

Safety Bay Road extension, Baldivis

City of Rockingham

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

**Environmental Protection Authority
Perth, Western Australia
Bulletin 678
April 1993**

THE PURPOSE OF THIS REPORT

This report contains the Environmental Protection Authority's environmental assessment and recommendations to the Minister for the Environment on the environmental acceptability of the proposal.

Immediately following the release of the report there is a 14-day period when anyone may appeal to the Minister against the Environmental Protection Authority's report.

After the appeal period, and determination of any appeals, the Minister consults with the other relevant ministers and agencies and then issues his decision about whether the proposal may or may not proceed. The Minister also announces the legally binding environmental conditions which might apply to any approval.

APPEALS

If you disagree with any of the contents of the assessment report or recommendations you may appeal in writing to the Minister for the Environment outlining the environmental reasons for your concern and enclosing the appeal fee of \$10.

It is important that you clearly indicate the part of the report you disagree with and the reasons for your concern so that the grounds of your appeal can be properly considered by the Minister for the Environment.

ADDRESS

Hon Minister for the Environment
12th Floor, Dumas House
2 Havelock Street
WEST PERTH WA 6005

CLOSING DATE

Your appeal (with the \$10 fee) must reach the Minister's office no later than 5.00 pm on 7 May 1993.

ISBN 0 7309 5600 8
ISSN 1030 - 0120
Assessment No.730

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Summary and recommendations

The City of Rockingham proposes to extend the existing Safety Bay Road so that it becomes a major east-west link road between the eventual extension of the Kwinana Freeway beyond its currently planned termination at Thomas Road Kwinana, to Ennis Avenue and the established residential areas of Waikiki and Warnbro. The proposal was referred to the Environmental Protection Authority in May 1992. The Environmental Protection Authority required that a Consultative Environmental Review of the proposal be undertaken and provided guidelines to assist the proponent, the City of Rockingham, in the preparation of the necessary documentation. The Consultative Environmental Review document was available for a four week submission period which ended on 21 December 1992. Thirteen submissions were received.

The proposal is to establish a road corridor which would provides the route for the extension eastwards of Safety Bay Road and its intersections with Mandurah and Eighty Road. The area subject to this proposal and assessment was limited to the connection between the existing Safety Bay Road and Eighty Road in Baldivis.

There were a number of issues of significance identified by the Environmental Protection Authority and by public submissions in the assessment of the proposal. These issues included System Six Recommendation M103, protection of Lakes Coo loongup and Walyungup and Baldivis Swamp, hydrology, flora and fauna.

The current Safety Bay Road alignment is within System Six Area M103 (refer Figure 2) and has the potential to further impact on this area when extended. The Environmental Protection Authority recommended in 1983 that this area become a Regional Park. The area is currently managed by the Department of Planning and Urban Development for Regional Open Space.

Lakes Walyungup and Coo loongup and Baldivis Swamp which are protected by the Environmental Protection (Swan Coastal Plain Lakes) Policy also have the potential to be affected by the proposal. This statutory policy carries a general presumption against filling, draining, mining or polluting of identified lakes. Lake Coo loongup includes the section of wetland south of the existing Safety Bay Road.

The proponent presented five possible road options being Options A, B, C, D, and E (refer Figure 4) which are described in detail in Section 4 of this report. The Environmental Protection Authority evaluated all of the options presented in the Consultative Environmental Review in terms of their potential impact on the key aspects of the environment requiring protection, that is, System Six Area M103, the lakes, and their associated flora and fauna. The alignment progressed by the proponent will require an amendment to the Metropolitan Region Scheme through the planning process. The Environmental Protection Authority considers that this process is best suited to addressing the relationship between the finally approved route and any affected residents.

All of the options presented have the potential to impact on the key aspects of the environment being considered.

Option A

Option A would have an additional impact on Lake Coo loongup because it would require increased fill but it has only minor additional impacts on System Six M103 because it is following the existing alignment. There would be significant impacts on the landscape of the ridge to the east of Mandurah Road because of the clearing and cutting which would be required to construct the road. The Environmental Protection Authority considers that this option could be environmentally acceptable subject to the requirements outlined in Recommendation 2 below.

Option B

Option B would have significant impact on Lake Coo loongup because it would require the construction of a new causeway thereby affecting the integrity of the lake. It would also have a greater impact on System Six M103 and the flora and fauna or the area as it crosses a new area of the lake and would require the removal of native vegetation which is in excellent condition

(refer Figure 3). However, the Environmental Protection Authority considers that Option B could be made environmentally acceptable subject to the requirements outlined in Recommendation 2.

Option C

Option C would have considerable impacts on Lake Cooloongup and System Six Recommendation M103 and the associated flora and fauna as it requires extra filling of Lake Cooloongup, and disturbs a relatively large area of vegetation which is in good to excellent condition. Option C is considered to be environmentally unacceptable.

Option D

Option D also impacts on System System Six M103, Lake Cooloongup and Baldivis Swamp in largely the same manner as Option C, however, it could also adversely affect the hydrology of both Lake Cooloongup and Lake Walyungup as it would require the removal of the dune and limestone topographic ground between these two lakes. Option D is considered to be environmentally unacceptable.

Option E

Option E is the proponent's preferred option, and is the only option which almost completely avoids additional impact on Lake Cooloongup. This option passes to the south of the most natural area of Lake Cooloongup through an area which is largely grassed and used for grazing. With appropriate management such as culverting, the road should not adversely impact on the hydrology of either Lake Cooloongup or Lake Walyungup.

Option E has the greatest impact on the System Six M103 area in terms of area of land affected within System Six, however, it has a relatively low impact on flora and fauna as it passes through an area with a minimal amount of natural vegetation. Management measures such as culverting, fencing and use of signs would be required at time of construction to minimise impacts on fauna. Option E should also be moved slightly further south in the vicinity of Baldivis Swamp, as proposed by the proponent in the responses to public submissions (Appendix 2), to allow for an appropriate buffer between the road and the Swamp. Option E is environmentally acceptable subject to moving the alignment slightly further south as discussed and subject to the commitments given by the proponent in Appendix 1.

Other Options

A number of submitters put forward alternative options to those presented in the Consultative Environmental Review. These alternatives Options F1, F2, G and X (shown as figures 5, 6, and 7) and the proponent's response to them are fully detailed in Appendix 2 of this report.

These options are largely similar to options put forward in the Consultative Environmental Review and have potential environmental impacts which range from acceptable (F1, F2, and X) to unacceptable (G).

Should the proponent choose to alter the proposal by adopting one of these alternative options, the Environmental Protection Authority would need to undertake a full evaluation of their potential impacts and provide further specific advice to Government regarding their environmental acceptability.

Conclusions

Of all the options put forward in the Consultative Environmental Review the Environmental Protection Authority prefers the modified Option E as it requires the least management to make it environmentally acceptable. However, the Environmental Protection Authority considers that Options A and B could also be made environmentally acceptable with intensive management and has recommended accordingly. Options C and D are environmentally unacceptable.

Recommendation 1

The Environmental Protection Authority has concluded that Options A, B, and E of the proposal to extend Safety Bay Road from its existing termination to Eighty Road at Baldivis, as modified during the process of interaction between

the proponent, the Environmental Protection Authority, the public, and the Government agencies that were consulted, are environmentally acceptable subject to objectives outlined in Recommendation 2.

In reaching its conclusion the Environmental Protection Authority identified the main environmental factors requiring detailed consideration as:

- implications for System 6 Recommendation M103;
- conservation of regionally significant and diverse flora and fauna associated with M103 and Lakes; and
- protection of Lake Cooloongup, Lake Walyungup and Baldivis Swamp from adverse impacts.

The Environmental Protection Authority considers that in respect of Options A, B, and E these environmental factors have been adequately addressed either by environmental management commitments given by the proponent (Appendix 1), and by modifications made in Appendix 2, or by the Environmental Protection Authority's recommendations in this report.

Recommendation 2

The Environmental Protection Authority recommends that in order for Options A, and B to be environmentally acceptable the following objectives should be met by the proponent:

- the new road should incorporate appropriate culverting or bridging where it crosses Lake Cooloongup so that the hydrology of the lake is not adversely affected;
- the necessary intersection of Safety Bay Road with Mandurah Road should have no direct physical impact on Lake Cooloongup or its fringing vegetation;
- the remaining section of the existing Safety Bay Road should be removed and the area rehabilitated (for Option B); and
- the section of road which crosses Lot 330 north of Baldivis Swamp should incorporate design and construction features to avoid affecting the hydrology of the lake.

Without this degree of management both of these options would have unacceptable environmental impacts.

Recommendation 3

The Environmental Protection Authority concludes that Options C and D are not environmentally acceptable and recommends that they do not proceed in this form.

1. Introduction

The proposal to extend Safety Bay Road from its existing termination at Mandurah Road to Eighty Road Baldivis was referred to the Environmental Protection Authority in May 1992, at which time the Environmental Protection Authority required a Consultative Environmental Review of the proposal be undertaken. The Environmental Protection Authority required that the proposal be assessed at this level because of its potential impacts on System 6 Recommendation M103, Lakes Cooloongup and Walyungup, Baldivis Swamp and flora and fauna. The Environmental Protection Authority provided guidelines to assist the proponent, the City of Rockingham, in the preparation of the necessary documentation within two weeks of setting the level of assessment. The Consultative Environmental Review was made available for a four week public review period which ended on 21 December 1992.

2. Description of proposal

It is proposed to establish a road corridor to provide a route for Safety Bay Road through the study area identified in Figure 1, specifically between Mandurah and Eighty roads Baldivis. The corridor is to also provide for intersections with Mandurah and Eighty roads. It is intended that the route be reserved as an Important Regional Road under the Metropolitan Region Scheme and the City of Rockingham Town Planning Scheme No. 1.

The eastern extension of Safety Bay Road will serve two major functions in that it will initially provide a linkage between the soon to be developed Baldivis urban area and Rockingham, and in the longer term will also provide access to the southern end of the Kwinana Freeway when the freeway is extended south to this area. It is argued by the proponent that an extended Safety Bay Road is integral to the road hierarchy for the South West Corridor and that a decision not to proceed would require significant alterations to the planning for the area. (Mitchell McCotter, 1992)

3. Review of public submissions

The Consultative Environmental Review document prepared for the proposal was available for a four week public submission period which closed on 21 December 1992. Comments were sought on the proposal from the public, community groups and State Government agencies. Thirteen individual submissions were received. The submissions raised a number of issues relating mainly to:

- impact of the proposal on System Six Recommendation M103;
- impact on lakes;
- impact on hydrology of the lakes;
- impact on flora and fauna;
- safety, noise and dust;
- need for the road;
- alternative road proposals;
- aboriginal heritage;
- relationship of the proposal to the draft South West Corridor Structure Plan and general land use and planning issues; and
- affect on existing lifestyle.

A detailed list of issues raised in submissions and the proponent's response to these issues is incorporated in Appendix 2 of this report. Many of the issues are also specifically discussed in the following section of this report, however, the last two issues listed above are planning issues which should be dealt with by the Department of Planning and Urban Development and the City of Rockingham under planning procedures.

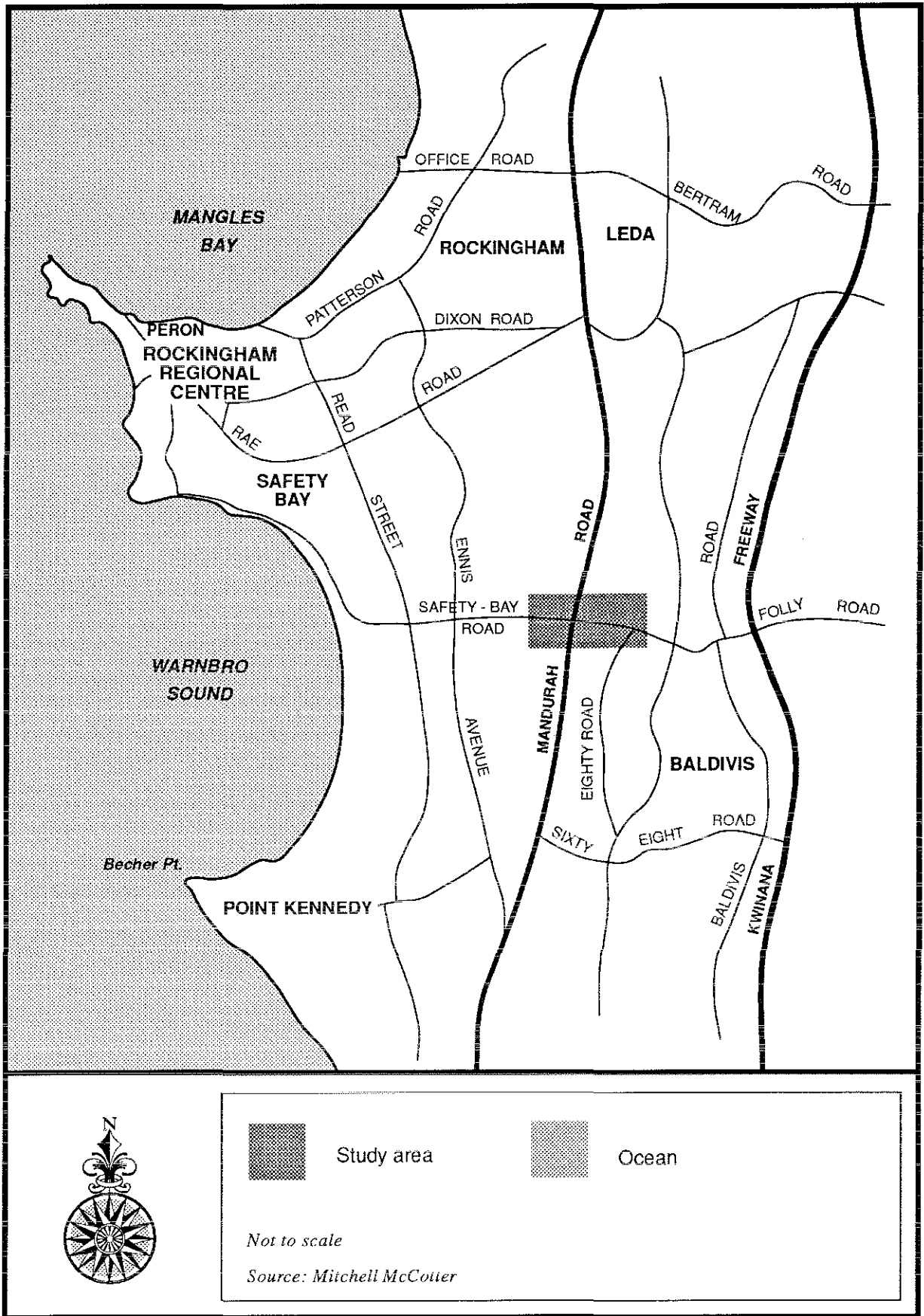


Figure 1: Study area.

4. Key environmental issues

There were a number of environmental issues the Environmental Protection Authority considered should be addressed during the preparation and assessment of the road proposal. The following is a discussion of the key environmental issues.

4.1 System 6 Recommendation M103

In 1972, the Environmental Protection Authority established the Conservation Through Reserves Committee to make recommendations with respect to National Parks and Nature Reserves of the State. Western Australia was divided into twelve different Systems each representing a natural and demographic entity. The Perth metropolitan area was included within the Darling System, that is System Six. System Six covers the most intensively used part of the State where land values are high and where competition for differing land uses is often intense. The study attempted to define those parts of the region which should be kept mainly natural so as to preserve certain conservation, recreation and landscape values. One of the key issues to be addressed in this assessment is the effect of this proposal on System Six Recommendation M103 (refer Figure 2).

The System Six M103 area is recognised for its lakes, variety of different vegetation species and formations and its abundance of bird life.

This area has been included within the System Six recommendations as it constitutes open space of regional significance because of its conservation value and because as a large, attractive area within the South West Corridor, its recreational importance is likely to grow in the future. In recognition of its many values, the Environmental Protection Authority recommended in 1983 that this area become a Regional Park (Environmental Protection Authority, 1983).

Area M103 also contains land which does not have conservation and recreation as primary management objectives and it was recognised that management of the area would therefore require coordination. Nonetheless, the Environmental Protection Authority stated that important management considerations for M103 included ensuring that Lake Coo loongup is managed primarily for the conservation of flora and fauna and ensuring that Lake Walyungup is managed to permit development for recreational use. The area is currently managed by the Department of Planning and Urban Development for Regional Open Space.

The current Safety Bay Road alignment traverses through System Six Area M103 and has the potential to impact further on this area when extended.

4.2 Lakes protected by the Environmental Protection (Swan Coastal Plain Lakes) Policy

There are a number of lakes within the study area which have the potential to be affected by the road plan. These include Lake Walyungup, Lake Coo loongup and Baldivis Swamp. Lakes Coo loongup and Walyungup are part of the Coo loongup Suite of wetlands as defined by Semeniuk, 1987 and Baldivis Swamp is part of the Stakehill Suite. Lake Coo loongup includes the section of wetland south of the existing Safety Bay Road as defined by the C A Semeniuk Geomorphic Wetland Classification System (Semeniuk, 1987), the Environmental Protection (Swan Coastal Plain Lakes) Policy and by previous Environmental Protection Authority publications (Environmental Protection Authority, 1983 and 1990).

All of these lakes have high conservation value although Lake Walyungup's primary management objective is for recreation. An evaluation of the lakes undertaken by the V&C Semeniuk Research Group using the Environmental Protection Authority's Bulletin 374 identified Lake Coo loongup as a Category H lake (high conservation), Lake Walyungup as a Category C lake (conservation) and Baldivis Swamp as Category O (Conservation and Recreation) (V & C Semeniuk Research Group, 1991).

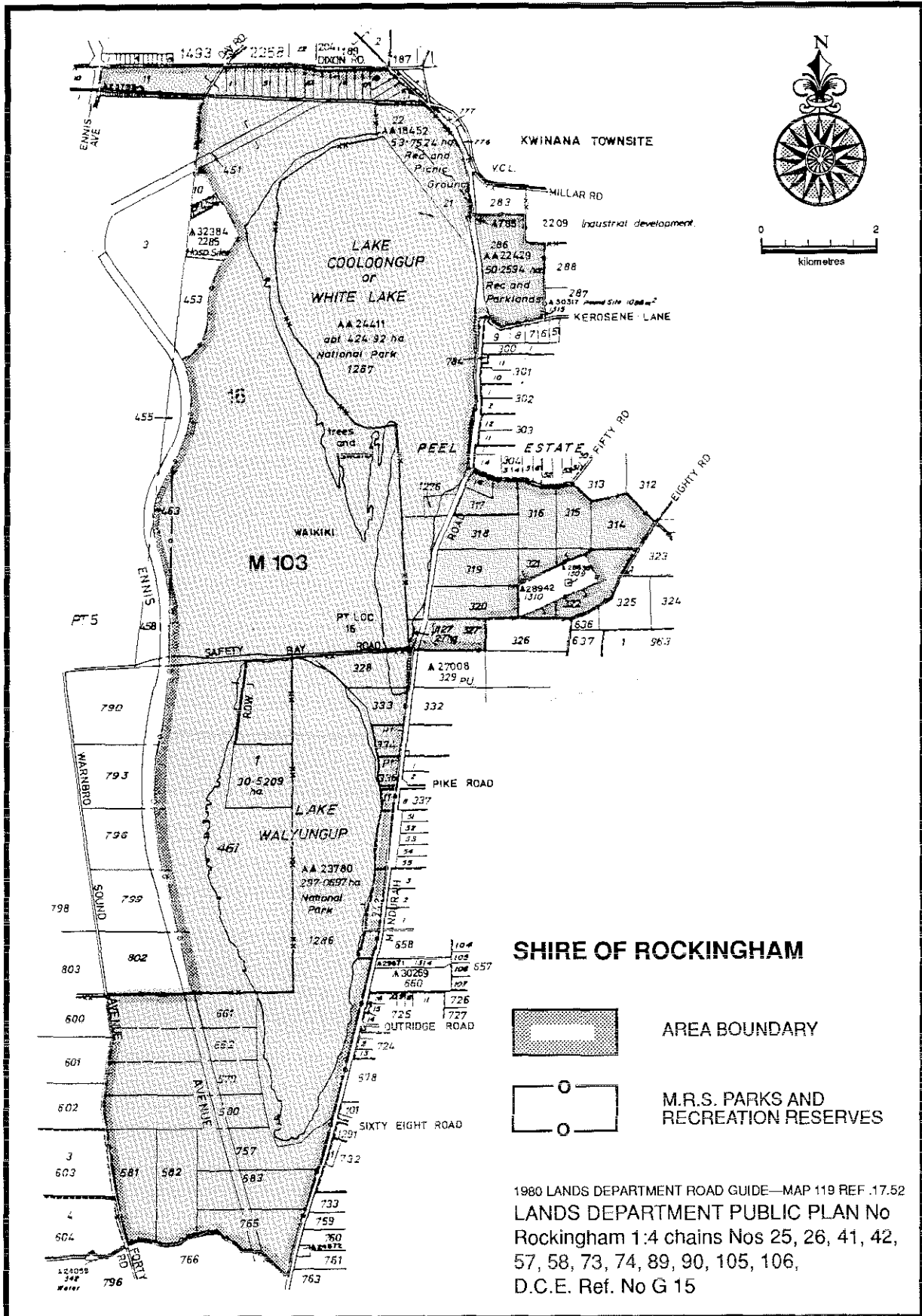


Figure 2: System 6 recommendation M103.

These lakes are all protected by the Environmental Protection (Swan Coastal Plain Lakes) Policy which was put in place to prevent the degradation or destruction of lakes such as these by preventing activities include filling, excavating, mining, drainage or pollution of the lakes. As such, the Environmental Protection Authority wished to ensure that impacts to these lakes is minimised.

4.3 Hydrology

Lakes Cooloongup and Walyungup are considered to be separate hydrological systems which are each surrounded by small drainage basins defined to the east by the Coastal limestone ridge, to the west by dune systems, and are separated from each other by a sand dune and limestone topographic divide. These are considered to be not only surface watersheds but also act as groundwater divides within the shallow localised flow systems (Layton Groundwater Consultants, 1976 in Mitchell McCotter, 1992).

Water balance studies of Lake Cooloongup have shown that it receives groundwater inputs from the Stakehill Mound and from the Rockingham Plain to the west and that there is through-flow of groundwater from the east to the north-west which has the result of limiting the salinity of Lake Cooloongup (Environmental Protection Authority, 1990). Lake Walyungup is a closed system, that is, its water balance is predominantly dependent on direct precipitation and evaporation and hence, its salinity level is significantly higher than Lake Cooloongup (Mitchell McCotter, 1992; V & C Semeniuk Research Group, 1992).

The Baldvis Swamp is part of the Stakehill Suite of wetlands and is hydrologically connected with the groundwater system of the Stakehill Mound (Mitchell McCotter, 1992).

The Environmental Protection Authority wishes to ensure that the hydrology of the lakes is not adversely affected by the proposal.

4.4 Flora and fauna

The vegetation communities within the study area are different according to whether they are located east or west of Mandurah Road. There are four communities west of Mandurah Road. These are:

- *Gahnia trifida* (Coast Saw Sedge) sedgeland;
- grasslands;
- closed *Melaleuca raphiophylla* (Freshwater Paperbark) forest; and
- *Juncus kraussi* (Sea Rush) sedgeland.

The vegetation communities east of Mandurah Road consists of five vegetation communities. These are:

- tuart/jarrah/marri tall open forest;
- tuart/jarrah marri mixed eucalypt/grassland (mixed eucalypt overstorey over weeds and pasture grasses);
- tuart grassland (scattered mature tuarts over grassland over weeds and pasture grasses);
- closed *Melaleuca raphiophylla* (Freshwater Paperbark) forest; and
- Wetland complex vegetation (consisting of floristically and structurally diverse community featuring a mixture of eucalypts, banksia and melaleuca with a mixed understorey).

The fauna consists of a wide variety of birds particularly waterbirds — mammals such as the Southern Brown Bandicoot (*Isodon obesulus*), kangaroos, wallabies and reptiles such as the Long Neck Tortoise (*Chelodina oblonga*) and amphibians.

The Environmental Protection Authority is seeking to minimise the disturbance to the areas which contain the greatest variety of species and vegetation structure. These areas are mainly within and immediately surrounding the lakes and on the limestone ridge in the vicinity of Tamworth Hill (refer Figure 3).

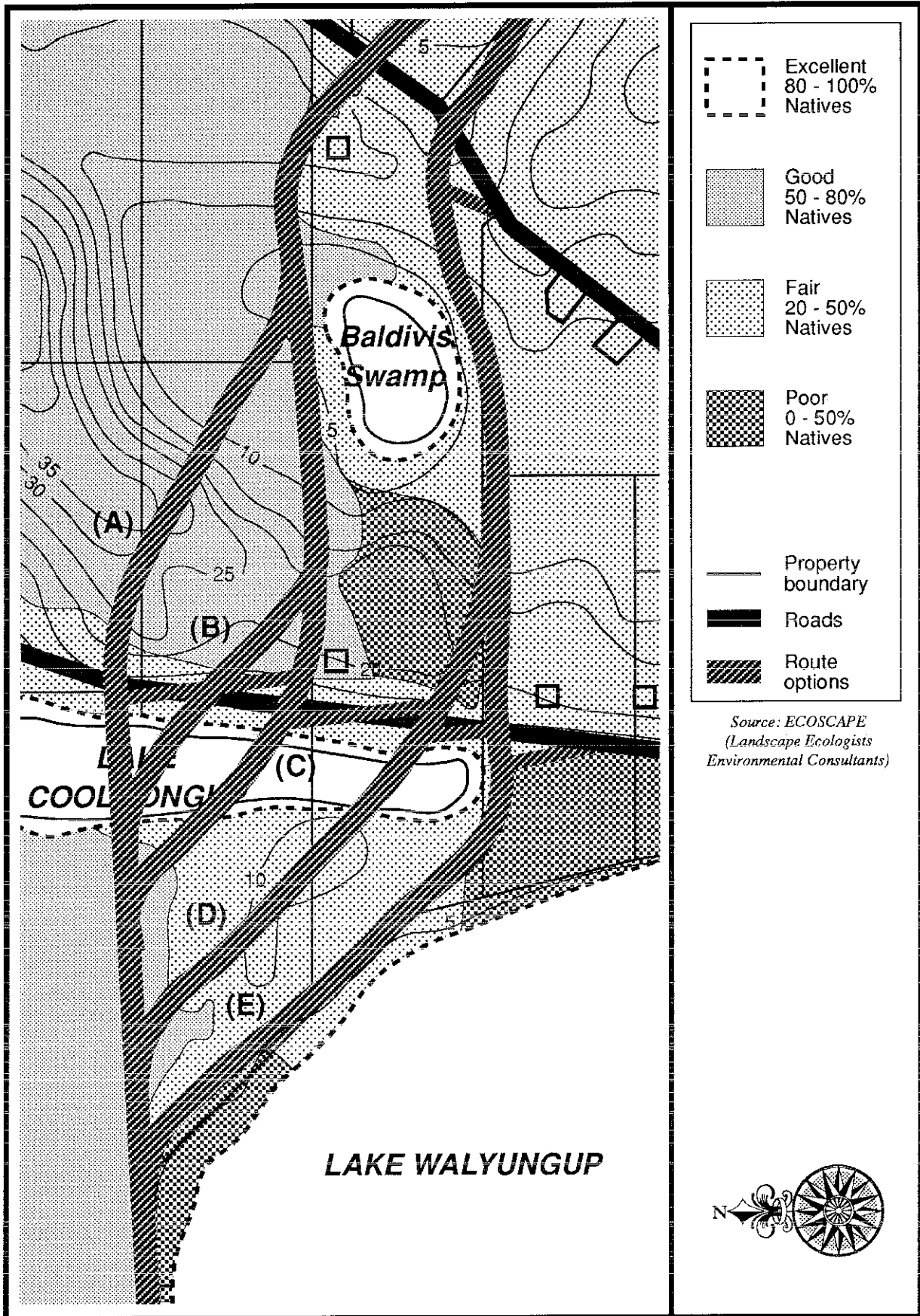


Figure 3: Bushland condition

5. Description of alternative alignment options

The five route options put forward by the proponent in the Consultative Environmental Review as shown in Figure 4 are described by Mitchell McCotter (1992) as:

"Option A, the straight-ahead option, uses the existing alignment of Safety Bay Road to its intersection at Mandurah Road and then cuts through the Coastal limestone ridge and dunes immediately east of Mandurah Road. The route then skirts the northern side of Baldivis Swamp on Lots 331 and 332, intersects with Eighty Road and skirts the southern edge of Tamworth Hill Swamp.

Option B branches off the current Safety Bay Road 250 metres west of the existing Mandurah Road intersection and crosses the Lake Cooloongup wetland before passing through a saddle in the limestone ridge and dunes and running along the fenceline between Lot 332 and Lot 329. This option skirts the northern edge of Baldivis Swamp and from this point its course is identical to Option A.

Option C leaves the current alignment of Safety Bay Road 500 metres west of Mandurah Road and cuts across the Lake Cooloongup wetland passing through the same saddle in the limestone ridge as Option B. From this point the route is identical to Option B.

Option D branches off the current alignment of Safety Bay Road 850 metres west of Mandurah Road. After traversing some low dunes it also crosses the Lake Cooloongup wetland before passing through a second saddle in the limestone ridge that falls on the boundary of Lot 332 and Lot 334. This option then skirts the southern edge of Baldivis Swamp before crossing Eighty Road and passing to the south of Tamworth Hill Swamp.

Option E leaves the current alignment of Safety Bay Road 1000 metres west of Mandurah Road. After paralleling the north-eastern shore of the Lake Walyungup wetland the route skirts the southern extremity of the Lake Cooloongup wetland before passing through the same saddle in the limestone ridge crossed by Option D. From that point the route is identical to Option D."

6. Evaluation of alternative alignment options

The Environmental Protection Authority has evaluated each of the options presented in the Consultative Environmental Review (refer figure 4) in terms of their potential environmental impact on the key aspects of the environment which the Environmental Protection Authority is seeking to protect. The alignment progressed by the proponent will require an amendment to the Metropolitan Region Scheme through the planning process. The Environmental Protection Authority considers that this process is best suited to addressing the relationship between the finally approved route and any affected residents.

6.1 Option A

Option A has the potential to impact on System Six M103, Lake Cooloongup, Baldivis Swamp and flora and fauna associated with these areas.

The road construction would require extra fill to widen the existing causeway to accommodate a dual two lane carriageway and hence would have an impact of the southern end of Lake Cooloongup. Due to its location on the existing alignment this option would maintain the same degree of disturbance on the System 6 area west of Mandurah Road, though it would create greater impact on a small section of the System 6 area on the east of Mandurah Road as this area is currently well vegetated and not subject to any development proposal. Baldivis Swamp could be adversely affected because the road has the potential to alter the hydrology of the swamp.

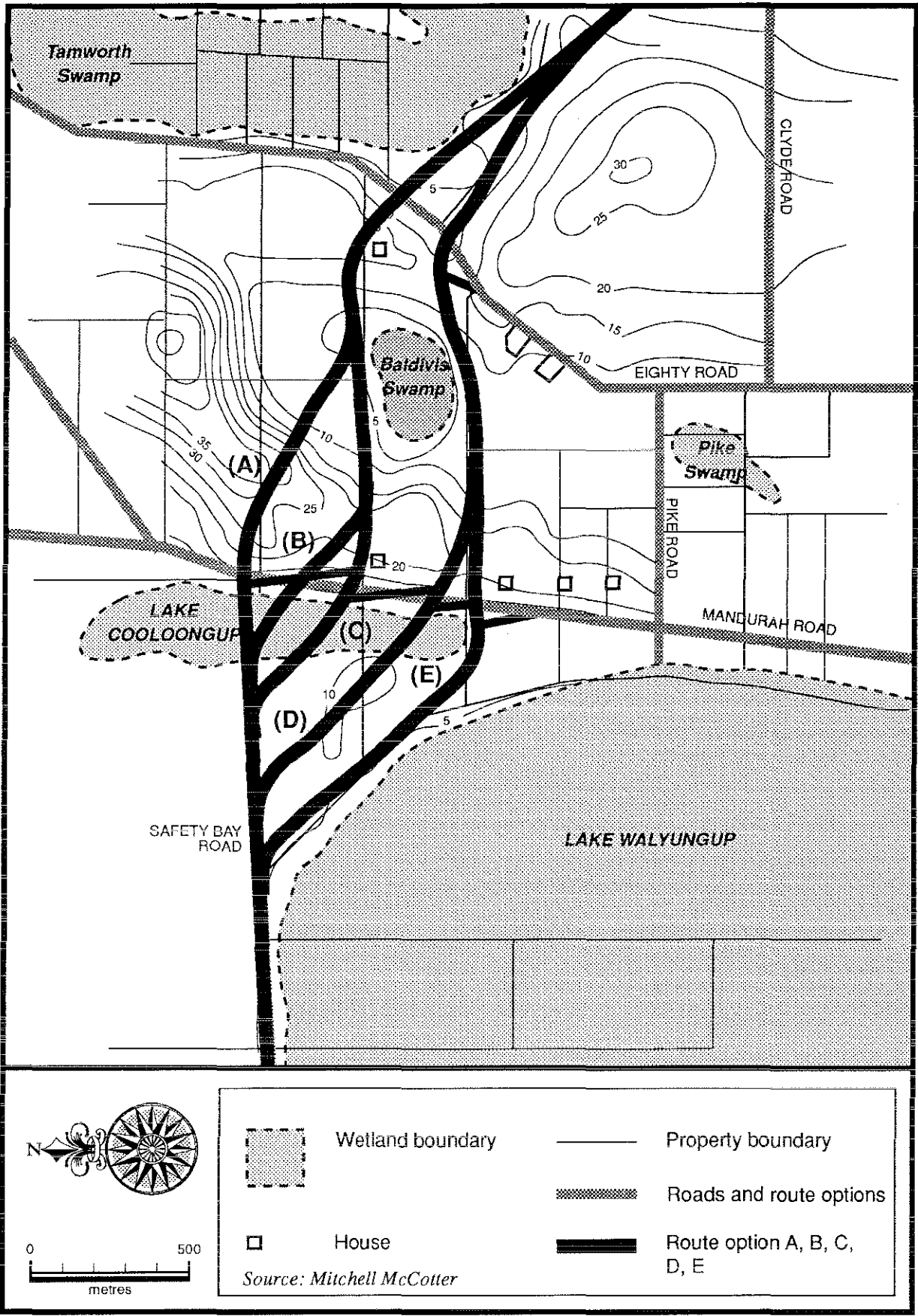


Figure 4: Route options in CER.

The Environmental Protection Authority considers that this proposal could be environmentally acceptable provided that it is managed correctly, that is:

- the necessary intersection of Safety Bay Road with Mandurah Road should have no direct physical impact on Lake Coo loongup and its fringing vegetation; and
- the section of road which crosses Lot 330 north of Baldivis Swamp should incorporate design features such as bridging so that the hydrology of the lake is not adversely affected.

With this level of management, this Option has relatively minor additional impacts on System Six M103 and Lake Coo loongup, though it would still have significant impacts on the landscape of Tamworth Hill in that an extensive cut would be required, particularly as the intersection treatments may have to be accommodated on the limestone ridge. This may not be desirable from an aesthetic or cost point of view, and would require the clearing of an area of native vegetation which is in good condition.

6.2 Option B

Option B also has the potential to impact on System Six M103, Lake Coo loongup, Baldivis Swamp and associated flora and fauna.

This option would have a greater impact on Lake Coo loongup and System Six M103 and the associated flora and fauna, as it would require the construction of a new causeway through a new section of the lake. The potential impact of Option B on Baldivis Swamp would be the same as that of Option A.

To be environmentally acceptable Option B would need to meet the requirements outlined for Option A in Section 5.1. The existing Safety Bay Road would also have to be removed to balance the impact associated with the construction of a new causeway. Option B would not be acceptable unless the existing road is removed and the area rehabilitated.

6.3 Option C

Option C impacts considerably on System Six M103, Lake Coo loongup, Baldivis Swamp and associated flora and fauna. This option would require significant management to ameliorate its impacts on the lakes and would have a high level of impact on flora and fauna as it would require the disturbance of a relatively large area of structurally different vegetation communities (refer Figure 3). Consequently, this option is not environmentally acceptable.

6.4 Option D

Option D has impacts on System Six M103, Lake Coo loongup, Baldivis Swamp and flora and fauna. Option D has the additional impact of removing the dune and limestone topographic high ground that forms part of the watershed between the Lake Coo loongup and Lake Walyungup drainage basins and therefore affecting the hydrology of these lakes. This option is not environmentally acceptable.

6.5 Option E

Option E is the proponent's preferred option. Option E impacts the greatest on System Six M103 in terms of length of disturbance, but does not impact significantly in terms of flora and fauna or on the hydrology of the lakes. Option E does not have significant additional impact on Lake Coo loongup as it passes to the bottom of the area in best natural condition and through an area which although in need of fill to facilitate the proposal, does not have relatively high value in terms of flora and fauna habitat (refer Figure 3). There is concern about this alignment's proximity to Baldivis Swamp and as proposed by the proponent in the responses to submissions (Appendix 2), the corridor for Option E should be moved slightly further south in the region of Lot 335 and Eighty Road to increase the distance between it and Baldivis Swamp. This option also passes slightly further south of Tamworth Hill Swamp than other options and is therefore better because it provides a greater buffer area between the road and the swamp.

Option E would require the incorporation of management measures such as fencing, signs, and provision of crossing areas beneath the road for fauna at the time of construction, to make it environmentally acceptable. Management measures required to make this proposal environmentally acceptable are contained in commitments given by the proponent in Appendix 1.

6.6 Options put forward in submissions

A number of alternative options were put forward by submitters. The alternative options G, F1, F2 and X (Figures 5, 6, and 7, Appendix 2) and the proponent's response to them are detailed in Appendix 2. The proponent's response deals with the potential environmental impact associated with each proposal and also discusses the social, economic and engineering aspects of each option put forward.

Many of these options have comparable environmental impacts which have already been discussed. Options F1 and X have similar environmental impacts as Option A and therefore could be environmentally acceptable if similar management measures are implemented. Option G would not be environmentally acceptable as it crosses through the middle of Tamworth Hill Swamp, a wetland which has recognised conservation value and which is protected by the Environmental Protection (Swan Coastal Plain Lakes) Policy.

From an environmental point of view one of the main alternative options put forward, Option F2, which is worthy of further consideration is that of upgrading existing roads such as Pike Road to form the connection between Eighty Road and Mandurah Road. This would have less environmental impact although it may have greater social impact.

However, should the proponent choose to alter the proposal put forward in the Consultative Environmental Review by adopting one of these alternative options, the Environmental Protection Authority would need to undertake a full evaluation of their potential impacts and provide further specific advice to Government regarding their environmental acceptability.

7. Conclusions and recommendations

The Environmental Protection Authority has considered the alternative alignments presented by the proponent in the Consultative Environmental Review document, submissions from the public and the proponent's response to these issues. The Environmental Protection Authority will not make any recommendations in regard to issues of planning. Such decisions are the responsibility of the City of Rockingham and the Department of Planning and Urban Development. The Environmental Protection Authority has reached the following conclusions and recommendations.

Recommendation 1

The Environmental Protection Authority has concluded that Options A, B, and E of the proposal to extend Safety Bay Road from its existing termination to Eighty Road at Baldivis, as modified during the process of interaction between the proponent, the Environmental Protection Authority, the public, and the Government agencies that were consulted, are environmentally acceptable subject to objectives outlined in Recommendation 2.

In reaching its conclusion the Environmental Protection Authority identified the main environmental factors requiring detailed consideration as:

- implications for System 6 Recommendation M103;
- conservation of regionally significant and diverse flora and fauna associated with M103 and Lakes; and

- protection of Lake Coo loongup, Lake Walyungup and Baldivis Swamp from adverse impacts.

The Environmental Protection Authority considers that in respect of Options A, B, and E these environmental factors have been adequately addressed either by environmental management commitments given by the proponent (Appendix 1), and by modifications made in Appendix 2, or by the Environmental Protection Authority's recommendations in this report.

The Environmental Protection Authority considers that modified Option E is preferable to the other options presented as it requires the least management to make it environmentally acceptable. Commitments given in both the Consultative Environmental Review and responses to public submissions by the proponent are sufficient to manage the potential environmental impacts of Option E. Options A and B require further specific and intensive management to render them environmentally acceptable.

Recommendation 2

The Environmental Protection Authority recommends that in order for Options A, and B to be environmentally acceptable the following objectives should be met by the proponent:

- the new road should incorporate appropriate culverting or bridging where it crosses Lake Coo loongup so that the hydrology of the lake is not adversely affected;
- the necessary intersection of Safety Bay Road with Mandurah Road should have no direct physical impact on Lake Coo loongup or its fringing vegetation;
- the remaining section of the existing Safety Bay Road should be removed and the area rehabilitated (for Option B); and
- the section of road which crosses Lot 330 north of Baldivis Swamp should incorporate design and construction features to avoid affecting the hydrology of the lake.

Without this degree of management both of these options would have unacceptable environmental impacts.

Recommendation 3

The Environmental Protection Authority concludes that Options C and D are not environmentally acceptable and recommends that they do not proceed in this form.

8. References

- Environmental Protection Authority (1983), Conservation Reserves for Western Australia as recommended by the Environmental Protection Authority, the Darling System - System 6. Part II: Recommendations for Specific Localities.
- Environmental Protection Authority and Water Authority of Western Australia (1990), Jenny Arnold's Perth Wetlands Resource Book. Bulletin 266, Chapters 1-4 and 9-11.
- Mitchell McCotter (1992), Extension of Safety Bay Road, Consultative Environmental Review, Western Australia.
- Semeniuk, C A (1987), Wetlands of the Darling System - A geomorphic approach to habitat classification, Journal Royal Society of Western Australia, 69.95-112.

V & C Semeniuk Research Group (1991), Environmental and Landscape Audit Stage 2 Interim Report: The Southwest Corridor Study - a report to the Department of Planning and Urban Development, Western Australia.

Appendix 1

Proponent's commitments

COMMITMENTS

The most significant commitment that is made in this CER is to adopt a route alignment for the extension of Safety Bay Road which is longer and more expensive than other routes considered. The route was selected due to its minimal environmental impacts on wetlands and the landscape. The following detailed commitments are made in this CER by the proponent, the City of Rockingham.

1. There will be no filling or drainage of wetlands protected by regulations.
2. Drainage facilities will be designed to contain up to a 1 in 5 year average recurrent interval storm without direct discharge to wetlands through the provision of purpose built storage/infiltration basins.
3. Accompanying the opening of the realignment, the existing roadway will be closed to through traffic, however, continued access will be allowed for maintenance of services. The precise details of this closure will be negotiated at the time with, and to the satisfaction of, the management authority for System Six Area M103. Currently this is DPUD, however in future it will be transferred to CALM.
4. Culverting of the proposed route across the southern sumplands will be installed during construction to allow faunal movement and to maintain hydrological connectivity to the satisfaction of the manager of System Six Area M103.
5. Fauna Crossing warning signs will be installed by the Council if, after a one year review with CALM officers, road casualties are considered excessive. This will be carried out to the satisfaction of the manager of System Six Area M103.
6. A revegetation program would be developed and implemented by Rockingham City Council, in consultation with DPUD or CALM where appropriate, during construction using endemic species with the aim of stabilising earthworks and enhancing habitats along the new road alignment. This will incorporate a weed control program. The program will be carried out to the satisfaction of the System Six Area M103 manager.

7. Access to private land and wetlands will be prevented by appropriate signage and fencing at the time of construction.
8. Residents will be consulted in relation to fencing and revegetation programs for areas adjoining their land by Council prior to construction.
9. Vegetated noise/landscape bunds will be provided on the northern side of the route adjacent to the residence on Lot 331. These will be designed in consultation with the landowner.
10. During construction water carts will be used to minimise dust, and a temporary drainage system will be constructed as agreed to the satisfaction of Council.
11. Dieback free fill will be used and dieback hygiene procedures implemented. Machinery storage areas will be identified on degraded lands and machinery will be restricted to the road corridor in sensitive areas to the satisfaction of System Six Area M103 manager.

Appendix 2

Proponent's response to public submissions

SUMMARY OF ISSUES RAISED BY SUBMISSIONS ON THE CER FOR THE EXTENSION OF SAFETY BAY ROAD.

INTRODUCTION

The following is a summary of issues raised by submissions on the above proposal. Much of the wording used in the summary is paraphrased directly from submissions received. The proponent's response to each of these issues is requested as part of the Consultative Environmental Review process.

ISSUES

JUSTIFICATION FOR THE PROPOSAL

- 1 The proponent's justification that there will be no direct link with Rockingham if this project does not go ahead is not justification for the loss of wetland habitat. There are alternative roads that could be upgraded to cope with the predicted traffic flows. There is no edict that major traffic routes must be direct.

Response

Safety Bay Road runs between Lake Coo롱gup and Lake Walyungup at present, as far as Mandurah Road. It is inevitable that with the imminent development of the Baldvis area the road will become increasingly important as a traffic route between the coast and the city centre and the future urban areas of Baldvis as well as provide a link to the future extension of the Kwinana Freeway. The alternative of upgrading local roads such as Baldvis Road, Eighty Road and Pike Road to serve these functions is undesirable given the forecast volumes of traffic likely to be generated in the future. It is desirable on both traffic management grounds, social and environmental amenity grounds that the traffic route be designed in as direct and unobtrusive manner as possible. The impact of the preferred option for the upgrading of Safety Bay Road on the above Lakes and Baldvis Swamp is the least significant of the options assessed.

- 2 One of the reasons cited for extending Safety Bay Road to the east is to provide access to the southern end of the Kwinana Freeway when it is extended. This is not considered to be sufficient justification for the construction of a Safety Bay Road extension at the present time because the incumbent State Government has publicly stated that it has no intention of extending the Freeway beyond its Thomas Road intersection in the foreseeable future. Also, a possible rail link to the Rockingham area, and areas further south has been mooted, and until a definite decision is made in favour of either road or rail, there is no justification for inconveniencing private land owners or prematurely destroying the natural environment.

Response

The extension of the Kwinana Freeway is only one of the reasons for the extension of Safety Bay Road, however it is an important consideration in the context of the anticipated transport needs of the region. The State and Local Authorities

commitment to the establishment of a rail system servicing the southwest region is intended to complement rather than substitute the road system. The future alignment of the Kwinana Freeway extension is currently being pursued by the Department of Planning and Urban Development by way of an amendment to the Metropolitan Region Scheme.

- 3 An understated reason, though perhaps the most compelling for extending Safety Bay Road to the east at this time would appear to be pressure being applied to the proponent for the immediate development of the planned Urban subdivision by Taylor Woodrow on Clyde Avenue.

Response

It is the responsibility of the regulatory authorities to consider proposals put forward by private landowners for their property and in this instance, Taylor Woodrow as the major landowner in the area is undoubtedly keen for the outstanding issues that are holding up the development of Baldivis to be resolved. The road extension is an important part of the development of Baldivis in the short term as well as being of regional significance in the long term.

LAND USE AND PLANNING

- 4 The current rural zoning for the whole of Baldivis should be protected and retained, and no Urban development should be allowed to proceed in this area. The continuing urban sprawl is forcing primary producers further and further away from the productive and friable soils of the coastal plain, which is also an area of reliable rainfall, onto more marginal growing lands. It is believed that controls should be placed on the development of urban land on the Swan Coastal Plain, that the areas of Baldivis be preserved for the ongoing benefit of future generation of food producers, and that the remaining natural environment be protected. If such a policy were to exist, there would be no need for an eastern extension of Safety Bay Road, and present well maintained road infrastructures would be sufficient for Special Rural land use.

Response

The Baldivis area has been identified by the Department of Planning and Urban Development as being suitable for urban development. This has been confirmed in recent years through the publication of Metroplan and the Urban Expansion Policy. These documents act as the State Government's planning guideline for the Perth Metropolitan Region . The need for the road has arisen out of the planning guidelines established by these reports.

- 5 The CER is premature as the Structure Plan for the whole South West Corridor is only in its draft phase and no conclusive plan for the region has yet been established, nor has any public comment on this plan been called for at this stage. Until the Structure Plan is complete, no Urban developments or road reserves in the Baldivis area should be given final approval, as it would be pre-empting the conclusions that may be reached by the South West Corridor Structure Plan in providing an overall future directive for the region.

Response

Major transport links are an integral part of planning any new community and in this respect the CER is important to examine alternative route alignments linking the Baldivis area to the city. Following final approval for the CER it will be necessary for the preferred alignment to be protected by virtue of an amendment to the Metropolitan Region Scheme. The Draft Structure Plan for the South West Corridor has now been released for public comment, and in accordance with the recommendations of Metroplan and the Urban Expansion Policy, the Plan identifies Baldivis as an area suitable for urban development.

- 6 The resumption of a road reserve along the south boundary of Lot 332 will severely reduce the area of productive land on this lot resulting in a loss of income and an inability to dissipate the cost of capital equipment. This section also has a significant amount of natural bushland which includes mature stands of tuart, marri, jarrah, banksia, hakea, sheoak and acacia tress, in a parkland setting, as well as more dense bushland with an understorey of native shrubbery including blackboy, zamia palm, templetonia, native wildflowers and orchids. This bushland provides a natural habitat for a great variety of fauna.

Response

It is acknowledged that the route will impact on Lot 332 and require the purchase of land. However the area required is less than 8% of the area of the property. It is also acknowledged that vegetation will be destroyed however vegetation in this area was assessed as being in fair condition, compared to vegetation in good condition on Lots 327 and 329, and excellent condition in the wetlands.

- 7 Lot 335 has been cleared for market garden, but strong objection is made to the term 'degraded' in regard to the other affected areas, as some has not even been cleared and has been only lightly grazed in order to preserve the natural habitat. There are some introduced pasture grasses, but the only weed infestation is recently arrived onion weed, having blown in from the coast as a consequence of the indiscriminate clearing of the large urban developments to the west.

Response

Vegetation condition was assessed by recording the proportion of native species generally found in a community. The term "degraded" was used to refer to the areas with less than 50% native species.

- 8 No mention has been made of the intended use of Lots 330 and 326 as a caravan park, which would surely be of greater benefit to both the owners and the City of Rockingham if better access were provided by means of a main road.

Response

Lots 330 and 326 will retain access from Eighty Road, which is adequate to service any development of a caravan park on those lots. There is not seen to be any

significant advantage gained by Lots 330 and 326 having direct access onto Safety Bay Road.

DISCUSSION OF CER OPTIONS AND THEIR IMPACTS

- 9 The area affected by the proposal contains four important wetlands (Lake Coo loongup, Lake Walyungup, Tamworth Hill and Baldivis Swamps). These provide a variety of habitats which are important for biodiversity on the Swan Coastal Plain. This area is the core of the proposed Rockingham Lakes Regional Park and a road through it will disrupt breeding and wildlife migration between the wetlands. The proposed road will also damage valuable tuart woodland, coastal sedge, and melaleuca woodland. It is not accepted that this road is essential. There are other options available which would be less damaging to the environment and which would still provide adequately for local traffic movements.

Response

The importance of the wetlands and wildlife they support has been acknowledged in the CER, and was a major consideration in selecting the preferred option. While it will cause the loss of native vegetation, the route minimises impacts on the areas of greatest significance.

The proposed route will need to cater for a significant volume of traffic in the future (around 30,000 vehicles a day in 2021) and therefore needs to be of a sufficient standard. All options for extension of Safety Bay Road would affect native vegetation, wetlands and private property. The preferred route is an attempt to balance and minimise these impacts.

- 10 Baldivis swamp will be seriously affected by the encroachment of the road alignment.

Response

The road alignment will not impinge on the area of Baldivis Swamp as defined in the regulations. In addition most of the fringing vegetation will be retained. On this basis it is considered that the route will not seriously affect Baldivis Swamp.

- 11 The comprehensive detail of the study is appreciated and there is confidence that the Southern Route (Option E) has far less impact on the Baldivis Swamp situated at the western end of Lot 331 Eighty Road Baldivis, due to the recharge of the swamp being mainly from the Northern boundary of this Lot and Tamworth Hill.

Response

The comment is acknowledged.

- 12 The proposed extension of Safety Bay Road following the proponent's preferred route is not supported because of the destruction of valuable wetland habitat. The preferred route will result in the loss of the northeast corner of Lake Walyungup, a System 6 area; and the loss of fringing vegetation from Baldivis Swamp and Tamworth Hill Swamp.

Response

The destruction of wetland is limited to the degraded area on Lot 334 (west) where the route crosses the southern extension of Lake Cooloongup, also known as Groves Swamp. The route crosses previously grazed land adjacent to the north-east corner of Lake Walyungup, but will not impinge on the lake or its fringing vegetation. None of the fringing vegetation at Tamworth Hill Swamp will be affected and most of the fringing vegetation at Baldivis Swamp will be preserved.

- 13 The proponent's suggestion on page 5.2 that the condition of the affected wetland area west of Mandurah road is poor, is ridiculous. The plant communities, while not pristine, are extremely healthy and support a thriving ecosystem.

Response

The condition of the vegetation communities was assessed on the basis of the proportion of native species present. Where the route crosses the wetland west of Mandurah Road the area generally has less than 50% native species. The wetland areas to the north and Baldivis Swamp, were assessed as comprising 80-100% native species. Consequently the term poor was used in a relative sense and it is acknowledged that the area mentioned supports a healthy ecosystem.

- 14 The quality of the report and the methods used by the consultants to assess the options are satisfactory, though the range of options are not. Option E is the best of a bad lot but there are much better options available if you look further south near Pike Road. The City of Rockingham should not be allowed to construct a major road through such a sensitive area.

Response

A total of 9 options have been assessed as part of the process of preparing the CER. Five were listed in the CER and the remaining four options raised by the public are assessed in detail at the end of this response. This constitutes the assessment of a wide range of options appropriate as part of the assessment process.

- 15 The assessment criteria and methodology of comparison used in the CER is not consistent with that used by the Main Roads Department which is detailed in their document "Draft Environmental Management Manual, September 1990" or by any other environmental assessment treatise that we know of. The criteria are not balanced and objective and do not truly reflect an objective assessment of the alternatives. Option E appears to be favoured as a precursor for discussion throughout the CER.

Response

The assessment criteria and methodology applied in the CER are based on methods used by Mitchell McCotter and others in previous road route selection studies. A similar method was used by Mitchell McCotter on the Mineral Sands Road Study - Sues Road to Capel. With respect to the method the Main Roads Department noted:

"... the matrix represents the most reliable and balanced means by which an objective road option assessment could be undertaken" (EPA Bulletin 573, Appendix 3).

Furthermore, the criteria and method used in the CER were circulated to the EPA, City of Rockingham and Department of Planning and Urban Development for comment and revision prior to application.

- 16 The CER mentions that the cut into the ridge would be required for Options A to D and not for E. This is hard to substantiate as to achieve an at grade crossing of Mandurah Road, the height of the ridge above the road is 10m and the distance from the crest to Mandurah Road is 150m.

Response

A cutting will be required for the preferred route and this is noted a number of times in the CER including in Section 6.5 on page 6.4.

An amount of cut into the ridge is required for all Options A to E. The amount of cut required for Option E is much lower than for Options A, B and C but is nevertheless adequate to accommodate the change in height between the existing crest of the ridge and Mandurah Road in Option E.

- 17 The CER says that Options A to D incorporate curves, whereas Option E offers a straight cutting and maximum line of sight. This is hard to substantiate as Option E has half of the distance from the top of the crest to the 'at grade' crossing with Mandurah Road than the other two options. As a result it would have much less sight distance than the other options.

Response

Option E is considered to be preferable than Options A, B, C, and D because the approach to the intersection with Mandurah Road is straight through the cutting. Option E includes sufficient provision for earthworks for cut through the ridge to provide a suitable vertical alignment on the approach to the intersection.

- 18 Option E is the worst, and not the best when both horizontal and vertical geometry are considered. In order to increase the sight distance for Option E the crest would have to be lowered with the resultant greater cutting for the road and large sideways cuttings would have to be made to create the necessary sight distance. To increase the safety of Option E, major environmental, economic and landscape impacts would result.

Response

The extent of cut through the crest of the ridge to provide satisfactory vertical alignment for Option E is less than the proposed earthworks for other options and as such is not considered to represent major environmental and landscape impacts in comparison with other options. The report indicates that Option D and E

would require cuttings 6-9 metres high and 300m long, compared to Option A (20m high and 450m long), Option B and C (10m high and 400m long).

- 19 The staggered T intersection treatment shown in the CER is for rural roads. Displaying the diagram from the AUSROADS handbook without the accompanying text is misleading. This will be a major urban intersection. The conceptual long term intersection treatment shown in Figure 5.4 shows a 'right out left in' staggered T intersection. This is not an appropriate arrangement in accordance with AUSROADS. The preferred arrangement is a 'left out right in' arrangement. This would mean that the northern approach of Mandurah Road would have to be moved into the Lake Cooloongup wetland. Attempts to avoid this impact and provide the appropriate stagger (150m, not 80m as is stated in the CER) require major cuttings, reduced road safety and increased cost with a northern alignment heading off into the ridge, closer to the crest and requiring significant vertical geometry modification and cutting.

Response

The "right-left" stagger for the proposed short term intersection is the preferred option for rural intersections.

The conceptual intersection treatment proposed for the long-term intersection was also a "right-left" stagger. The Austroads handbook indicates that a "left-right" stagger is preferable if right turn auxiliary lanes are to be provided on the major road, for three reasons as follows:

- **reduced delay to side street traffic;**
- **increased capacity of cross traffic; and**
- **increased safety as entry to the major road is a less complex (safer) manoeuvre.**

Road safety is ranked as the third of the above three reasons and is included only in relation to the complexity of traffic manoeuvres. There is no substantive evidence available to indicate that the left-right stagger is indeed safer than the right-left stagger at such intersections.

It is important to note that both left-right and right-left staggered intersections provide substantially improved safety in comparison to a four way intersection design. In this context any perceived safety differences between the left-right and right-left staggered intersections is marginal. The Austroads manual would not advocate either the left-right or right-left stagger types if either of these designs were considered to be "unsafe".

It is also relevant to consider the proposed long-term intersection design. ^{Mandurah} ~~Safety~~ Bay Road will remain the main road at the intersection until such time as the Kwinana Freeway is extended as far south as the Baldivis/Karnup area. Unpublished traffic modelling undertaken by the MRS indicates that Mandurah Road would carry daily traffic volumes in excess of 15,000 vehicles per day at Safety Bay Road following the extension of the freeway to Thomas Road.

The initial intersection priority proposed with Mandurah Road as the major road is correct. The longer term intersection design for the year 2021 traffic projections would depend on the actual future traffic volumes using Mandurah Road. It is possible that the combined future traffic volumes on Safety Bay Road and Mandurah Road would require a major intersection treatment such as traffic signal or a roundabout. The right-left and left-right stagger configurations are both equally acceptable for a traffic signal controlled intersection. It is also recommended that a roundabout be given detailed consideration as a suitable long term intersection treatment in view of the semi-rural nature of the location and the changing nature of the road priority over time whereby Mandurah Road would initially be the major road but would be superseded in this role at a future date that would be determined by the eventual extension of the Kwinana Freeway south to the Baldivis-Karnup areas.

- 20 Option B, as drawn shows curve radii of far greater than the optimum than would be recommended for this particular route option. With optimum curves of about 350m radius, the plan of the road could be moved very close to the existing causeway, thus minimising the impact on the wetland and maximising the use of the existing causeway. The new area of impact of Option B would be closer to 50m rather than 200m if the alignment radii were optimised.

Response

The curve radii for Option B can be reduced. This would however further constrain the intersection design with Mandurah Road onto a short straight section of road between two curves which is not a desirable design for an intersection if ideal "entering vehicle" sight distance is to be provided. The layout of Option B in the CER has been drawn with this point in mind.

- 21 It is Government policy that developers and Government Departments adhere to which is coordinate services within the one corridor. It is stated that to move the optic fibre cable and the water main (and also duplicate it) would be too expensive. Whereas on the other hand, minor impacts on wetlands can be tolerated for safety compromises and economic premiums. This is lacking in common sense. The construction of a new causeway for Option B could allow an amalgamation of service in one corridor and not two as would be the case with Option E.

Response

It is recognised that it would be preferable to retain services within a single corridor. However in this instance the costs of relocating the existing water main are of the order of \$1200 per metre. Consequently any route, apart from Option A, would incur significant additional costs if the services had to be relocated. In proposing that the water main remains in its current location, the preferred option is recognising the existing situation and minimising additional impacts on the wetland.

- 22 On Page 4.5 a misleading statement is made about the base width of the embankment at 14m and the road reserve width of 40m. The current road reserve width is 40m also.

The embankment with minor widening (2 to 3m) would accommodate a dual two lane carriageway.

Response

The existing embankment is approximately 15 metres wide where it passes through the wetland of Lake Cooloongup/Groves Swamp. It would require significant rebuilding to accommodate a dual two lane carriageway.

- 23 Page 4.5 of the CER details that the impact on System 6 would be the greatest as a result of Option E and moderately as a result of Option B. No consideration is given to the cumulative effect of the impact on System 6 of retaining the causeway and building another roadway through System 6. The net effect of building Option B would be negligible in comparison given the possibility of removing the existing junction with Mandurah Road and building and moving the embankment to the south - filling in one part of the wetland but recreating another. The opportunity to install culverts to connect Lake Cooloongup back to itself would also be possible and cost effective at the time of construction.

Response

It is acknowledged that Option B could have less impact on the System 6 area than the preferred option. The report also acknowledges however, that there are different values within the System Six area and that Lake Cooloongup was considered to be the most significant of the two lakes on conservation grounds. Option B has a greater impact on Lake Cooloongup/Groves Swamp than Option E.

- 24 The vegetation and fauna habitats of this area are of low importance as the vegetation types and associations are well represented. It is not accepted that the vegetation is high in conservation value in absolute terms. Comparisons made with nearby heavily grassed and totally grassed areas provides a relatively high conservation value. This is not discussed in the CER. The impression given is that the vegetation is high in conservation value. This is a distinct disadvantage of a numeric/objective evaluation and comparison of options. The conservation value of the flora and fauna should be compared absolutely.

Response

If absolute is defined to consider species which are rare, endangered or geographically restricted (ie. listed as a CALM priority species), the site was assessed in "absolute" terms and no flora species of this nature were found, although a more detailed survey might record such species. In terms of fauna, the Southern Brown Bandicoot is a species which is listed on Schedule 1 and 2 of the Wildlife Conservation Act as likely to become extinct or rare and hence would have high conservation value in an "absolute" sense.

The route selected would have the least impact on species assessed on an "absolute" scale. That is route E does not pass through major Bandicoot

habitats. However, the assessment shouldn't be restricted to "absolute" terms as local and regional conservation values are also important.

The criterion used to assess the routes in terms of vegetation and fauna were cognisant of these values.

The regional conservation values of the area relate to the types of communities found in close association with each, thus providing diversity in both floral and faunal composition. The preferred route serves to maximise their integration and thereby preserve regional conservation values. Local conservation values are preserved by the preferred route option in comparison to other options as it passes through the most degraded area.

The statement that the vegetation and fauna habitats are of low importance as the vegetation types are associations are well represented is refuted. It is considered that the habitats found in this area are of both local and regional importance.

- 25 The net amount of vegetation impacted by Option B, assuming revegetation and installation of culverts, is considered to provide a net gain, whereas leaving the causeway as it is and installing another road, clearly has a net loss. Option B should be chosen in preference to Option E and other Options.

Response

Option B would cause loss of *Juncus kraussi* sedgeland assessed to be in excellent condition, closed *Melaleuca raphiophylla* in excellent condition, Tuart-Jarra-Marri open forest in good condition and an area of wetland complex vegetation north of Baldivis Swamp also assessed to be in excellent condition. In contrast the preferred option only affects vegetation assessed to be in fair or poor condition. On the basis of impacts on vegetation it is considered that the preferred option has fewer impacts than Option B.

- 26 Landscape effects are based on assumptions about vertical and horizontal geometry that are incorrect. The impact of Option E in comparison to Option B would be almost identical with B being slightly less obtrusive because of the skewed cut.

Response

Option B passes through the ridge on the east side of Mandurah Road at a point where the crest is at about 20 metres AHD. The preferred option passes through the ridge where the crest is about 16 metres AHD. Consequently the depth of cut required will be less for the preferred option than it would be for Option B. However, it is acknowledged that a skewed cutting may have some advantages over a straight cutting in terms of impacts on the visual environment.

- 27 The landowners affected by this proposal were aware of the original Structure Plan for the Baldivis area which showed an alignment closely resembling Option B. Option B had their overwhelming support. The same cannot be said for Option E, particularly in view of the direct impacts on dwellings and residents. Option B was designed with their

wishes in mind. Other options were not considered appropriate given the impacts that would result.

Response

There has been a far wider consideration of the issues involved in the roads extension as a result of the CER than previously occurred. There has been direct individual contact between the consultants and landowners and community groups in the area. The proposal was also advertised for public comment in the local newspaper 'Courier Saturday' on 21st November 1992. There is, as a result, a wider understanding of the alternative route alignments and their impacts upon the wetland systems, flora and fauna, archaeology, ethnography, private property and traffic management than occurred previously.

- 28 The owners of Lot 331 Eighty Road Baldivis fully endorse the preferred Option E.

Response

The comment is acknowledged.

- 29 Option A would have a huge impact on the agistment earning capacity of Lot 331 Eighty Road, and would interfere greatly with the fencing and reticulation installations on this lot.

Response

It was recognised during the course of the study that Options A, B and C would have greater impacts on Lot 331.

- 30 It is stated that the range of services which currently utilise the Safety Bay Road alignment are to be left in place and the road retained as a service road, therefore, it will not be possible for the commitments made in Chapter 8 to be adhered to viz rehabilitation of the present road area, and as undertaken to the South West Corridor Community Advisory Committee. It is recognised that this would be a very expensive exercise which really precludes any but Option A. It should also be remembered that there is a commitment by both Council and State Government to the under ground placement of power lines. It should be feasible to do this at the same time as duplication of the road, and much less expensive. Parking is not required at Lake Cooloongup, it is required to service the recreation area of Lake Walyungup.

Response

It will be necessary for maintenance vehicles to be able to gain access along the pipeline route. However it will not be necessary for a sealed road to remain. Consequently the existing alignment can be substantially rehabilitated.

The option of providing parking is a suggestion for consideration in management plans for the Rockingham Lakes Regional Park.

- 31 If Option E is approved the current causeway across Lake Cooloongup should be removed so that the southern part of Lake Cooloongup can be reconnected with the northern part.

Response

Removal of the existing causeway would require relocation of the water-main at enormous expense. This water main is likely to be duplicated in the future, and at that time it may be possible to economically install culverts under the embankment to improve the connection between the wetlands.

- 32 Routes B, C and D should be discarded as they impact too much on the natural environment, however Option E impacts on more landowner's properties than the other alternative. Land resumption costs for Option E land will be greater than that of the alternative routes. Highly productive market garden land will be lost forever as a prime food producing resource. The impact on this land is greater, economically, than on any other land along the proposed extension.

Response

It is recognised that a small area of productive market garden would be lost under the preferred option and that this represents a loss of land and a loss of future income to the operator. This would be taken into account during the purchasing process. The need to locate the roadway from Baldivis Swamp as much as possible however, necessitates that a small portion of the road reserve will intrude on the market garden. The road designs actively attempted to reduce the impact of the road on the market garden as much as possible.

- 33 Options B, C, and D present both environmental and engineering problems which would appear to disqualify them. Option E impacts onto a hitherto untouched additional area of Lake Walyungup, which, although considered more of a recreation area than Lake Cooloongup is still an important feeding ground for waterbirds, a conservation area for reptiles and part of the proposed Rockingham Lakes Regional Park.

Response

The preferred option crosses former grazing land near Lake Walyungup but does not impact on the lake or its fringing vegetation.

- 34 The preferred option should be Option A as this would have minimum impact on existing residences in the area, and it has the next lowest ranking to E on its impact on flora and fauna. The impact on the landscape of cutting through the higher ground with Option A has been overstated in the CER. At the highest point, the cut would be 20 metres over a length of 450 metres compared with 9 to 10 metres over 200 metres in Option E. There would be fewer bird and small animal mortalities due to cars on Option A than would occur on Option E because it is closer to the duck nesting and turtle habitats. The encroachment on System 6 Area M103 protected lakes and associated wetlands is much more severe under preferred Option E rather than Option A.

Response

It is recognised that Option A has some advantages, particularly in using the existing causeway. However because cuttings require sloping sides (batters) a 20 metre cutting could be well over 100 metres wide at the top. This additional width is one of the reasons why the cutting for Option A would have greater visual impacts than the cutting for the preferred option.

Option A will pass through densely vegetated Tuart-Jarrah-Marri forest and a wetland complex north of Baldivis Swamp. There is the potential for fauna road kills in both of these areas. It is acknowledged that Option A would have less impacts on the System 6 area than the preferred option.

- 35 Option A is preferred because the wetlands have already been disrupted by the existing road which is to remain whichever option is used. Also further works will need to be carried out in this area so that the degradation will be on going and any other option will impinge on other wetlands which though in a degraded condition, have sufficient large native flora to facilitate a reasonably speedy return to their natural state.

Response

See comment 34.

- 36 The existing Safety Bay Road alignment follows a Causeway built up early this century along a natural causeway between the lakes Cooloongup and Walyungup, and does not cross lake Cooloongup.

Response

It is not conclusive that the existing Safety Bay Road alignment follows a natural causeway between Lakes Cooloongup and Walyungup.

- 37 The area extending south along the frontage of Mandurah Road from the existing Safety Bay Road is shown in the CER as Lake Cooloongup although only the main lake is thus shown on official maps. Known locally as Groves Swamp, it includes a separate small and valuable seasonal wetland which is connected to neither lake (Refer Figure 2). It is a reedy paperbark area on a blacksoil humus based mud base, similar to Baldivis Swamp, which bears no direct relationship to the limestone clay bases of either of the two major lakes. The sumpland then extends across the full frontage of Lots 328, 333, and 334 West, and still contains water and numerous feeding birds in mid December. Appendix C "Waterbird Data from RAOU's Scopewest Survey" presents a most misleading and erroneous picture of the true nature of this swamp which is a feeding, nesting and roosting area for hundreds of birds including blue crane, white heron, ibis, snowy egret, mountain and wood duck as well as long neck tortoise. Observations over the last 33 years, show that most fauna contact is with Lake Walyungup, for which it provides sumpland drainage. This is the area of which part is proposed to be filled under Option E for the proposed interchange as well as road resumption.

Response

The southern extension of Lake Coo loongup or Groves Swamp is quite different in terms of its hydrology, vegetation and habitats provided compared to the main body of Lake Coo loongup.

Appendix C shows that these results were obtained from only three site visits on 7.7.90, 1.10.90 and 31.7.91. Observations over 33 years would record a great deal more species than the five listed in Appendix C. The CER did not include a full list of bird species observed during fieldwork which are now shown below.

Listed in Appendix C	Noted in Question 37	Sighted during CER fieldwork near Groves
Pacific Heron	Blue Crane (White-faced Heron)	Australasia Grabe
White-faced Heron	White Heron (Little Egret)	Straw-necked Ibis
Black Swan	Ibis (Straw-necked Ibis)	White-faced Heron
Pacific Black Duck	Snowy Egret (Great Egret)	Aust. Shell Duck
Grey Teal	Mountain Duck (Aust. Shell Duck)	Dusky Moorhen
	Wood Duck (Maned Duck)	Pacific Black Duck
		Silver Gull

The southern tail of "Groves Swamp" is the most degraded section of the wetland and thus impacts from the road are likely to be less than for other options. The possible culverting of the existing Safety Bay Road passing through Groves Swamp along with stopping traffic will increase the biological and habitat value of the wetland. Restoring much of the degraded parts of the Swamp will also increase its biological value particularly as this will integrate with the existing stands of vegetation surrounding the central and northern parts of Groves Swamp.

- 38 It has been suggested by the Department of Planning and Urban Development that the whole of the ridgeland woodland area be designated Landscape Protection Area, yet Option E proposes to cut an ugly swathe through this area destroying some trees which are hundreds of years old as well as other younger tuart, jarrah, marri, wattle, banksia and sheoak which are growing up to replace them. From west to east this will present an ugly scar, from east to west it would be merely uninteresting, whereas it could provide a spectacular entry into Rockingham.

Response

The preferred option will involve a cutting and the destruction of vegetation. However it has been specifically sited so as to minimise these impacts.

- 39 It is noted that some additional protection is to be given from noise on the boundaries of Lot 331, though no mention is made of this in relation to other adjacent properties. In particular in relation to Lot 334, no mention is made of the noise from the proposed interchange which runs across the full frontage of the block, and will have the considerable force of the prevailing wind behind it for most of the time.

Response

The residence on Lot 334 is located some 50 metres from Mandurah Road, which, in the future, will be carrying significantly higher volumes of traffic than it currently does. Consequently traffic noise on Mandurah Road will increase irrespective of the extension of Safety Bay Road. However, during detailed design of the intersection the impacts on Lot 334 will be taken into consideration.

- 40 In terms of safety, the proposed alignment of Option E and especially the interchange, is too close to the existing Pike Road and will be a traffic hazard, with the potential for an estimated 63 000 traffic accidents per day.

Response

When Safety Bay Road has been extended Pike Road will carry very little traffic, serving mainly those who live on or near it. The distance between Pike Road and the new intersection will be of the order of 350 metres which is sufficient to provide safe driving conditions.

- 41 Section 4.8 states that Option E impacts on a very small area of degraded wetland. It is presumed that this refers to Baldivis Swamp which has in fact been described by naturalists as a well preserved wetland and is open only to native flora and fauna and is fenced off from all domestic use. It is known that Lots 334, 332 and 331 is an area where Southern Brown Bandicoots survive as well as wallabies, bats, kangaroos, possums.

Response

The degraded wetland referred to is on Lot 334 (West) being the southern end of Lake Coo롱gup or Groves Swamp. The quality of Baldivis Swamp is recognised and the route has been designed to minimise impacts on it. It is also acknowledged that Southern Brown Bandicoots, and other animals live in the area, and the routes were compared on their effects on fauna. The preferred option was identified as having the least impacts in this regard.

- 42 The CER indicates that this road will proceed and that the only decision which is to be made is the particular route. There is discontent with this situation, however, on the basis that the road will proceed, support it given to Option E as the least harmful to the environment. Clearly the impact of the either Option A, B, C, and D are totally unacceptable.

Response

The road has been planned and discussed publicly for the last 12 years in a wide range of documents.

- 43 Options E and D will have significant social impacts on land owners, including segregation from neighbours, increasing the likelihood of intrusion onto and possible damage of property, and loss of privacy and quiet enjoyment of the land.

Response

The social impacts of the preferred option are recognised and a number of steps are proposed to ameliorate impacts. These include consultation with landowners in preparing detailed designs and landscape plans and fencing of properties.

- 44 The EPA's acceptance of the CER without a scientific survey of the existing fauna is difficult to understand. Southern Brown Bandicoots have been observed in the vicinity of Baldivis Swamp on several occasions.

Response

CER's are the lowest level of environmental assessment and as such rely heavily on previous work, published or otherwise, with only limited fieldwork.

Baldivis Swamp and the wetland area to the north of it provide ideal habitats for the Southern Brown Bandicoot, with dense foliage and moisture. Movement between these habitat areas by the Bandicoot would be high where as movement to the open areas south of Baldivis Swamp is less likely. Hence Options A, B and C are likely to have a greater impact on the Bandicoot compared to Options D or E.

It is considered that the existing studies and fieldworks are adequate to understand the effect of the route alignments on fauna in the area. The potential impacts of the proposal don't justify a major fauna study of the locality.

- 45 An opinion has been formed that there is an ancient stream bed emanating from the south west corner of Lot 334 on the eastern side of Mandurah Road. There exists a small rock face with evidence of the collapse of a roof section. It appears that an underground stream flowed/flows from a small cave system, the area immediately in front of the rock face was filled to construct Mandurah Road, but the stream course can be easily followed on the west side of Mandurah Road. The stream bed parallels the road and is actually the southern end of Lake Coo loongup and would have been a major source of water supply to that lake as it diverts water away from Lake Walyungup. In the wet months water lies in the water course and water birds can be seen raising their families. Option E and its ancillary road works impinge directly on this subsystem. It also seems more than likely that this rockface, stream and cave would have been a significant aboriginal site.

Response

If this stream is a current source of water to Groves Swamp or Lake Coo loongup flow will not be altered as the preferred option will include culverting where it crosses the wetland. Investigations by professional archaeologists and ethnographers did not locate any Aboriginal sites in that vicinity.

- 46 The CER shows disregard for the safety of native fauna when stating in section 6.2 that protection of fauna will only be carried out after deaths have already occurred. Fauna crossing warning signs should be installed immediately. Placement of culverts would be of more practical help.

Response

The CER includes a commitment to culvert the road on construction. The suggestion to install fauna crossing warning signs at the time of the road's construction is noted and will be undertaken by the proponent.

- 47 The regulations protecting wetlands will be broken by the proposed filling of lots 334 west, 333 and 328 and also by the encroachment on Baldivis Swamp.

Response

The route does not impact on wetland areas as defined under the Environmental Protection Policy.

- 48 The central dune between lots 328 and 333 is show in the CER as 10m, however this should be 18m according to the official topographical maps, which is a considerable difference when road building.

Response

Figure 4.1 in the CER includes contours at 10 metre intervals. Close inspection will show that CER figure identifies that dune as 20 metres in height. The preferred route does not impact on that dune.

- 49 Open table drains are likely to add to the mosquito/midge problem which already exists in the area but which is now largely controlled by natural means, that is frogs and waterbirds. these will be frightened off by traffic in any but Options A and X.

Response

Open table drains are not likely to hold standing water for any significant length of time. Soil permeability is generally high and consequently stormwater will infiltrate or drain to detention basins. The area of standing water in table drains and detention basins will be insignificant when compared to the area of standing water in the locality.

- 50 A major worry for residents is the potential pollution of groundwater, the only source of water in the area.

Response

The existence of a new road is unlikely to increase the risk of groundwater pollution significantly.

- 51 Impact on hydrology as it affects seasonal wetlands is not minimal, as considerable filling is involved particularly on Lot 334 west.

Response

Filling on Lot 334 (West) will alter surface water flows in the immediate area. However the embankment will be designed and culverted to minimise these impacts and to allow surface water flows to remain as close as possible to the current situation.

- 52 Drainage facilities will be adequate for the roadworks, but then would deprive the wetlands of their natural runoff, and the seepage into Lake Walyungup.

Response

The drainage facilities will return water to the natural system. They will allow water to infiltrate to groundwater via detention basins. Lake Walyungup is a surface expression of groundwater and is considered a closed system and the proposed drainage system will provide for runoff within the catchment to be returned, via pollution control devices, to the system.

- 53 Motives in a revegetation program are laudable though it cannot replace 500 year old trees, nor can it replaced bulldozed paperbark swamps.

Response

It is acknowledged that mature trees will be lost. However, other route options would have involved loss of a larger number of mature trees.

- 54 As part of any approval for the construction of this road, there should be a recommendation that conditions are set that require the construction to be undertaken in such a way that additional damage to surrounding areas is not sustained. The Main Roads Department have procedures whereby contractors are required to meet stringent conditions in order to minimise damage to adjoining areas. The City of Rockingham should also be required to meet stringent construction conditions.

Response

The City of Rockingham undertakes to impose the same procedures adopted by Main Roads in ensuring that contractors minimise damage to adjoining areas.

ABORIGINAL ISSUES

- 55 Aboriginal sites are portrayed in a manner to substantiate Option E and not in an objective manner. An independent Aboriginal survey of the area including Option B and E by Messrs O'Connor and Quartermaine found no Aboriginal sites nor any objection whatsoever to the development of a road connection through from Eighty Road to Ennis Avenue. The Waugal was not considered to be relevant in this location, nor the association of the Waugal with water in these lakes. It is maintained that the association of the Waugal and water and the relative impacts of each option are portrayed in a misleading fashion - the highest impact associated with water. Any relative significance that is attributed to each route can not be substantiated.

Response

An independent ethnographic survey undertaken as part of the CER stated as its conclusion:

"All Aborigines consulted said there were no Aboriginal sites affecting the survey area. It is necessary to respect the wetlands as much as possible during the road development" (Tamora, 1992 p.10).

An Aboriginal informant consulted as part of the study specifically noted that all waterways are connected with the Waugal, sanctifying water as a divine source of life.

- 56 Option E should be excluded because Aboriginal elders have stated that an unrecorded campsite exists on Lot 335 where route E would encroach. The ethnographic report also noted the connection between the Waugal and wetlands and waterways in the area.

Response

The Aboriginal camp-site is located some 400 metres south of the preferred route. The preceding comment outlines the findings of the ethnographic study.

- 57 All options should be equivalent as regards archaeology/ethnography impacts, as all options cross water or in some degree intrude on wetlands. There are no known aboriginal sites in the area.

Response

The ranking of options took account of the advice of the professional ethnographer. It is acknowledged that options A, B, C and D all traverse water or wetland systems, however Option E has been designed to avoid the wetland systems and has been ranked accordingly.

COST

- 58 The costs quoted in the CER were for the construction of a single carriageway and earthworks for dual carriageways, no consideration was given to things such as staged development of intersections, providing appropriate sight distances, that is extra cutting, constructing an extra carriageway, and geotechnical complexities. If these matters are taken into account, it is estimated that the total cost of Option E in comparison with that of Option B would be approaching double, without considering land resumption costs.

Response

The CER details the factors that were included in the order of cost figures. It also noted that they should be regarded as a preliminary estimate.

Cost estimates are conceptual at this stage and can only be finalised after detailed design and geotechnical investigations. The costs of the preferred option and any

other option could be altered by a range of factors including the quantity of limestone encountered during excavation.

- 59 Five residences, not two as stated will be affected, and a 30% resumption of land is not considered insignificant.

Response

Table 4.3 of the CER indicated that two residences lie within 150 metres of the preferred route and four properties are affected. This referred to residences on Lots 334 and 331. It is also recognised that there are other homes near the route on Lot 332 and on Pike and Eighty roads, however it is considered that these will suffer fewer impacts as a result of the proposal.

It is also recognised that any loss of area from a private holding is significant for the property holder. The 30% figure was used as a criteria to determine the relative impacts of purchase on the remainder of the property.

- 60 No mention is made of compensation for loss of amenity and the devaluation of Lot 334 from the proposed interchange.

Response

The purchase procedures under the Metropolitan Region Scheme Act and Public Works Act may provide for additional payments over and above land value.

- 61 Resumption costs of \$20 000 per hectare is a considerable undervaluation, and no provision has been made for loss of future income, nor for future devaluation due to visual, noise, dust and emission pollution. Cost of rehabilitation and alteration to services has not been included, which seriously questions estimates as under any but Option A, it has been said that eventually the existing alignment of Safety Bay Road will be returned to parkland.

Response

The land costs quoted were a generalisation on land values in the area supplied by a valuer. The valuation and purchase procedure would take into account the productive capability of the land, future earning potential, improvements and other relevant issues.

CONSULTATION

- 62 Taylor Woodrow convened two meetings with residents of the Baldivis area, the Baldivis Ratepayers Association. The residents' wishes, particularly the owners and occupiers of Lot 331 and 334 were taken into account in the design, they supported Option B, considering that Option E had an adverse effect on the house on Lot 334. The second meeting of about 150 people in the Baldivis Hall overwhelmingly supported the development and the roadworks proposal.

Response

The owners of Lot 331 are supportive of the preferred option as it has less impacts on their property (see comments 28 and 29). The adverse impacts on Lots 332, 334 and 335 are acknowledged in the CER. As stated in response 27 there has been a far wider consideration of all the issues involved in the road extension than occurred previously.

- 63 The level of consultation that has taken place with parties directly affected by the proposed extension of Safety Bay Road has been entirely unsatisfactory. In our case, consultation has consisted of one ten minute telephone conversation with an employee of Mitchell McCotter throughout the entire planning process.

Response

The study team adopted an open approach to residents and contacted all of those directly affected by the proposal. Whilst some contacts were more prolonged than others there was also the opportunity for further discussion at any stage. The proponent also met with all directly affected landowners on site following the release of the CER. All landowners were given a copy of the CER free of charge to enable them to express their comments on the proposals.

- 64 There was consultation by Mitchell McCotter Consultants, and the opportunity to exchange views with them, however, during the public comment period, this CER does not appear to have been advertised in the local press, as is usual practice in matters of local interest, thus depriving of a voice any members of the general public who may have been interested.

Response

The CER was advertised in the local press, in the Weekend Courier on 21st November 1992 and copies of the CER were forwarded to affected landowners and local community associations and the major environmental community agencies.

- 65 The quality of the CER and the information supplied by the consultant is of an unusually high standard.

Response

The comment is appreciated.

ALTERNATIVES TO OPTIONS PROPOSED IN THE CER

- 66 The alignment should be moved further to the south to eliminate the need for destruction of the remaining fringing vegetation and enable revegetation of these fringes, and significantly reducing the potential impacts on the fauna.

Response

Moving the alignment to the south would decrease the impacts on vegetation and fauna, however it would increase the impacts on residences and private property. The consideration of route F(2) in the following section on alternative routes is indicative of this problem.

- 67 The alignment of the extension of Safety Bay Road should follow the existing Safety Bay Road alignment west of Mandurah Road and the alignment alongside Baldivis and Tamworth Hill Swamp's should be altered to allow a 200 metre buffer between the seasonal high water mark and the road edge. This alignment will negate most of the environmental impacts from the proposed extension of Safety Bay Road.

Response

The preceding comment applies.

- 68 The preferred option is that Safety Bay Road be retained on its present alignment up to Mandurah Road and that it not be extended east of Mandurah Road. Access to Baldivis should be provided by upgrading Pike and Clyde Roads.

Response

See following section on consideration of alternative routes.

- 69 There are two alternative routes which would be more environmentally acceptable for the connection of Safety Bay Road where it presently terminates at Mandurah Road, to Eighty Road, and its extension in the long term to the Kwinana Freeway. Figure 1 shows the proposed alternatives which have been labelled F and G, with G being the preferred option. These routes have only been proposed because the views of submitters opposing the proposal altogether may be disregarded by the proponents and their powers invoked to proceed with an eastern extension of Safety Bay Road despite those views..

Response

See following section on consideration of alternative routes.

- 70 Options E, D, B, and C all impact severely on System 6 land to the west side of Mandurah Road. This is unacceptable and could be avoided by utilising the current reserve (in the short term), as far as Mandurah Road, and creating an alternative route to the ones proposed on the east side of Mandurah Road. Options A, B, and C have the most severe impact in terms of visual, noise and atmospheric pollution and social impacts. These Options also impact severely on Lot 329 which remains as one of the only natural pieces of bushland unaffected by grazing, left in the Baldivis district. It is recommended that a variation on Option A, named Option X in Figure 2 be chosen.

This means that the existing Safety Bay Road alignment west of Mandurah road is retained, and preliminary work needs to be done to provide the interchange and link with the new section. The eventual aim would be a separated four lane highway

between Ennis Avenue and Mandurah Road, later to Eighty Road to be accomplished by the duplication of the existing road on the north side of the current alignment. Immediately to the west of Mandurah Road on the existing Safety Bay Road intersection there is a dangerous dip, with poor visibility. The duplicated section should be built up over culverts here to give better visibility, and also to minimise the depth and expense of any cutting used on the east side. The culverts and associated bunding would serve as access to the fauna between the two areas of wetland and swampland which lie either side of the existing natural causeway. In another ten years, it will be necessary and desirable to build a flyover at this point. Preliminary road building in this way would provide a takeoff point for such a flyover, and minimise future expense. Option X would take the route a little further north of the residence on Lot 331 and the prevailing southwest wind should provide natural assistance in minimising noise and nuisance to that property. The route eastwards from there would avoid the massive Tamworth Hill, avoid the major Tamworth Swamp, link into Clyde Road as planned in the Baldivis Structure Plan produced by Taylor Woodrow, and head towards Folly Road to provide the next link to the Freeway extension. Table 1 is a comparison matrix which has been amended to include Option X and which also includes allowances for rehabilitation and re-location of services costs.

Response

See following section on consideration of alternative routes.

- 71 Option A was envisaged as a road reserve in 1980, and Government land was acquired for the purpose to integrate with other Government purposes, and considerable studies were done. Option A meets all criteria as does Option X (refer Figure 2).

Response

See following section on consideration of alternative routes.

- 72 Of the options put forward in the CER, none really address the greatest impact on the environment, that being the impact on the status quo of local residents, their property and their lifestyle. Of the options proposed only options A and E are worthy of any consideration. It is recommended that Option F as shown in Figure 3 be considered. Option F is similar to Option E in that it has a minimal effect on the System Six recommendations, wetlands, flora and fauna, landscape, hydrology, archaeology and ethnography, and above all virtually no impact on private property or residences.

Option F incorporates the use of existing road reserves with very little exception, avoids the expense of resumption costs of private land, and avoids disruption to lifestyle and amenities. Option F is the longest route option and will involve a construction component possibly greater than the other options but this will be diminished by the fact that resumption and compensation costs are at a minimum. Table 2 shows the assessment of Option F in the comparison table using the ranking units determined by the consultants in the CER.

Response

See following section on consideration of alternative routes.

CONSIDERATION OF ALTERNATIVE ROUTES

1.0 INTRODUCTION

Four alternative routes were put forward in submissions. For convenience these have been labelled as per the submissions: F(1), G, X and F(2). A brief description of each of the route options is as follows.

- F(1)** This route follows the existing alignment of Safety Bay Road to its junction with Mandurah Road. East of Mandurah Road this route follows the boundary of Lots 327 and 329. It then turns south-east to cross Lot 330 diagonally, to a junction with Eighty Road near the northern boundary of Lot 331. The route then crosses Eighty Road to connect with the route options has indicated in the CER.
- G** Option G follows the same route as F(1) to the eastern boundary of Lot 327. From this point it turns north-east to cross Lot 326 and rejoin Eighty Road at the northern corner of Lot 326. From here the route crosses Lot 325 and then Lot 963 and Lot 921 for a future junction with the proposed freeway alignment.
- X** This route also uses the existing alignment of Safety Bay Road to Mandurah Road. It provides for Safety Bay Road to terminate at a T-junction on a realigned Mandurah Road just east of its present position. This realignment of Mandurah Road would then continue in a southerly fashion across Lot 329 before turning to the east to exit Lot 329 at its south-eastern corner. It follows the southern boundary of Lot 330 before turning south-easterly to a junction with Eighty Road near the northern boundary of Lot 330. On the eastern side of Eighty Road the route would continue to link with the previously determined alignment of the Safety Bay Road extension.
- F(2)** Route F(2) follows the preferred option as provided in the CER along the north-eastern shore of Lake Walyungup. However, it deviates to the south on Lot 333 and continues following the shore of Lake Walyungup across Lot 334 west before joining Mandurah Road at its junction with Pike Road. The route then follows the current alignment of Pike Road to the east before turning north-east across the corner of Lot 335 to follow the existing alignment of Eighty Road before turning east to join the previously determined route of Safety Bay Road.

These routes have been compared on the criteria used in the CER. They have also been reviewed for their engineering feasibility and for their impacts on regional planning. These two issues are dealt with in the following section.

2.0 ENGINEERING AND PLANNING ISSUES

A brief review has indicated that whilst each of the route options is likely to be feasible from an engineering construction point of view, they all raise a number of concerns on traffic management grounds. Option X would require traffic from Safety Bay Road to make a right hand turn onto the proposed new route to access both the Baldivis subdivision and in the longer term future the Kwinana Freeway. In the long term Safety Bay Road will be the dominant road in this area carrying significant volumes of traffic

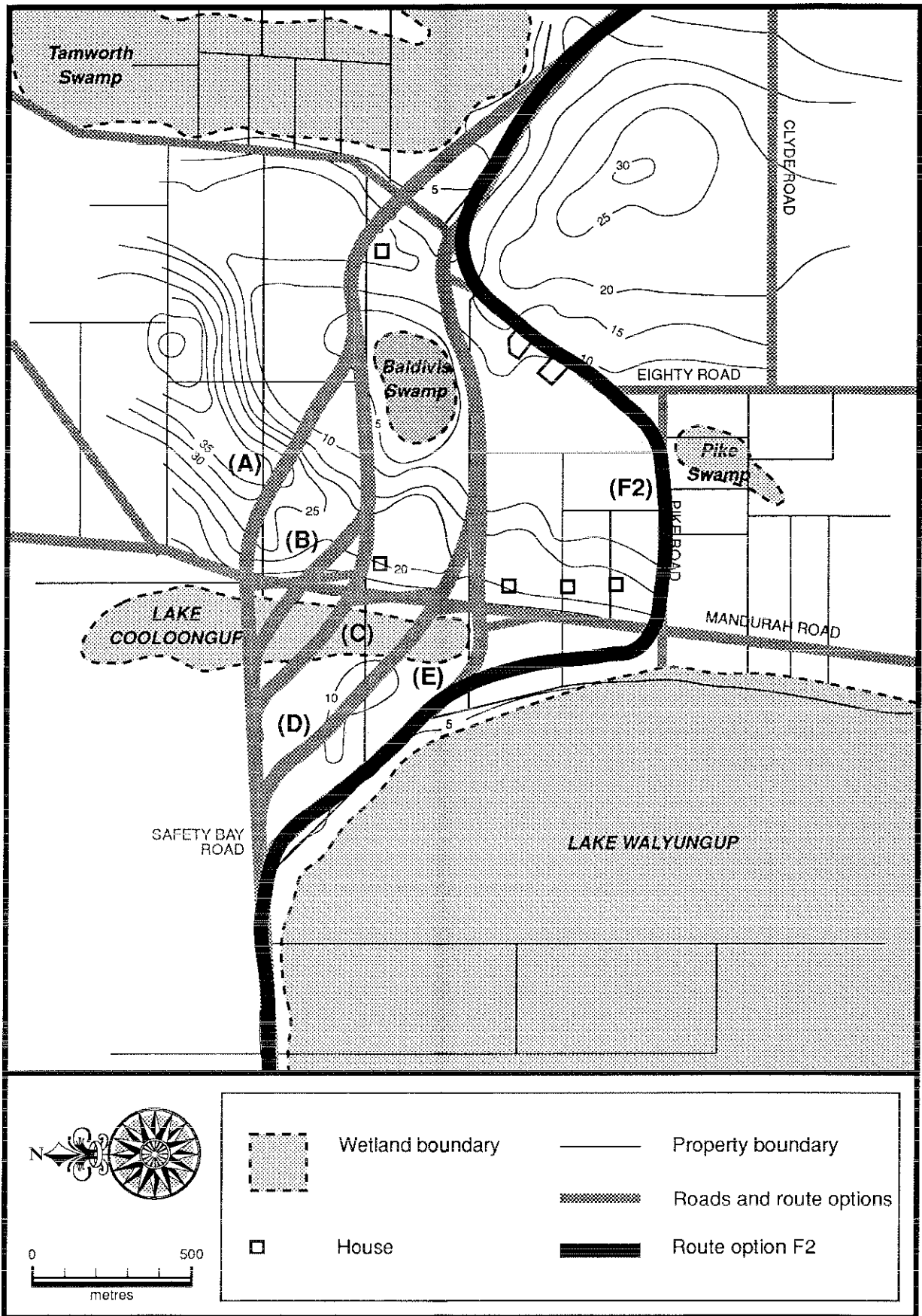


Figure 5: Submitters alternative route option F2.

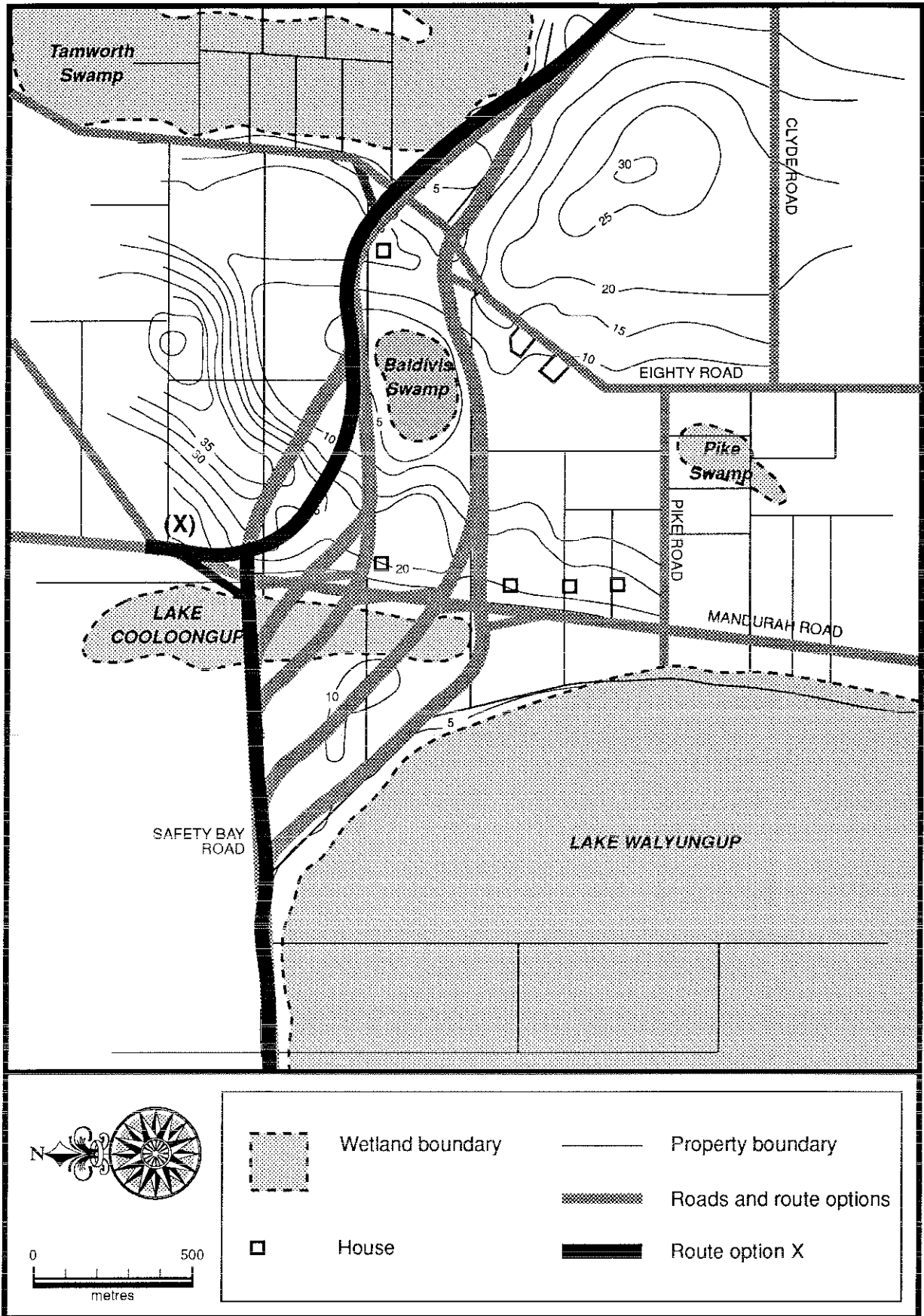


Figure 6: Submitters alternative route option X.

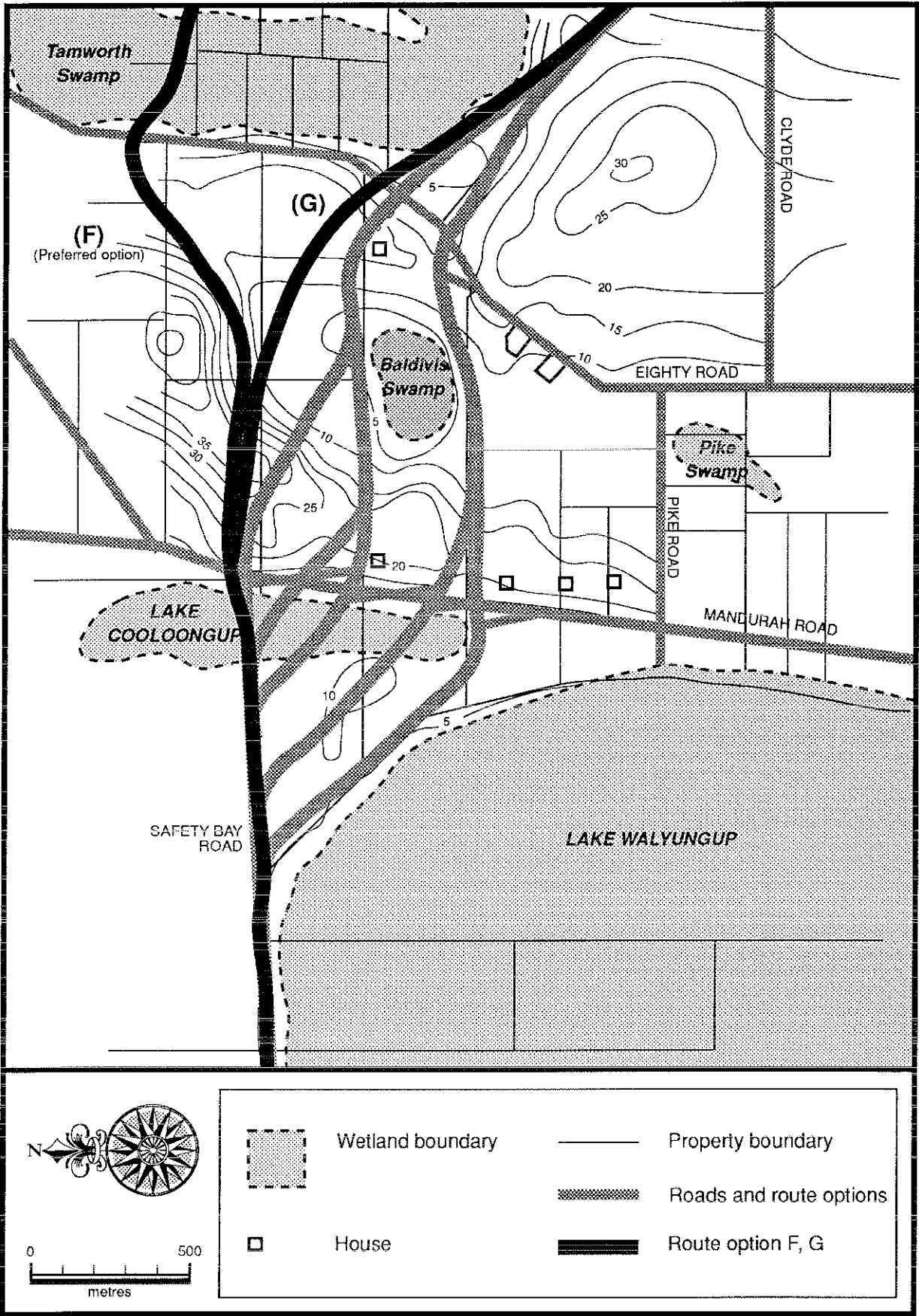


Figure 7: Submitters route options F and G.

from Rockingham to the freeway. Consequently the preferable alignment would provide for Safety Bay Road to act as the priority route with Mandurah Road acting as a subordinate route. This would infer that traffic on Safety Bay Road should not have to make turning movements in its journey towards the freeway. The alignment of Option X may provide for Safety Bay Road to act as a direct route, however the curve radii would need to be adjusted to ensure adequate horizontal geometry. In other words, the curve of the road may need to be increased, which would result in more cutting into the hill to ensure adequate road gradients and traffic sightlines. The intersection treatments of Option X are also undesirable from a traffic safety point of view.

Another factor which needs to be considered is the length of the route. Apart from construction costs, a longer route increases the operating costs of vehicles travelling the route. If vehicle costs are assumed to be 50 cents per kilometre and 15,000 vehicles per day use the route, each additional kilometre of length will increase aggregate running costs by over \$2.5 million per year. Option F(2) is approximately 750 metres longer than the preferred option.

Whilst all of the routes submitted provide linkages between Mandurah Road and the future extension of the freeway, the indirect nature of Options G and F2 are undesirable given the likely volume of traffic anticipated on the road once the freeway has been constructed. Route option G deviates to the north to some considerable extent. It would require an alteration to the design and plans for the freeway to provide for the freeway junction as proposed on Lot 921. In addition, the route is not well located to service any future development of the Baldivis and North Baldivis Structure Plan areas, particularly the southern portion of the Baldivis Structure Plan area. Similarly Option F2 is not well located to service the North Baldivis area.

3.0 COMPARISON OF ROUTES

The options have been assessed and compared on a similar basis to that used in the CER. It should be noted that Option G has only been considered as far as its junction with Eighty Road, and as route plans are not available costings have not been prepared. Table 1 provides a comparison between the preferred option and the four additional options.

The following discusses the results in relation to each additional option.

Option F(1)

Option F(1) would have limited additional effects on the wetlands because of its use of the existing causeway. However, it would impact on Lot 327 which is within the System 6 area, and it would require a cutting through the peak of Tamworth Hill which reaches 37 metres in height. This would have significant impacts on the landscape, and generate a cost penalty. It would involve the loss of vegetation on Lots 327 and 330 which were assessed as being in good condition and this has resulted in high impacts on both flora and fauna.

In addition this route would provide difficulties in achieving an acceptable intersection arrangement with Mandurah Road, and to do so may impact on the wetlands.

This route does not impact on any residence and only effects two private properties.

Option G

This option has similar impacts as Option F affecting System 6 on Lot 327 and cutting through the crest of Tamworth Hill. It would also provide some difficulties in achieving an acceptable intersection with Mandurah Road. It also impacts on areas assessed as having vegetation in good condition. It impacts on only one private property.

Comparative Criteria	Units *	E	F(1)	G	X	F(2)
Regulated wetlands - impacts	class	L	L	L	M	L
System Six areas - disturbance length	metres	1100	600	600	200	1600
- mgmt recommendations	class	M	M	M	M	M
Flora - impacts	class	L	H	H	H	L
Fauna - impacts	class	L	H	H	H	L
Hydrology - impacts	class	L	L	L	L	L
Landscape - impacts	class	L	H	H	H	L
Residences - no. of residences within 150m	number	2	0	0	1	6
Private Property - length through private property	metres	1100	800	900	600	1500
- no. of properties affected	number	4	2	1	2	5
Archaeology/ ethnography - impacts	class	L	L	L	L	H
Road Safety - impacts	class	L	M	M	M	L

L - Low Impact, M - Medium Impact, H - High Impact

Option X

Although this option uses the existing causeway it would require additional filling for intersection works on the northern side of the causeway. This would result in some detrimental impacts on the regulated wetlands. This option also impacts on Lot 327, being part of the System 6 area.

Although the route follows the topography, a cutting would be required to achieve a satisfactory alignment, and because this would be across the face of the ridge at its highest point, it would have significance adverse impacts on the landscape.

The route passes through Tuart-Jarrah-Marri forest assessed as being in good condition and would also impact on an area of wetland complex vegetation at the south-western boundary of Lot 330 that was considered to be in excellent condition, and is a likely habitat of the Southern Brown Bandicoot.

While the route generally has few impacts on private property it does impact on the northern sections of Lot 331 which is a concern to that landholder.

Option F(2)

This route avoids all areas of significant vegetation, and the regulated wetlands. It would also make use of an existing cutting at Pike Road and therefore have few landscape impacts.

The route does impact on a larger area of System 6 land, however, most of it is in a degraded state.

The major impacts of this route are on private property and houses. Pike Road has a road reserve which is about 20 metres wide. This would need to be widened to 40 metres and therefore would require the purchase of land on one or both sides of the road. Assuming land on the north side only was purchased five private properties would be affected. In addition this route passes within 150 metres of a number of houses including two west of Mandurah Road, two on Pike Road and two on Eighty Road. Four of these houses would be within 50 metres of the route and could be seriously affected.

4.0 REALIGNMENT OF PREFERRED OPTION ON LOT 331

Consideration has been given to a late submission suggesting that the alignment of the preferred option be altered to follow the southern boundary of Lot 331.

This is feasible in engineering terms, however to maintain adequate curve radii it would require relocating the alignment on the eastern side of Eighty Road onto private property to the south. This land is designated as part of the Taylor Woodrow site that is designated for urban development. The slight alteration to the road alignment can be readily incorporated into the detailed subdivision design for this position of the estate.

In environmental terms the alteration provides benefits in moving the route further away from the fringing vegetation of Baldivis Swamp through an area with fewer mature trees, and further from the house on Lot 331. It does however move the route closer to a house on Lot 2, Eighty Road, which is located 150 metres south of the southern boundary of Lot 331. Should the road be relocated to the north of the southern boundary it would be approximately an equal distance between the respective houses on Lot 331 and Lot 2. It would also allow the use of government reserve 32551 for intersection works and this would provide a saving in property purchase costs. It is recommended that the road alignment be amended to reflect this submission.

CONCLUSION

The CER has allowed for a full assessment of all the issues involved in the extension of Safety Bay Road. Option E has been demonstrated to be the safest route with the least impact on the wetlands and manageable impacts on the System Six area. The CER demonstrates that Option E has the least impact upon flora and fauna, hydrology, archaeology/ethnography of the respective options and it provides the greatest flexibility for intersection arrangements.

The CER acknowledged and the public comments confirmed that Option E has the least impact upon Lot 331 but the most impact upon Lot 334 primarily in terms of the intersection arrangement with Mandurah Road.

Four of the five alternative route options suggested during the public comment period have all been found to be undesirable on a range of traffic safety, landscape and environmental impacts. The alternative route option to align Option E to the northern side of the southern boundary of Lot 331 is endorsed as desirable.

On balance, therefore, it is considered that the modified Option E should remain the preferred option.

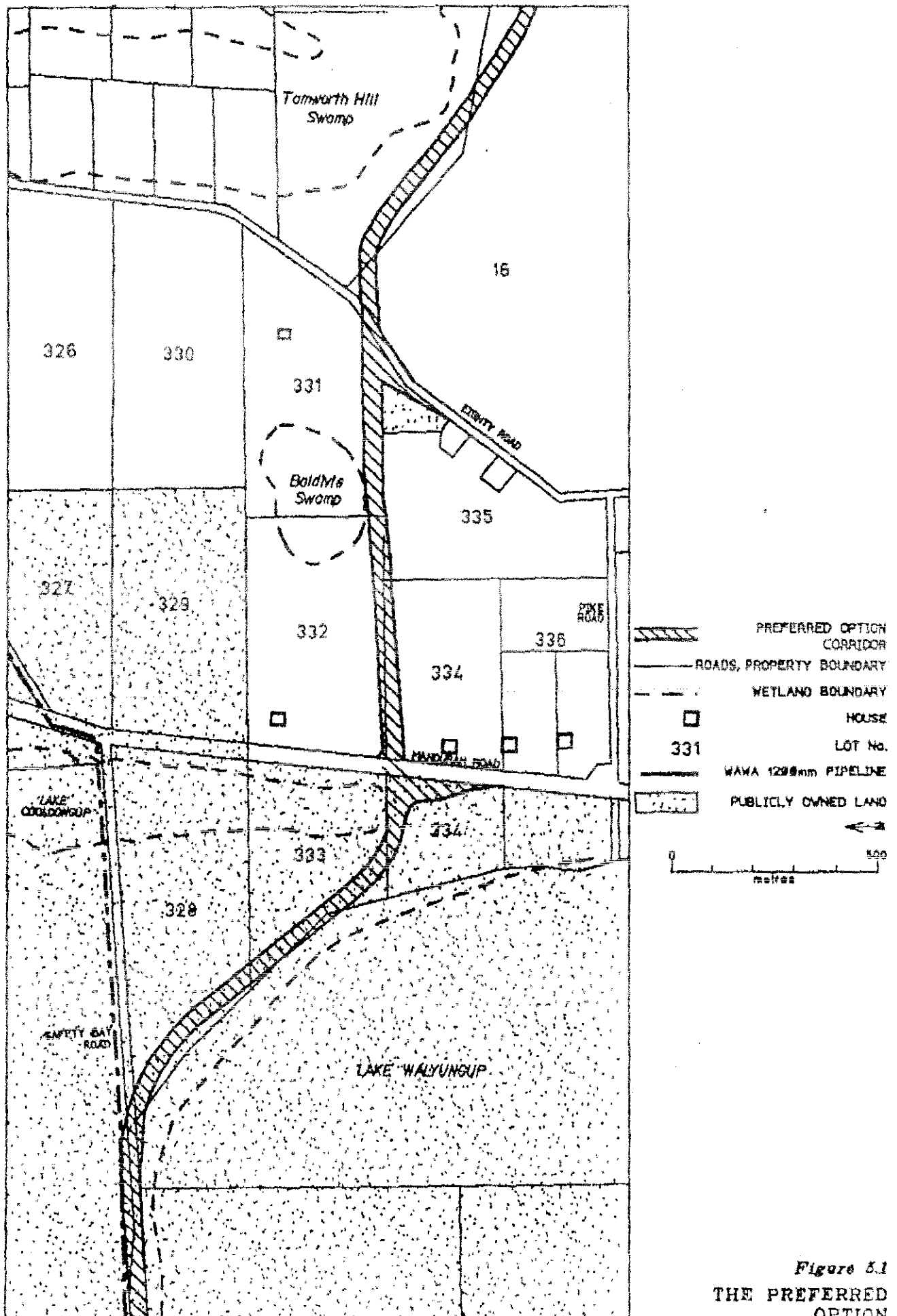


Figure 5.1
THE PREFERRED
OPTION