommendation 5

The Environmental Protection Authority recommends that Main Roads Department design and construct the detention basins to reduce their visual impact (while maintaining their hydrological functions).

Location

The Environmental Protection Authority does not in general support the use of wetlands as drainage basins. However, in the case of the Russell Road Swamp (drainage basin B3, Figure 3.3) the impacts of development will significantly effect the viability of the eastern remnant of this conservation category wetland. Accordingly, the Authority suggests that a primary detention basin be incorporated into any plans to use the eastern remnant of this wetland for drainage containment. The Authority has recommended that wetland habitat of similar type be constructed or rehabilitated to fulfil functions equivalent to those which would be lost (Recommendation 4).

The Mandogalup Swamp North drainage basin, identified as drainage basin B4 in Figure 3.3 in the PER, should be relocated to a less environmentally sensitive location as this is a conservation category ('C') wetland.

Under the current proposal, construction of drainage basin (B6) would require the removal of wetland vegetation associated with Sandy Lake. This is in contrast with the conservation management objectives ('C') of this lake and would impact the ecology and landscape amenity of the lake. The Authority believes that suitable alternative sites are available for the construction of this drainage basin, possibly outside the freeway reserve.

Recommendation 6

The Environmental Protection Authority recommends that, prior to the commencement of construction of the Forrest Road to Thomas Road extension of the Kwinana Freeway, the Main Roads Department should relocate the Sandy Lake (B6) and Mandogalup Swamp North (B4) detention basins in order to reduce the environmental impacts on these wetlands.

Opportunities

Scope exists to enhance Mandogalup Swamp (north middle; wetland no. 11) by diverting drainage which currently enters this wetland from the agricultural land to the east of the freeway reserve. This option, as part of a drain retraining strategy (PER, Figure 3.3, C4), could offer substantial environmental benefits but would require further investigation.

Similarly, the Sandy Lake detention basin (B6, Figure 3.3) should be relocated and possibly re-incorporated as an extension of the existing role of the southern portion of this wetland chain (located to the south of Thomas Road). This area is separated from the conservation areas of Sandy Lake by the Thomas Road culvert, category 'R' wetland habitat and currently receives runoff from the Marri Park Golf Course to the east. The hydrological and contaminant retention capabilities of this wetland could be further enhanced in order to protect downstream water resources (ie Peel Inlet). In addition, it is likely that the conservation values of Sandy Lake (north of Thomas Road) could be better served by modifying the artificial drainage of this area.

The above options should be more fully addressed within the context of the recommended Environmental Management Programme.

5.5 Wildlife underpasses

The Main Roads Department initially proposed to construct four wildlife underpasses associated with the freeway extension. Submission received by the Environmental Protection Authority suggests two additional wildlife crossings may be warranted along the extension of the freeway, one adjacent to lot 1195 and the other in the vicinity of lots 6 & 7 (adjacent to Sandy Lake - see PER Figure 3.3) and that these crossings should be built in conjunction with wire mesh fencing along the freeway boundary. These additional underpasses will now be constructed by the Main Roads Department (Appendix 3, sections 2.2 and 2.5).

The Department of Conservation and Land Management has expressed a desire to assist with the planning and design of wildlife underpasses associated with the project. Correspondingly, the Main Roads Department has also provided a commitment to seek advice from the Department of Conservation and Land Management on the construction of fencing and the location and design of the wildlife underpasses (Appendix 1, commitment 11; Appendix 3, section 2.4).

Recommendation 7

The Environmental Protection Authority recommends that the Main Roads Department construct wildlife underpasses and fencing in consultation with the Department of Conservation and Land Management.

5.6 Relocation of flora and fauna

The Main Roads Department prepares specifications for its road constructions on a routine basis and it is intended to include requirements to relocate flora and fauna within this document, where practical and appropriate (Appendix 3, section 1.9).

6. Conclusions

With the wisdom of hindsight the alignment of Kwinana Freeway extension between Forrest Road and Thomas Road is not ideal from an environmental standpoint. However, the Environmental Protection Authority recognizes the importance of its construction on future development in the area and the associated benefits to the people of Perth. Despite these factors, further loss of wetland habitat on the Swan Coastal Plain is not desirable. Consequently, the Authority has recommended that the Main Roads Department replace the functions of the wetland areas that will be lost as a result of the freeway construction and that, in the case of conservation ('C') category wetland habitat, replacements should be included, preferably within the conservation estate (Jandakot Botanic Park or Beeliar Regional Park), or otherwise secured for conservation.

This strategy is consistent with recent environmental approvals granted to the Water Authority of Western Australia for development of stage 2 of the Jandakot Groundwater Scheme.

7. References

- Balla, S A and Davis, J A (1992). Wetlands of the Swan Coastal Plain: volume 5 - Managing Perth's wetlands to conserve the aquatic fauna. Water Authority of Western Australia, ISBN: 0 7309 3745 3. pp 108 - 112.
- Department of Planning and Urban Development (1992). Draft Jandakot land use and water management strategy. ISBN 0 7309 3294 X.
- Environmental Protection Authority (1990). A guide to wetland management in Perth. EPA Bulletin 374.
- Water Authority of Western Australia (1991). Jandakot groundwater scheme stage 2, Public Environmental Review - Volume 1. ISBN 0 7309 1796 7.
- Water Authority of Western Australia (1992). Environmental management programme - Jandakot groundwater scheme Stage 2. ISBN 0 7309 5241 X.

Appendix 1

Proponent's commitments on the proposal

LIST OF COMMITMENTS BY PROPONENT

MAIN ROADS will undertake the construction of the section of the Kwinana Freeway from Forrest Road to Thomas Road as described in this report and, in particular, will incorporate all of the construction management and impact mitigation measures described in the text of the PER and specified below.

1. MAIN ROADS is aware of its responsibilities under the Aboriginal Heritage Act and will advise the Aboriginal Sites Department of the W.A. Museum and seek the necessary clearances in the event that any sites are uncovered during the construction programme.

SECTION 8.1.3

2. Clearing within the freeway reserve will be limited to the minimum necessary for the construction of the road works.

SECTION 8.1.1.1

3. Dieback infection will be managed according to the construction and rehabilitation dieback containment measures established by MAIN ROADS for this purpose and summarised in this report.

SECTION 8.1.1.2

4. Dust impacts will be minimised through the adoption of dust control procedures established by MAIN ROADS and in accordance with the usual requirements of the Local Authority and the EPA.

SECTION 8.1.4

5. All hydrocarbon and other waste materials generated by construction activity will be collected and disposed of off site at an approved disposal facility.

SECTION 8.1.5

6. Physical measures for managing the quantity and quality of stormwater discharged to the wetlands and groundwater will be implemented as described in this report.

SECTIONS 8.2.1 & 8.2.2

7. MAIN ROADS will undertake to carry out regular maintenance of the detention basins to ensure that in each location:

- a) The initial basin floor is kept in a clean condition and free from obvious contaminants.
- b) The secondary basin is also kept in a clean condition so that its designed capability of infiltrating a 1 in 10 year storm is maintained.

SECTIONS 8.2.1 & 8.2.2

8. Revegetation of cleared or degraded areas within the road reserve will be undertaken in accordance with the plans and procedures outlined in this report and the recommendations made by the biological consultants in the Biological Survey Report (Reference 13).

SECTION 8.2.3

9. Fencing to prevent native animals, including bandicoots and tortoises, from gaining access to the roadway will be implemented as appropriate over the length of the proposed construction.

SECTION 8.2.4

10. Culverts will be constructed beneath the roadway at appropriate locations to provide corridors for wildlife movement between wetlands separated by the freeway. The culverts will be constructed slightly above the normal water level, and thus will also act as a balancing mechanism for water levels in wetlands separated by the freeway.

SECTION 8.2.4

11. Advice will be sought from CALM on the construction of the fencing and of the location and the design of the culverts, including floor materials and gratings at entry and exit points required for the prevention of access by foxes and cats.
12. The proponent undertakes to carry out suitable monitoring procedures on the incoming stormwater from the road surfaces to the first retention basin in each set and to the water in the second basin in each set to ensure that the method of stormwater disposal is working effectively.

SECTIONS 8.2.1 & 8.2.2

Appendix 2

Issues raised during the public review period

SUMMARY OF SUBMISSIONS MADE DURING THE PUBLIC REVIEW PERIOD

| | |
|---------------------------|--|
| PROPONENT: | Main Roads Department |
| PROPOSAL: | Kwinana Freeway Extension - Impact on Wetlands |
| CLOSING DATE: | 7th September 1992 |
| NO OF SUBMISSIONS: | 12 |

The following comments, issues and questions have been raised with the Environmental Protection Authority during the public review period.

1. General

1.1 Seven wetlands and several hectares of Banksia Woodland would be lost if the project were to proceed. These losses could be partly offset by rehabilitation and revegetation within the road reserve however. The Main Roads Department should contribute to a habitat replacement fund which could then be used to create, rehabilitate or otherwise procure wetlands and woodlands for addition to the conservation estate (eg for inclusion in the Jandakot Botanical Park).

1.2 Seven wetlands will be adversely affected. These wetlands were evaluated using Bulletin 374 (refer Table 4.1). The proposal is directly in conflict with the management categories obtained via this process. Bulletin 374 makes it clear that H and C category wetlands should be actively managed and the natural attributes maintained and enhanced, as well as high priority be given to their management.

The commitments made by the proponent in Section 9.0 do not comply with the management objectives for H, C or R category wetlands, nor do these commitments include replacing wetlands lost or damaged by this proposal.

1.3 The presence of rare gazetted species may mean that some of the affected wetlands now fall into management category H (high conservation), depending on when appraisal of these wetlands occurred and when the rare species were gazetted.

1.4 The Freeway will transform the area and valuable conservation reserves, farmland and water resources could be lost. The Freeway extension should not be approved until planning for the Jandakot Botanical Park and the Jandakot Landuse and Water Management Strategy is completed.

1.5 Local indigenous plant species, specific to the affected areas, should be used for revegetation of the road reserve. This is currently only implied as the actual list of species to be used, and their landscape composition, is detailed in a separate document.

1.6 Both the Gibbs Road Wetland and Sandy Lake could be adversely affected by the construction of future Freeway interchanges and feeder roads. These works must be carefully planned and designed now so that future wetlands impacts are minimized. It is unjust for the Main Roads Department, and other road builders, to claim that wetland impacts associated with the future construction of these, and other, secondary roadworks are 'unavoidable' given the guidelines that were provided by the Environmental Protection Authority for this Public Environmental Review (Sections 3 & 5, Appendix A).

- 1.7 As the proponent is constructing and maintaining detention basin systems to contain stormwater generally within the road reserve, the Water Authority has no objections to the proposed freeway extension.
- 1.8 Removal, stockpiling and re-use of topsoil must be managed to prevent spread of dieback infection.
- 1.9 Flora and fauna directly ahead of the construction and clearing machines should be safely relocated. All possible safeguards should be adhered to and carried out to a satisfactory level.

2. Wildlife Crossings

- 2.1 The use of fencing, wildlife culverts and spillage controls is to be commended.
- 2.2 The Freeway bisects not only wetlands, but areas of Banksia Woodland that act as corridors for the movement of wildlife between the wetlands.

The large area of woodland between Hope Valley Road and Thomas Road is particularly important because it is one of the last remaining, relatively undisturbed areas of Banksia Woodland in the region (the only larger areas being Harry Waring Marsupial Reserve and the Thomsons Lake Nature Reserve) and serves as an important corridor for the movement of wildlife between The Spectacles and Sandy Lake (Dr R D Wooller, pers. comm.). In addition, it is immediately adjacent to the recently announced Beeliar Regional Park.

It is suggested that two additional wildlife crossings be constructed along the Freeway. One should be adjacent to lot 1195 and the other in the vicinity of lots 6 & 7 (adjacent to Sandy Lake - see Figure 3.3). These crossings should be built in conjunction with wire mesh fencing along the freeway boundary.

- 2.3 How does the positioning of culverts relate to the distribution of animals which may use these?
- 2.4 The Department of Conservation and Land Management will be pleased to assist with the planning and design of wildlife underpasses. Skylights, as planned for the centre of the freeway at the Ocean Reef Road wildlife crossing, may be useful.
- 2.5 The Southern Brown Bandicoot is on the State's threatened fauna list and was observed during the biological survey. Bandicoots located on the road reserve should be removed and relocated. Careful consideration should also be given to the number, design and location of wildlife underpasses.
- 2.6 As the initial collecting basin is designed to collect accidental spillages, it may be best not to deliberately provide wildlife habitat. Screening vegetation would be adequate for the basin. The secondary basin would be more suitable for providing extensive wildlife habitat.

Appendix 3

**Proponents response to the issues raised during
the public review period**

RESPONSES TO SUBMISSIONS MADE DURING THE PUBLIC REVIEW PERIOD

1. ITEM

- 1.1 The use of funds to create, rehabilitate or otherwise procure wetlands and woodlands for addition to conservation estates is outside the general intent of the Main Roads Act.

Funding of these activities would have to occur under more appropriate legislation. However, Main Roads is prepared to continue with appropriate negotiation in conjunction with other authorities on wetland management strategies if required.

- 1.2 The commitments given in Section 9, which include the minimisation of clearing, rehabilitation of cleared road verges, control of spread of dieback disease, maintenance of ground water quality and wetland water levels and provisions for the protection of fauna, are all designed to minimise impact on the wetlands and to provide protection for native fauna. As discussed in Section 5 of the PER, the freeway route has been selected to minimise regional wetland impacts and in particular to avoid impacting wetlands recognised as having high conservation value, such as the Spectacles. Reference is made to Item 1.1 which outlines Main Roads' position in relation to the question of wetland replacement.

- 1.3 At the time the assessment of the wetlands was carried out by Hart, Simpson & Associates it was known that a number of species gazetted as "rare or otherwise in need of special protection" were potentially present within the road reserve" (see Section 4.3.3 of the PER). Thus, while Section 4.3.1 of the PER identifies that the original assessments of the wetlands were conducted prior to the gazettal of the Southern Brown Bandicoot as a rare species, during the preparation of the PER the implications of the gazettal of the bandicoot were assessed and the recommendations made by the EPA in the Guide to Wetland Management taken into consideration. As discussed in the PER and 1.2 above, it is not possible to deviate the freeway around these wetlands without impacting other wetlands which are recognised as having greater significance. Consequently, recommendations to minimise the potential effects on wetland fauna, with special consideration of the Southern Brown Bandicoot, have been given in the management proposals contained in the PER.

- 1.4 Planning for the Jandakot Botanical Park is addressed under the Jandakot Land Use and Water Management Strategy which is soon to be released by the Department of Planning and Urban Development. The strategy acknowledges the Kwinana Freeway extension from Forrest Road to Thomas Road on its current alignment, noting that construction will be complete by mid 1994. Furthermore, the Department of Planning and Urban Development has gazetted a planning control area (No 23 on Plan No 1.2704) covering areas which may form the Jandakot Botanical Park. The freeway reserve is well clear of these areas.

- 1.5 It is Main Roads' intention to generally use indigenous plant species for the rehabilitation of all cleared areas. Plant selection will, however, need to take account of modified grade levels so that some species may need to be selected from adjacent habitats. An experienced Landscape Architect will design the landscaping requirements for the revegetation of the road reserve.
- 1.6 The earthworks construction for future ramps for the further development of the ultimate freeway system is to be constructed during the Stage 1 construction. Future pavement construction for these future ramps will therefore be within the confines of the present MRS boundary and storm water run-off from these ramps as well as the existing road system at all intersections will be diverted to the detention basins described in the PER.

Therefore, there will be no further environmental impact on the surroundings when the intersections are upgraded at some time in the future.

- 1.7 No comment required.
- 1.8 A strategy for the management of topsoil to control the spread of dieback infection has been covered in Section 8.1.1.2 of the PER.
- 1.9 Requirements in regard to flora and fauna will be incorporated within the specification.

2. WILDLIFE CROSSINGS

- 2.1 No comment required.
- 2.2 As suggested, two new wildlife crossings will be provided on the construction drawings in the section of highway between Hope Valley Road and Thomas Road. One of these crossings will be adjacent to the southern boundary of Lot 1195 and the other one will be adjacent to the southern boundary of Lot 6.
- 2.3 The locations of the fauna underpasses have been selected on the basis of providing corridors for movement between adjacent wetland areas which will be separated by the freeway. The species under consideration are principally wetland related species such as the bandicoot and long-necked turtle.
- 2.4 Discussions have been entered into with Mr Gordon Wyre and Mr Lindon Mudlar from CALM in respect to the design of wildlife crossings. Recommendations from CALM in respect to these crossings will be incorporated in the construction drawings.

- 2.5 As the freeway reserve does impinge on some remnant natural wetland vegetation it is possible that some bandicoot territories may be reduced by the road construction. In respect to the relocation of any bandicoots found on the road reserve the construction specification will be prepared to reflect this requirement.

Further liaison has taken place with officers from CALM and it is intended that two additional wildlife crossings will be incorporated on the construction drawings to facilitate the safe passage of bandicoots across the road reserve. These two new crossings will be designed in accordance with the advice received from CALM and will be located strategically between the Spectacles and Sandy Lake.

- 2.6 The comment that the initial retention basin in each series need not be landscaped on its base is noted and will be incorporated in the project to facilitate the easy cleaning out of pollutants which may enter the first basin.

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