

**Realignment of West Coast Highway
at south City Beach: Change to environmental
conditions**

Town of Cambridge

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

**Environmental Protection Authority
Perth, Western Australia
Bulletin 786
July 1995**

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 3 August 1994.

Environmental Impact Assessment (EIA)

Process Timelines in weeks

Date	Timeline commences from receipt of full details of proposal by proponent	Time (weeks)
16/9/94	Proponent Document Released for Public Comment	
29/9/94	Public Comment Period Closed	2
7/10/94	Issues Raised During Public Comment Period Summarised by EPA and Forwarded to the Proponent	1
31/3/95	Proponent response to the issues raised received and provided detail of altered proposal.	25
20/7/95	EPA reported to the Minister for the Environment	15

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3. Summary of public submissions and the proponent's response.
4. Correspondence between the Department of Environmental Protection and Main Roads Western Australia.

Summary and recommendations

The Environmental Protection Authority has been requested, by the Minister for the Environment under Section 46 of the *Environmental Protection Act* 1986 - 1994, to report on proposed modifications to an approved option for the realignment of West Coast Highway at south City Beach.

In its original assessment of this proposal, the Environmental Protection Authority considered the potential impacts of the seven (7) options upon the values of the System Six recommended conservation areas known as the Swanbourne Beach and Rifle Range (M46) and Bold Park (M47) (Environmental Protection Authority, 1992 Bulletin 655).

The regional values of the Bold Park area have been determined by the Environmental Protection Authority as (Environmental Protection Authority 1994 Bulletin 744): the size of the M47 area, being comparable to Kings Park, is one of the largest remaining bushland remnants in the urban area of the coastal plain; the natural vegetation of the area is of comparatively high quality and includes areas of species at extremes of their known ecological range; the fauna, as with the vegetation, exhibit considerable diversity with bird species being particularly well represented; recreational use is based on regional rather than just local patrons; and because of the above, and the areas' location in the metropolitan area, its educational value is also rated highly. These areas represent open space of regional importance to the Perth metropolitan area because of their high conservation, recreation and education values. Moreover, there are few substantial areas of urban bushland remaining so close to Perth residential areas.

In the original assessment the Environmental Protection Authority recommended that four of the seven options were environmentally acceptable. One of those options also met the requirements of the Main Roads Western Australia for safe road geometry.

This report from the Environmental Protection Authority evaluates an alteration to one of the previously approved alignments (Option C). The Town of Cambridge distributed a document describing the environmental impacts of this new option, which is known as Modified Option C, to all 259 people and groups who made a submission to the Environmental Protection Authority's original assessment.

During this assessment the Environmental Protection Authority identified the main environmental issues requiring detailed consideration as:

- the effects on regionally significant flora and vegetation communities;
- the effects on fauna and their habitats; and
- the effects of landform changes on views and quietness within Bold Park.

Following receipt of advice from Main Roads Western Australia, regarding the requirements for safe road geometry in this area, the Town of Cambridge submitted modified design details for the realignment of the West Coast Highway. This modified alignment (referred to as Option H) reduces the impacts upon the significant environmental values of Bold Park, whilst meeting the requirements of the Main Roads Western Australia.

Option H has a minimum curve radius of 350 metres (see Figures 3 and 4). The alignment is also modified by the use of batter treatments to reduce the impact of Quindalup dune heath vegetation near the area opposite the existing intersection with Challenger Parade. Option H would provide an alignment between Option C (previously assessed 1992) and Modified Option C (described above).

Members of the public have not been provided with an opportunity to comment on Option H for the realignment of West Coast Highway. However, Option H presents an environmental improvement over Modified Option C and all members of the public have the opportunity to appeal against any of the contents of this report by the Environmental Protection Authority to the Minister for the Environment.

The Environmental Protection Authority's preference is for the realignment of West Coast Highway to avoid the high conservation value areas of Bold Park, to avoid impacts on populations of regionally significant vegetation and to protect the viewscape and quietness of

Bold Park. Encroachment within the Bold Park area should preferably be limited to the area bounded by the Bridle Trail which runs approximately parallel to the existing alignment of West Coast Highway.

The Environmental Protection Authority has previously advised Government of the environmental acceptability of an alignment (Option G) which meets these environmental objectives and which also meets the requirements of the Main Roads Western Australia and Department of Planning and Urban Development (Environmental Protection Authority, 1992 Bulletin 655). The Environmental Protection Authority's preference is for this option to be implemented.

The Environmental Protection Authority concludes that Option H prepared by Main Roads Western Australia and the Town of Cambridge following public consultation and modification through the assessment process, meets most of the above environmental objectives by placing the alignment as far to the west as possible, whilst maintaining road design standards. Furthermore, detailed design work in preparation for construction of an alignment based upon Option H could investigate additional measures to reduce the impact on the high conservation value areas of Bold Park. In addition, to compensate for any loss of regionally significant vegetation communities, the proponent can implement a rehabilitation programme for the redundant portions of the existing alignment to replace the significant populations which are lost. Species used in this rehabilitation should be sourced from locally indigenous populations and plantings located in appropriate places within a reconstructed landform.

Conclusion

The Environmental Protection Authority concludes that Option H is environmentally acceptable provided significant environmental management prescriptions are applied to ensure that the highly valued and environmentally significant portions of the environment are protected or replaced.

The proponent has made a number of environmental commitments within the text of the document which was distributed to members of the public. These commitments have been accepted by the Environmental Protection Authority in good faith. However, the commitments are not in a form which makes them amenable to environmental auditing. In addition, environmental commitments were made in the original proposal, which have now been superseded by the current assessment. Therefore, the Environmental Protection Authority has incorporated the intent of the proponent's environmental commitments within its draft recommended environmental conditions. It is intended that the proposed statement of environmental conditions will replace the previous statement in its entirety.

Recom- mendation Number	Summary of EPA recommendation
1	The Environmental Protection Authority concludes that Option H for the realignment of West Coast Highway at south City Beach is environmentally acceptable and recommends that an Environmental Management Programme should be prepared to for detailed design and construction methods, however, Modified Option C is environmentally unacceptable because it would cause significant environmental impacts on the regional environmental values of Bold Park, these impacts are avoided by other alignment acceptable to the Main Roads Western Australia (Options G and H).
2	The Town of Cambridge should prepare an Environmental Management Programme which addresses rehabilitation of disturbed areas and replacement of any loss of regionally significant flora or vegetation complexes within the portion of the existing alignment which will no longer be required.

1. Introduction and background

The Environmental Protection Authority and the Department of Environmental Protection have had a long history of involvement in this section of West Coast Highway (see Table 1 on the next page). In 1992 the Environmental Protection Authority assessed a number of options for the realignment of West Coast Highway between Rochdale Road and Helston Avenue at south City Beach. The Environmental Protection Authority reported to the Minister for the Environment in October of 1992 (Environmental Protection Authority, 1992 Bulletin 655). Environmental conditions for the approved alignments were set on 2 February 1993.

The Environmental Protection Authority has been requested, by the Minister for the Environment under Section 46 of the *Environmental Protection Act* 1986 - 1994, to report on proposed modifications to an approved option for the realignment of West Coast Highway at south City Beach. The Environmental Protection Authority is aware of the transport requirements which Main Roads Western Australia and the Town of Cambridge are seeking to resolve. The Environmental Protection Authority's responsibility is to advise Government regarding the significant environmental values in the region which may be impacted by the proposal.

Immediately following the release of this report there is a 14-day period when anyone may appeal to the Minister against the Environmental Protection Authority's report. Following the determination of any appeals, the Minister for the Environment will decide on any modifications to the environmental conditions.

1.1 Original proposed (1992)

The original proposal contained seven options for the realignment of West Coast Highway between Rochdale Road and Helston Avenue at south City Beach. This section of West Coast Highway has a record of accidents (Dames & Moore, 1992). Over the period 1 January 1985 to 15 November 1990, 57 accidents have been reported on the section of West Coast Highway between Rochdale Road and Helston Avenue, City Beach (Dames & Moore, 1992). Two accidents over this period have been fatal. A further fatal accident occurred on 10 January 1994.

The level of assessment was set at Public Environmental Review, because of the potential impact upon areas recommended for conservation in the Environmental Protection Authority's System Six report (Environmental Protection Authority, 1983b). The areas affected are known as the Swanbourne Beach and Rifle Range (Recommendation M46) and Bold Park (Recommendation M47), which were identified for their conservation, recreation and education values and their proximity to Perth.

1.2 Environmental Protection Authority's original assessment

In its original assessment of this proposal, the Environmental Protection Authority considered the potential impacts of the seven options upon the values of the recommended conservation areas. In particular, the impacts upon regionally significant flora associations, the habitats provided for fauna and the human use values of Bold Park, such as quietness and views (Environmental Protection Authority, 1992 Bulletin 655).

The Environmental Protection Authority considered that the environmental impacts arising from Options A, B, C and G were acceptable given that the areas affected by these alternative alignments were already substantially degraded by previous road works and because they minimised intrusion into Bold Park; thereby reducing impacts upon the quietness and views from within Bold Park. Option G (which was recommended as environmentally acceptable by the Environmental Protection Authority) also met the geometric design standards for road safety set by the Main Roads Western Australia.

Table 1. Environmental Protection Authority and Department of Environmental Protection involvement in the proposed Realignment of West Coast Highway, south City Beach.

Date	Project milestones	Elapsed time
March 1988	Environmental Protection Authority Report and Recommendations on Knightsbridge subdivision requests the City of Perth to refer the Realignment of West Coast Highway.	
May 1990	Proposal for a realignment of West Coast Highway referred to the Environmental Protection Authority.	2 years
September 1990	Environmental Protection Authority & City of Perth agree on a two stage process of referral : 1. Realignment of West Coast Highway and 2. Land use structure plan for Bold Park and Environs within the City boundaries. Guidelines for preparation of environmental impact statement issued.	3 months
6 March 1992	Public Environmental Review for Realignment of West Coast Highway at south City Beach released for 8 week public review period.	18 months
22 June 1992	Summary of public submissions issued to City of Perth for response.	7 weeks
2 October 1992	City of Perth response to summary of public submissions.	15 weeks
23 October 1992	Environmental Protection Authority Report and Recommendations Bulletin 655 released.	approx 3 weeks
22 December 1992	Single appeal on the EPA's Report and Recommendation determined.	approx 8 weeks
2 February 1993	Hon. Ministers for the Environment, Planning and Transport agree to Environment Conditions for the proposal and issue to City of Perth.	approx 8 weeks
9 June 1994	Referral of Request for Section 46 amendment to Environmental Conditions.	16 months

The Environmental Protection Authority recommended against the more eastern alignments (Options D, E and F) because they would have significant impacts upon the regional park values, and the highly valued flora, fauna and human use values of this area. In addition, an alternative alignment acceptable to Main Roads (Option G) avoided these severe impacts. The Environmental Protection Authority concluded that Options D and F would result in destruction of a large portion of the Quindalup Dunes within Bold Park and associated high quality vegetation. Option E would severely impact upon the value of Bold Park as a large reserve,

causing unacceptable threats to the maintenance of the rich and diverse reptile and bird fauna of Bold Park, and intrude upon the quietness and views of the bushland. No strategies were developed during the environmental impact assessment process which would adequately manage these impacts.

1.3 Environmental conditions on the original proposal

In February 1993, the Ministers for Environment, Transport and Planning agreed upon the Environmental Conditions by which this proposal could be implemented. The environmental conditions set in 1993, by the Minister for the Environment, reflect the Environmental Protection Authority's advice regarding the environmental acceptability of the realignment options. The conditions allow Options, A, B, C or G to be implemented, subject to the proponent's commitments including detailed alignment design and construction plans once approved by the Minister for the Environment.

1.4 Proposed changes to the environmental conditions

The Environmental Protection Authority's original assessment identified a number of realignment options which were environmentally acceptable, including one which met the requirements of Main Roads Western Australia (Option G). Because of the need for substantial earthworks on the dune to the west of the existing alignment of West Coast Highway there was a higher cost for Option G. Due to financial constraints, the Town of Cambridge requested that the Minister for the Environment consider an alteration to another of the previously approved alignments (Option C). Option C was assessed by the Environmental Protection Authority in 1992 and considered to be environmentally acceptable. Option C was prepared by Sinclair Knight & Partners for the Friends of Bold Park Bushland Inc.

The alignment submitted to the Minister for the Environment for consideration in 1994, and presented in the Town of Cambridge's documentation supporting the request for a Section 46 amendment to the approved Environmental Conditions, is referred to in this report of the Environmental Protection Authority as 'Modified Option C' (Figures 1 and 2). Modified Option C has a curved geometry with a 400 metre minimum radius. This alignment option would be located to the east of the previously assessed Option C.

The proponent has made a number of new environmental commitments within the text of the document which was distributed to members of the public in support of this Section 46 amendment. These commitments have been accepted by the Environmental Protection Authority in good faith. However, the commitments are not in a form which makes them amenable to environmental auditing. Therefore, the Environmental Protection Authority has incorporated the intent of the proponents environmental commitments within its draft recommended environmental conditions (Section 6).

1.5 The proponent

At the time of the original environmental assessment by the Environmental Protection Authority (Environmental Protection Authority, 1992 Bulletin 655) and the setting of Environmental Conditions by the Minister for the Environment, the proponent was the City of Perth. As a result of the *City of Perth Restructuring Act 1993*, the proponent is now the Town of Cambridge. The Environmental Protection Authority understands that Main Roads Western Australia will assume administrative control for this portion of West Coast Highway on June 1 1995. Therefore, any realignment of West Coast Highway in this area will be constructed by the Main Roads Western Australia. Main Roads Western Australia will be identified as the proponent under the provisions of Section 38(7) of the *Environmental Protection Act 1986 - 1994*.

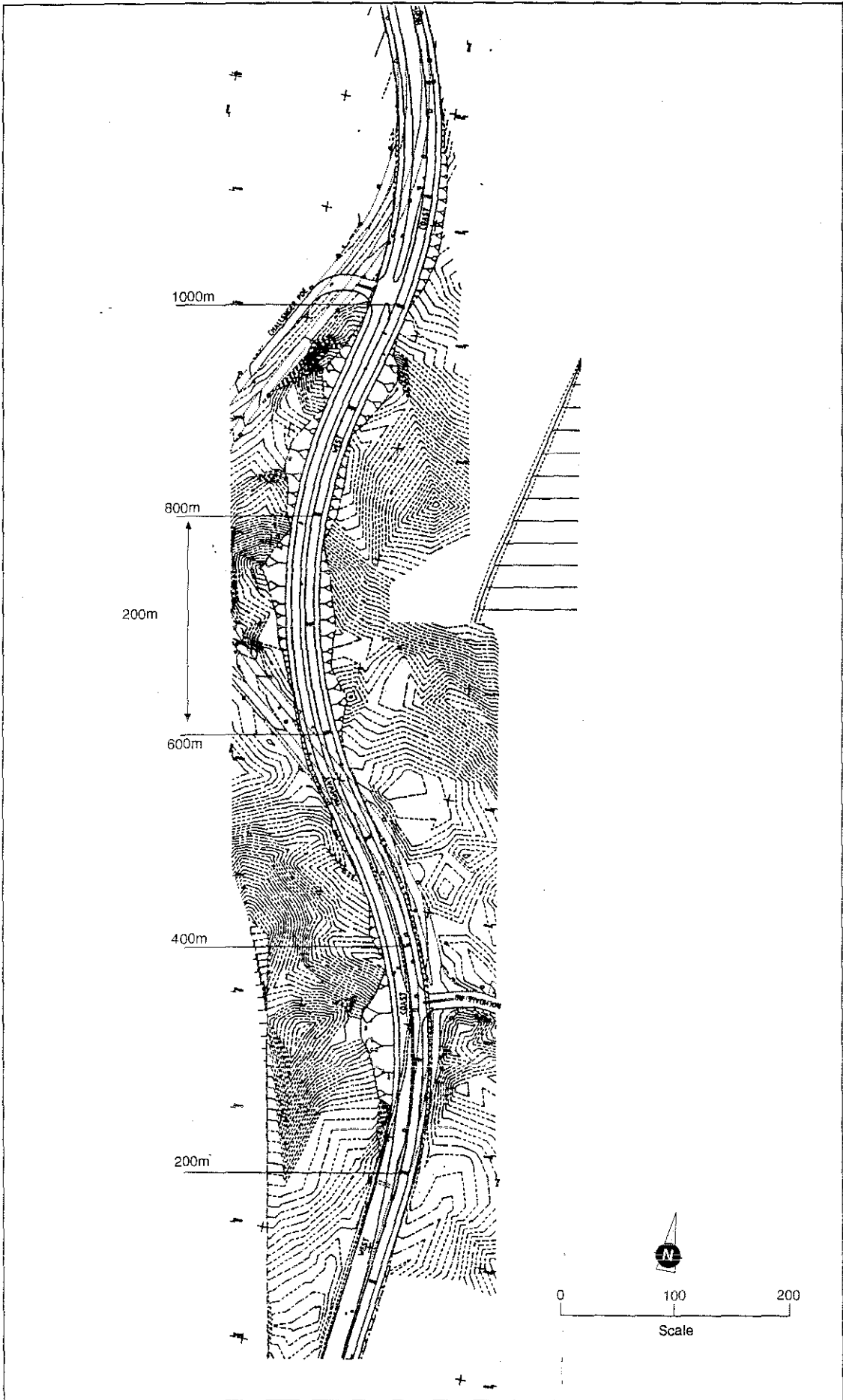


Figure 1. West Coast Highway alignment Modified Option C. Source: Dames and Moore (1994).

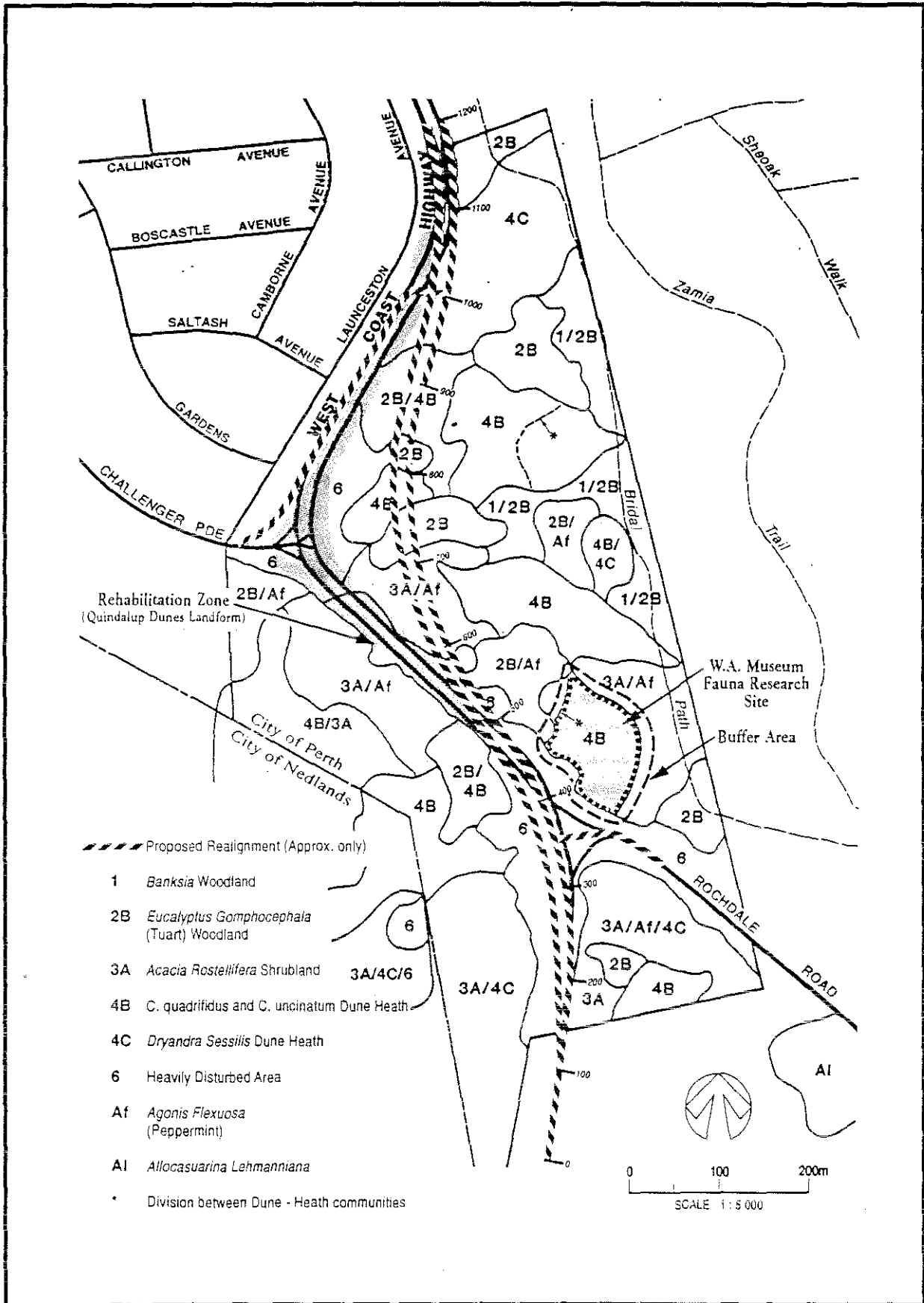


Figure 2. Vegetation of the Study area indicating alignment of Modified Option C. Source Dames and Moore (1994).

1.6 Structure of the report

This document has been divided into 6 Sections.

Section 1 describes the historical background to the proposal and its assessment, briefly describes the proposal (more detail is provided in the proponent's document supporting the request for a Section 46 amendment), and outlines the structure of this report. Section 2 explains the method of assessment and provides an analysis of public submissions.

Section 3 sets out the evaluation of the key environmental issues associated with the proposal. In each sub section, the objectives of the assessment is defined, the likely effect of the proposal, the advice to Environmental Protection Authority from submissions, the proponents' response to submissions. Then the adequacy of the response by the proponent is considered in terms of project modifications and environmental management commitments in achieving an acceptable outcome. The Environmental Protection Authority analysis and recommendations with respect to the identified issues are contained in this section. Where inadequacies are identified, recommendations are made to achieve the environmental assessment objective.

Section 4 summarises the conclusions and recommendations. Section 5 describes the recommended environmental conditions. References cited in this report are provided in Section 6.

2. Environmental impact assessment method

2.1 Steps in the method of assessment

The purpose of the environmental impact assessment is to determine whether a proposal is environmentally acceptable or under what conditions it could be environmentally acceptable. In this particular case, the proponent is requesting changes to Environmental Conditions which have previously been set.

The administrative procedures for this Section 46 amendment processes are defined in Table 2. Table 2 also indicates the timelines for each step of the environmental impact assessment process undertaken for this proposal.

The first step in the method is to identify the environmental issues to be considered. A list of topics (or possible issues) is identified by the Environmental Protection Authority through the preparation of guidelines which are referred to relevant agencies for comment prior to being finalised.

In the next main step these topics are considered by the proponent in the document supporting the Section 46 amendment request, both in terms of identifying potential impacts as well as making project modifications or devising environmental management strategies.

The document supporting the Section 46 amendment request is checked to ensure that each topic has been discussed in sufficient detail by the proponent prior to release for government agency and public comment. The submissions received are summarised by the Department of Environmental Protection on behalf of the Environmental Protection Authority and this process can add environmental issues which need to be evaluated in terms of the acceptability of potential environmental impact.

Proponents are invited to respond to the issues raised in submissions. Appendix 2 contains a summary of the issues raised in submissions and the proponent's response to those issues. A list of submitters appears as Appendix 3. Sixty two submissions were received by the Environmental Protection Authority, including individual written submissions from 57 members of the public and five community interest groups.

This information, namely the Guidelines, the proponent's document, the submissions and the proponent's response, is then subjected to analysis for environmental acceptability. For each environmental issue, an objective is defined and where appropriate an evaluation framework identified.

Table 2. Section 46 amendment process for the assessment of the proposed changes to the Environmental Conditions for the 'Realignment of West Coast Highway at south City Beach'.

Action	Date	Responsibility
Referral of Section 46 amendment	9 June 1994	Town of Cambridge
Advertisement of Section 46 amendment	18 June 1994	Environmental Protection Authority
Preparation of Guidelines for assessment	1 July 1994	Department of Environmental Protection
Preparation of documentation for assessment	15 September 1994	Town of Cambridge
Distribution of assessment documentation to public	15 September 1994	Town of Cambridge
Submissions received from public	16 September 1994 to 29 September 1994	Environmental Protection Authority
Summary of public submissions forwarded to proponent	7 October 1994	Department of Environmental Protection
Environmental Protection Authority site visit	24 October 1994	Environmental Protection Authority
Advice regarding geometric design standards received from Main Roads Western Australia	2 February 1995	
Response to public submissions	23 March 1995	Town of Cambridge
Proponent provided detail of altered proposal	31 March 1995	Town of Cambridge
Publish report to Minister for the Environment	20 July 1995	Environmental Protection Authority

The expected impact of the proposal, with due consideration to the commitments to environmental management made in the text of the document supporting the Section 46 amendment request, is then evaluated against the assessment objective. The Environmental Protection Authority then determines the acceptability of the impact. Where the proposal, as defined by the proponent has unacceptable environmental impacts, the Environmental Protection Authority can either advise the Minister for the Environment against the proposal proceeding or make recommendations to ensure the environmental acceptability of the proposal.

In its original assessment for this proposal, the Environmental Protection Authority stated that it will give advice on environmental issues alone (Environmental Protection Authority, 1992 Bulletin 655). The Environmental Protection Authority maintains this position. Determination of the appropriateness of any given option in regard to geometric design standards for road safety must be made by the Town of Cambridge in consultation with Main Roads Western Australia.

Limitation

This evaluation has been undertaken using information currently available. The information has been provided by the proponent through preparation of the Consultative Environmental Review document (in response to guidelines issued by the Environmental Protection Authority), by Department of Environmental Protection officers utilising their own expertise and reference material, by utilising expertise and information from other State government agencies,

information provided by members of the public, and by contributions from Environmental Protection Authority members.

The Environmental Protection Authority recognises that further studies and research may affect the conclusions. Accordingly, the Environmental Protection Authority considers that if the proposal has not been substantially commenced within five years of the date of this report, then such approval should lapse. After that time, further consideration of the proposal should occur only following a new referral to the Environmental Protection Authority.

2.2 Public submissions

This proposal was referred to the Environmental Protection Authority on 9 June 1994, and has been assessed under the provisions of Part IV (Section 46) of the *Environmental Protection* 1986 - 1994. The assessment follows the administrative procedures detailed in the 'environmental impact assessment administrative procedures' (Environmental Protection Authority, 1993). Timelines for the proposal are shown in Table 2.

To assist public consideration of the proposed altered alignment, the Town of Cambridge made available a document discussing the environmental impacts of the proposed Modified Option C. The Town of Cambridge delivered a copy of this document to each of the 259 individuals or groups who made a written submission during the public review period for the original assessment conducted by the Environmental Protection Authority in 1992. Members of the public were provided with a two week period in which to make a submission to the Environmental Protection Authority on the modified proposal.

Sixty two submissions were received by the Environmental Protection Authority, including individual written submissions from 57 members of the public and community interest groups. Submissions received by the Environmental Protection Authority were within the following categories:

- 57 from individual members of the public; and
- 5 from groups and organisations.

The principal issues of concern raised in public submissions included:

- Regionally significant flora;
- fauna and their habitats;
- physical (landscape) effects of the project;
- impacts upon the human use values of Bold Park; and
- other issues.

A list of submitters is included as Appendix 2. Appendix 3 provides the Department of Environmental Protection's summary of the submissions and responses from the proponent with the assistance of their consultants and Main Roads Western Australia.

The Environmental Protection Authority has considered the submissions received (including late submissions) and the proponent's response as part of the assessment of the proposal.

Biophysical impacts

- relationship of the proposal to the System Six recommendations for the area;
- impacts on regionally significant vegetation communities and flora;
- impacts on fauna and their habitats;
- effects of landform changes on views and quietness within Bold Park; and
- proposed environmental management for the proposal;

Social surrounds

- noise impacts of the existing road on residents in south City Beach; and

- construction of an underpass to form a pedestrian link between the Perry Lakes and the Ocean;

Other issues

- justification for the proposal / safety standards;
- the Section 46 amendment process (lack of time to respond), and information contained in the proponent's document supporting the Section 46 amendment request; and
- other matters not directly related to the Section 46 request for amendment to the Environmental Conditions.

The Environmental Protection Authority has considered the submissions received (including late submissions) and the proponent's response as part of the assessment of the proposal.

2.3 Synopsis of public submissions

Submissions generally acknowledged the need to improve road safety at this location, but many indicated that alternative methods for improving safety should be adopted rather than requiring such a significant realignment with severe impacts upon the high conservation values of Bold Park.

Biophysical impacts

Relationship of the proposal to the System Six recommendations for the area

Many submissions restated the conservation values of the area affected by the proposal and further fragmentation and encroachment into the Bold Park bushland. It was also identified in many submissions, that the area affected by the proposal, whilst disturbed, provides a buffer from encroachment of weeds and other human disturbance to the main portion of Bold Park.

The System Six report to Government provides a policy base for the Environmental Protection Authority with regard to identifying areas of conservation value in and around the Perth Metropolitan area. The recommendations of the System Six report are taken into account by the Environmental Protection Authority in its evaluation of this proposal in Section 3.

Impacts on regionally significant vegetation communities and flora

Many submissions focussed upon the representativeness of the Quindalup vegetation complex and flora of regional significance indicating that, in their opinion, the road will have significant impacts on these values which should be avoided. Submitters noted that the vegetation associations in the area of the Quindalup Dunes are different to those found on Quindalup soils (where soil is used as the only criterion). References in the document supporting the request for a Section 46 amendment referred to other locations where the same flora species can be found (such as Mount Claremont Bushland, Port Kennedy, Secret Harbour and the coastal portions suggested for inclusion in Yalgorup National Park). Members of the public considered these comments to be misleading because the areas mentioned are not securely set aside for conservation.

Impacts on fauna and their habitats

Submissions were also concerned about the impacts of the proposal upon reptile and bird fauna and their habitats. The Environmental Protection Authority's evaluation of the impacts on fauna and their habitats is contained in Section 3.1 of this report.

Effect of landform changes on views and quietness within Bold Park

Submitters expressed concern about the effects of cutting into the 30 metre high dunes in the south western corner of Bold Park because it may add more visual and noise intrusion into Bold Park. The proponent responded that, while no visual analysis undertaken, the road realignment will be in a cut within dunes for most of its length which will reduce noise and visual impacts within Bold Park. Landscaping proposed to restore some measure of the original landscape character.

The Environmental Protection Authority's evaluation of the impacts on landform and views and quietness within Bold Park is contained in Section 3.3 of this report.

Proposed environmental management for the proposal

Submitters suggested that earthworks for the project should be contained within the limits of the embankment batters. Submissions also commented on the need to identify areas for storage of equipment, stockpiling of materials as well as specifying weed and disease controls and the need for quality supervision of the project. Rehabilitation of the unused portion of the existing alignment was identified as an important requirement, particularly in relation to the use of locally indigenous seed and cuttings. A further concern to submitters was the techniques to be used for the rehabilitation of the batter slopes of the cut and fill areas, especially in regard to ensuring that vegetation can be planted in those areas and that they are not visually intrusive. The need for environmental management for the implementation of the project is taken into account by the Environmental Protection Authority in its evaluation of this proposal in Section 3.

Social surrounds

Impact of noise from existing road on residents in south City Beach

The impact of noise from the existing road on residents was raised as an issue by local submitters. Some members of the local community indicated that Modified Option C was preferred to other alignments which were previously found to be environmentally acceptable (including Option G), because it moved the road further away from their residences, thus reducing the local noise impacts. Suggestions were made that a quieter road surface material should be used and that drains and service access points should be at surface level.

The Town of Cambridge acknowledged that the location of Modified Option C would provide a quieter noise environment for some local residents. The matter of construction materials and detailed design are issues to be dealt with at detailed design stages and the points raised would be considered at that time.

The Environmental Protection Authority is aware that the residential areas of south City Beach are located west of the existing alignment of West Coast Highway. No residences between Challenger Parade and Helston Avenue front onto West Coast Highway. There is a verge and a service road separating the residential area from the existing alignment of West Coast Highway. All of the realignment options move the West Coast Highway further away from residences located in south City Beach. The Environmental Protection Authority notes that this will provide a benefit which is important to the local community. Additionally, in detailed design and construction further noise reducing mechanisms can be incorporated; *e.g.* noise attenuation features such as earth bunds. Since the proposal improves the local noise environment, the Environmental Protection Authority considers that the details of construction can be left to the proponent and does not need to be considered further in this report.

Construction of an underpass to link Perry Lakes and the Ocean

Public submissions noted that the realignment of the West Coast Highway provides an opportunity for the inclusion of a pedestrian and equine underpass. Submitters commented that its inclusion during construction would not involve a large additional cost, and would provide unrestricted access from Perry Lakes, through Bold Park and then through preserved M46 bushland west of the Highway to the beach.

The Town of Cambridge agreed with this suggestion, commenting however, that the inclusion of the underpass would be subject to need and general support for such a facility and the availability of funds.

The Environmental Protection Authority also notes that the provision of an underpass can provide additional recreational benefits to the community using the Bold Park and coastal recreation areas. However, the inclusion of an underpass does not significantly affect the proposal in environmental terms and should be negotiated between the Main Roads Western Australia, Town of Cambridge and the Kings Park Board. This issue is therefore not considered further in this report of the Environmental Protection Authority.

Other issues

Justification for the proposal / safety standards

A number of submissions questioned why interim measures such as safety barriers and additional warning signs were not in place already. One substantial submission identified the need for studies to define the speed environment before deriving the appropriate geometric standards for road safety.

In relation to the justification for the proposal the Environmental Protection Authority considers that the case is well established. Indeed, the Authority has long been involved in seeking to complete due process to resolve the safety problem at this location (see Tables 1 and 2). Responsibility for determining the need and priority of road maintenance is a matter for Main Roads Western Australia, the Ministry for Planning and local authorities. This issue is therefore not further investigated in this report.

Section 46 amendment process and proponent's document

Issues raised in public submissions regarding the information contained in the proponent's document, the Section 46 amendment process have been adequately dealt with in the responses to public submissions provided by the proponent and will not be further commented upon by the Environmental Protection Authority in this report (see Appendix 3). In addition, members of the public have the right to appeal any matters raised in this report.

Other matters

Submitters raised a number of sundry issues which were not directly related to the project being considered for assessment. Issues such as funding, the construction of the proposed Stephenson Highway (or Western Suburbs Route), reservation of the Mount Claremont Bushland are not directly related to the environmental acceptability of the modified proposal, or are the responsibility of other agencies and have therefore not been considered in this report.

2.4 Advice from Main Roads Western Australia

Following receipt of the summary of submissions, the Town of Cambridge sought advice from Main Roads Western Australia regarding questions of geometric design standards for road safety which were raised by the public (see Appendix 3). The Town of Cambridge indicated to the Department of Environmental Protection that the Main Roads Western Australia were undertaking a review of geometric design standards for this road and that the responses to submissions would be delayed as a consequence. The Department of Environmental Protection then requested that Main Roads Western Australia provide advice to the Environmental Protection Authority regarding the appropriate geometric standards for road safety resulting from this review. The Department of Environmental Protection's correspondence and replies from Main Roads Western Australia appear in Appendix 4. Main Roads Western Australia responded to questions from the public regarding the geometric design criteria as follows (see Appendix 3 for full response):

"(T)he advocated 400m radius minimum curve is not a holy dictum in the road engineering profession."

"As the AUSTRROADS 1989 'Guide to the Geometric Design of Rural Roads' puts it "The practise of good road design, especially under constraints, involves judgement as well as calculation. It involves compromises between conflicting goals. Experience assists the designer to arrive at an appropriate compromise that cannot be met by a system of mathematical rules. Therefore, the Guide gives range of values within which the designer has reasonable flexibility to produce an appropriate design for any specific problem, while retaining a reasonable overall level of uniformity."

Following public consultation, Main Roads advised both the Town of Cambridge and the Department of Environmental Protection that 'to minimise the impact on Bold Park a radius of 350 metres is acceptable' (Main Roads Western Australia, 1995).

2.5 Modified proposal following public consultation

Following receipt of advice from Main Roads Western Australia, regarding the requirements for geometric design standards for road safety in this area, the Town of Cambridge submitted modified design details for the realignment of the West Coast Highway. This modified alignment reduces the impacts upon the significant environmental values of Bold Park, whilst meeting the requirements of the Main Roads Western Australia. To assist the clarity of this Environmental Protection Authority report, the most recently modified alignment (shown in Figures 3 and 4) shall be referred to as Option H.

Option H, which is shown in Figures 3 and 4, has a minimum curve radius of 350 metres. The alignment is also modified by the use of stepped batter slopes to reduce the impact on Quindalup dune heath vegetation in the area opposite the existing intersection with Challenger Parade. Option H provides an alignment between Option C (previously assessed 1992) and Modified Option C (described above).

Members of the public have not been provided with an opportunity to comment on Option H for the realignment of West Coast Highway. However, Option H presents an environmental improvement over Modified Option C and all members of the public have the opportunity to appeal against any of the contents of this report by the Environmental Protection Authority to the Minister for the Environment.

The Environmental Protection Authority will provide advice regarding the environmental acceptability of both Modified Option C and Option H in this report. As indicated previously, the Main Roads Western Australia in consultation with the Town of Cambridge are the appropriate authorities to determine geometric design standards for road safety, the Environmental Protection Authority will not comment on that issue.

3. Evaluation of key environmental issues

The Environmental Protection Authority has considered the issues raised during the environmental impact assessment process including matters identified in public submissions. Table 3 summarises the topics raised, the characteristics of the proposal and the comments received in order to identify issues warranting evaluation. The Environmental Protection Authority has evaluated the key environmental topics arising from this proposal, based on existing information and advice from other Government agencies, viz:

- the effects on regionally significant flora and vegetation communities;
- the effects on fauna and their habitats; and
- the effects of landform changes on views and quietness within Bold Park.

3.1 Effects on regionally significant flora and vegetation communities

3.1.1 Objective

The Environmental Protection Authority's objective is to ensure that, where possible, impacts upon regionally significant flora and vegetation communities are avoided.

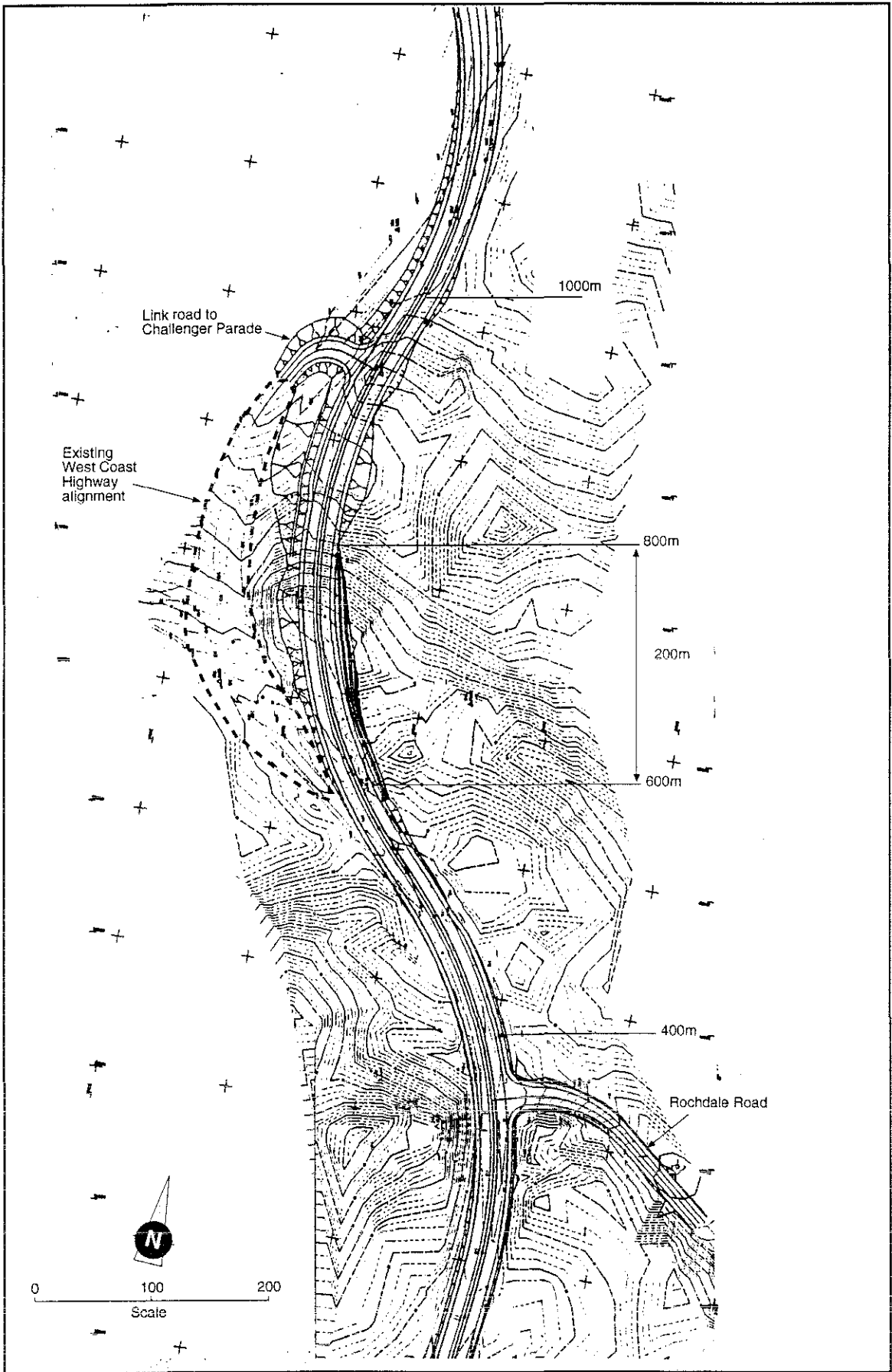


Figure 3. West Coast Highway alignment Option H; showing alignment in relation to contour mapping and existing highway.

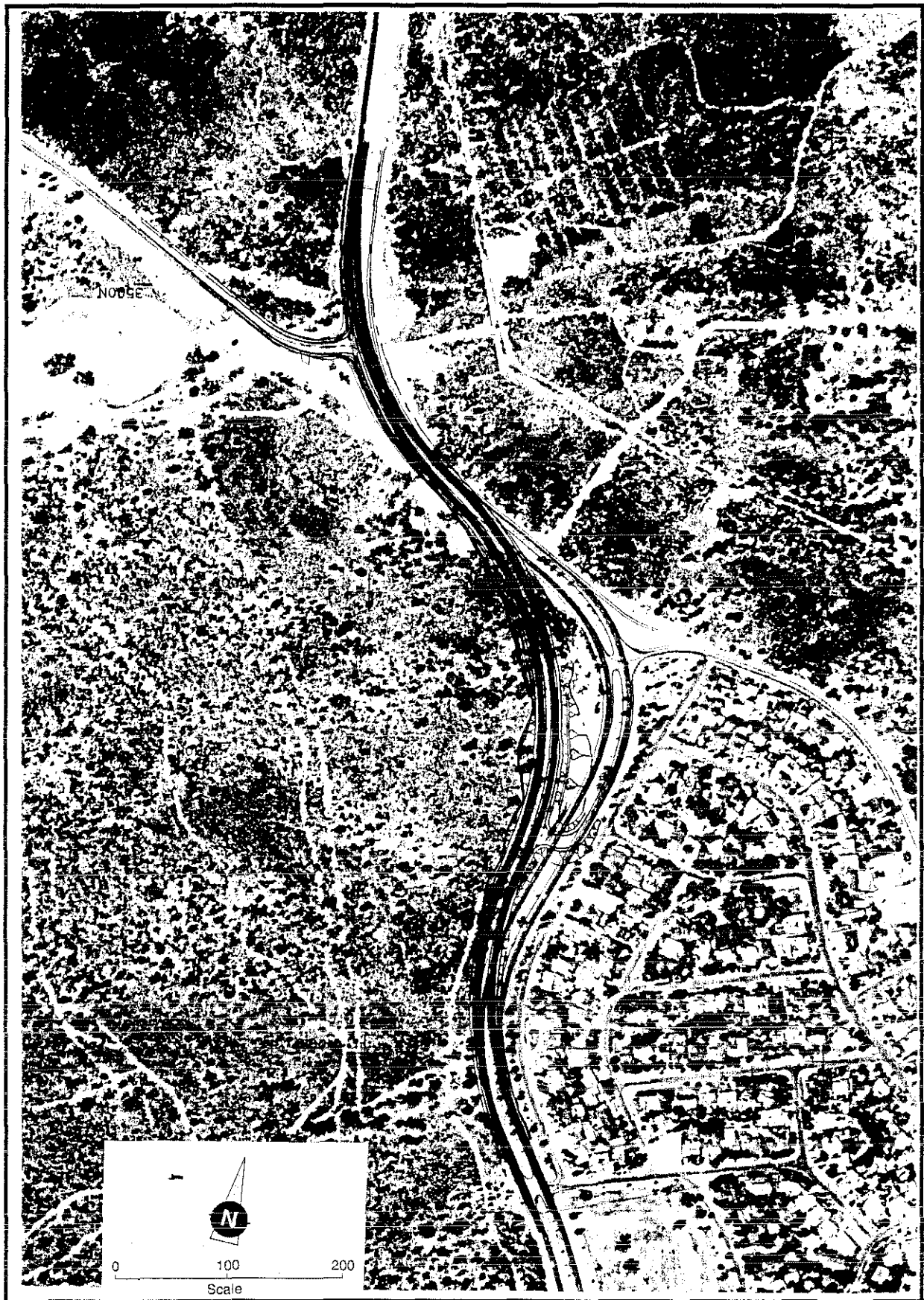


Figure 4. West Coast Highway alignment Option H overlaid on aerial photography.

TOPICS	PROPOSAL CHARACTERISTICS	PUBLIC COMMENTS	PROPONENT RESPONSE	IDENTIFICATION OF ISSUES
Biophysical Environment				
Impact on part of System Six recommended area of vegetation.	Realignment affects about 5% of Quindalup Dunes association.	Concern about reduction in area and greater risk of encroachment.	Representativeness of association not significantly affected; need for rehabilitation of modified areas.	Effects on regionally significant flora and vegetation communities warrants evaluation by EPA.
Impact on vegetation and the Quindalup Dunes association.	Proposed road alignment traverses the only area of Quindalup vegetation in M47 area.	Concern about loss of Quindalup vegetation and effect on a diverse area of vegetation.	The acceptability of the relatively small reduction in native vegetation depends upon weighing the benefits and costs of the project.	Impacts on vegetation warrants evaluation by EPA as indicated above.
Effects on fauna and their habitat.	Realignment removes habitat of birds and reptiles.	Concern over loss of dense stand of <i>Dryandra sessilis</i> bird habitat and Quindalup Dune vegetation reptile habitat.	Rehabilitation program to include <i>Dryandra sessilis</i> . Catch and release programme proposed for reptiles.	Impacts on fauna and habitats to be evaluated by EPA.
Encroachment effects beyond limits of embankment batters.	Intention to limit activities to within the immediate area of the works.	Concern about impacts beyond construction limits: both direct disturbance and indirect effects (eg weed invasion).	Commitments to monitoring of construction operations.	This matter addressed by proponent's commitments which are in the text of their document.
Effects on landform changes on views and quietness within Bold Park.	Road realignment will be in a cut within dunes for most of its length.	Concern that topographic effects will add more visual and noise intrusion into Bold Park.	No visual analysis undertaken. Being in a cut reduces noise and visual impact. Landscaping proposed to restore some measure of the original landscape character.	Effects on the landscape views and quietness within Bold Park to be evaluated by the EPA.

TOPICS	PROPOSAL CHARACTERISTICS	PUBLIC COMMENTS	PROPONENT RESPONSE	IDENTIFICATION OF ISSUES
Social surroundings				
Noise effects from existing Highway.	Improves noise in the local residential environment.	Desire for the road to be further away from houses.	All proposed alignments place the road further from houses.	Impacts can be managed through mechanisms available to residents through local government.
Underpass to link Perry Lakes with the ocean.	Not indicated in proposal.	Desirable addition to proposal.	Agreed that the opportunity exists, but is dependent on need and general support from community and availability of funds.	Agreed that it is desirable, but is not part of this proposal and should be negotiated between Main Roads, the Town of Cambridge and Kings Park Board.
Extent of accidents and justification of road realignment.	Accident record for bend in West Coast Highway.	Intersection accident record doesn't justify realignment.	Justification based on bend accidents not intersection accidents.	Justification doesn't require further evaluation.
Minimum radius curve for realignment.	400m in original proposal.	Preference for 300m radius curve.	400m radius is desirable but not mandatory: 350m would be acceptable for 90 km/h speed zone.	Main Roads and Town of Cambridge appropriate authorities to determine geometric design standards.
Section 46 amendment process	Two week review period.	Insufficient time to consider the issues and get advice from experts on the matters raised.	The issues have been well canvassed in previous assessments.	Members of the public have appeal rights on matters raised in this report.

Table 3. Identification of issues requiring Environmental Protection Authority evaluation.

3.1.2 Evaluation framework

Existing policy framework

System Six report

The recommendations contained in the System Six report represent the Environmental Protection Authority's main focus for conserving a comprehensive set of reserves representing the major communities of natural wildlife and flora types in the hinterland area surrounding Perth; which represents the most intensively used part of the State (Environmental Protection Authority, 1983a; Environmental Protection Authority, 1983b). State Cabinet accepted in principle the general recommendations contained in Part I of the System Six Report and approved of the progressive implementation, as far as possible, of the detailed area recommendations contained in Part II.

The significant environmental impacts arising from this proposal are associated with the areas known as Swanbourne Beach and Rifle Range and Bold Park. The System Six report identified that the Swanbourne Beach and Rifle Range (M46) and Bold Park (M47) have considerable local and regional significance for conservation, representing natural values of flora, fauna, ecosystems, and as a location of importance for education, scientific and recreational purposes (Environmental Protection Authority, 1983b). The System Six report recommends these areas be planned and managed as 'Regional Parks'.

The regional values of the Bold Park area have been determined by the Environmental Protection Authority (Environmental Protection Authority, 1988; Bulletin 322; & 1992 Bulletin 655) as: the size of the M47 area, being comparable to Kings Park, is one of the largest remaining bushland remnants in the urban area of the coastal plain; the natural vegetation of the area is of comparatively high quality and includes areas of species at extremes of their known ecological range; the fauna, as with the vegetation, exhibit considerable diversity with bird species being particularly well represented; recreational use is based on regional rather than just local patrons; and because of the above, and the areas' location in the metropolitan area, its educational value is also rated highly. These areas represent open space of regional importance to the Perth metropolitan area because of their high conservation, recreation and education values. Moreover, there are few substantial areas of urban bushland remaining so close to Perth residential areas. The recent Public Environmental Review 'Land Use Strategy for Bold Park and Environs' provided much information to support the System Six recommendations M46 and M47, and indeed provided additional evidence to indicate the particularly special values of the overall area (Mitchell McCotter and Ecoscape, 1993, Environmental Protection Authority, 1994 Bulletin 744).

Metropolitan Region Scheme Amendment 967/33

The Western Australian Planning Commission (formerly State Planning Commission) has recently advertised a major amendment to the Metropolitan Region Scheme which proposes to reserve land within Bold Park and environs (portions of System Six recommendation areas M46 and M47) for the purposes of Parks and Recreation. It is intended that the reserve will be vested in the Kings Park Board as a 'Regional Park' (Western Australian Planning Commission, 1995). The amendment to the Metropolitan Region Scheme includes an indicative alignment for the West Coast Highway. However, the finalisation of this road reservation is dependent upon completion of the requirement of this Section 46 amendment under the *Environmental Protection Act 1986 - 1994*. Several other modifications to the Metropolitan Region Scheme in this general area are also proposed within the amendment.

Therefore, the main criteria for evaluation of impacts from the proposal upon regionally significant flora and vegetation communities arising from the realignment are the protection of populations of flora species which are at their ecological limits, and the conservation of vegetation communities which are poorly represented in secured conservation reserves. To ensure that the values of these elements of the biota are protected, consideration must also be given to construction methods and subsequent rehabilitation, such that significant populations are protected from the disturbance and intrusion of weeds and disease.

Technical information

Figure 2 shows the vegetation communities of the immediate study area. Dames and Moore (1994) note that species indicative of the Quindalup Dunes such as *Calothalmus quadrifidus* and *Chamelaucium uncinatum* extend well to the west of the study area. Whilst the Quindalup soils appear throughout much of the central portion of Bold Park (Mitchell McCotter and Ecoscape, 1993), and species which are found within the Quindalup vegetation complex are found throughout the central portion of Bold Park, the south western corner of the immediate study area is considered to be the only location of the Quindalup vegetation complex within the central area of Bold Park (see Appendix 3 reply 3.1 from Dames and Moore).

Acacia rostellifera and the vegetation of the Quindalup complex more generally, are found along the coast of the Swan Coastal Plain. However, much of this vegetation has been removed for urban development resulting in poor representation of this Complex in secured conservation reserves (Semenuik, *et al.*, 1988, Portlock, *et. al.*, 1993, Trudgen, 1994). Portlock, *et al.* (1993) and Trudgen (1994) indicate between only 5 and 7 per cent of the original extent of the vegetation of the Quindalup vegetation complex is represented in conservation reserves. Most of this is within Yalgorup National Park south of the metropolitan area, though there are also areas north of the metropolitan area (Griffin, 1993). However, there is very little of this vegetation complex represented in secured reserves in the central metropolitan area. With a relatively small proportion of the overall Quindalup vegetation complex in secured conservation reserves the potential for loss of biodiversity is significant. Reserving several geographically separate examples of vegetation community types helps to provide security for biological diversity against catastrophic events (Gibson, *et al.*, 1994).

Flora within the Quindalup vegetation complex in the immediate study area includes *Acacia rostellifera*, which is not otherwise represented in the central portion of Bold Park and a hybrid of *A. rostellifera* and *A. xanthina* (*A. xanthina* is near the southern limit of its ecological distribution and within Bold Park was previously thought only to occur north of Reabold Hill) (Keighery, personal communication, 1994). The peppermint (*Agonis flexuosa*) which is within this area is considered to be at the northern limit of its ecological range within this location (Dames and Moore, 1994). Further north within the immediate study area, the vegetation complexes include Tuart (*Eucalyptus gomphocephala*) communities, and dune heath communities of *Calothalmus quadrifidus* and *Chamelaucium uncinatum* (some of which is indigenous and some of which is planted) (Dames and Moore, 1994). The locally indigenous form of *C. uncinatum* is at the southern limit of its ecological distribution. Tuart communities are regionally significant because they are not well represented in secured conservation reserves (Trudgen, 1984).

In a local context, the Mount Claremont bushland to the south of Rochdale Road, and the area to the west of the existing alignment of West Coast Highway also contain vegetation of the Quindalup complex. Both of these areas have been recommended for conservation in numerous scientific studies (Environmental Protection Authority, 1983; Wykes, 1990; Griffin, 1993; Environmental Protection Authority, 1994 Bulletin 744). The section of Quindalup vegetation complex which is to the west of the existing West Coast Highway (Swanbourne Beach area) has lower conservation values because of its size, fragmentation and disturbance by previous road works. Nonetheless, the portions which are not disturbed have significant flora and fauna values (Mitchell McCotter and Ecoscape, 1993), and provide a link between the coast and the central area of Bold Park. A portion of the Mount Claremont bushland and the coastal portion of System Six recommendation area M46 (Swanbourne Beach), both of which contain the Quindalup vegetation complex, are included within the Metropolitan Region Scheme amendment process to be reserved as Parks and Recreation (refer to Section 3.1.2 above).

The portion of the Quindalup Dune and associated vegetation complex in the south west corner of Bold Park, does have some weed encroachment to the understorey. Nonetheless, the indigenous structural components of the vegetation of the Quindalup complex remain intact, including grasses and mosses in the substratum.

Impacts from Modified Option C

From the commencement of the Modified Option C, south of Rochdale Road, to approximately 600 metres northwards (see Figure 2), the alignment will impact upon areas which are already disturbed from previous road works, or is to the west of the existing road (previously indicated to be environmentally acceptable (Environmental Protection Authority, 1992 Bulletin 655)). Between the 600 and 800 metre milestones (Figure 2), Modified Option C will encroach into the only area containing vegetation of the Quindalup Complex within the central area of Bold Park (Dames & Moore, 1992, Keighery, personal communication, 1994). From milestone 800 to 900 metres the alignment would be on a substantial amount of fill (up to approximately 6 metres) in an area which contains some Tuart and Dune Heath (Dames and Moore, 1994). From 900 - 1,000 metres the alignment would again cut through high dunes containing dune heaths and some Tuart.

Impacts from Option H

The alignment of Option H would intrude into Bold Park opposite Challenger Parade by approximately 35 metres less than Modified Option C. The impacts upon flora arising from Option H would therefore be less severe than from Modified Option C. Nonetheless, destruction of a portion of the Quindalup vegetation complex south east of the existing intersection with Challenger Parade, including the removal of regionally significant species, would be required. Similarly, Tuart and dune heath vegetation will be impacted further north.

3.1.3 Public submissions

Submissions generally acknowledged the need to improve the road safety in this location, but many indicated that alternative methods for improving safety should be adopted rather than requiring such a significant realignment with severe impacts upon the high conservation values of Bold Park. Most submissions indicated that the options previously assessed, particularly the Sinclair Knight and Partners option prepared for the Friends of Bold Park Bushland Inc. would be preferable as it balanced the requirements of safety and conservation. Submitters reiterated the values of the Bold Park area and indicated a desire to resolve the safety problem without disturbance to significant elements of flora communities.

Submissions also indicated that it is important to rehabilitate the portion of the existing highway which will no longer be required.

3.1.4 Response from the proponent

The proponent agreed with the general objective of implementing a solution which balances the requirements for safety and minimises disturbance to the conservation values of the area, whilst acknowledging the cost of construction. In the document supporting the request for a Section 46 amendment, the Town of Cambridge proposed to use Gabion Matresses to support the areas of cut and fill; this technique would minimise disturbance to vegetation and to the dune formations, the Town of Cambridge. In preparing the preliminary design for Option H, the Town of Cambridge have shown the amount of disturbance arising from stepped embankments (see Figures 3 and 4).

The Town of Cambridge has also agreed to rehabilitate that portion of the existing alignment of West Coast Highway which would no longer be required, to be consistent with the natural landform and to contain locally indigenous flora of the Quindalup complex in the appropriate locations of the landscape (Dames and Moore, 1994).

3.1.5 Evaluation

The area to the east of the existing alignment of West Coast Highway, which will be impacted by either Option H or Modified Option C is an area of high conservation value as defined in the Environmental Protection Authority's recommendations contained in the System Six report and the Environmental Protection Authority's previous advice on the proposed options for realignment of West Coast Highway and another proposal for land use at Bold Park and

environs. Several species of flora with local or regional significance are affected within the study area; including populations of locally indigenous *Acacia rostellifera*, a hybrid between this species and *A. xanthina*, *Chamelaucium uncinatum* and *Eucalyptus gomphocephala*. However, the importance of the portion of the Quindalup Complex within Bold Park is also related to its continuance with the adjoining Spearwood vegetation complexes, its position in buffering the central area of Bold Park from disturbance phenomena (thus reducing edge and fragmentation effects such as additional weed encroachment), and its position in the landscape providing a buffer against vehicular noise from the Highway and enclosing the viewscape within Bold Park (see Section 3.3).

The Environmental Protection Authority's preference is for the realignment of West Coast Highway to avoid the high conservation value areas of Bold Park, to avoid impacts on populations of regionally significant vegetation and to protect the viewscape and quietness of Bold Park. Encroachment within the Bold Park area should preferably be limited to the area bounded by the Bridle Trail which runs approximately parallel to the existing alignment of West Coast Highway. The Bridle Trail provides a convenient marker of the limit of existing areas of degraded vegetation. The impacts which arise from creating new 'edges' within bushland (particularly weed encroachment and the effects arising from additional wind and light exposure) will also be substantially avoided by encroachment being limited to the areas of existing disturbance.

The Environmental Protection Authority has previously advised Government of the environmental acceptability of an alignment (Option G) which meets these environmental objectives and which also meets the requirements of the Main Roads Western Australia and Department of Planning and Urban Development (Environmental Protection Authority, 1992 Bulletin 655). The Environmental Protection Authority's preference is for this option to be implemented. Whilst a large scar may be created by this alignment, the Environmental Protection Authority considers that this is a less significant than impacts upon the regionally significant values of Bold Park. In addition, this impact can be reduced by environmental management measures including planting of locally indigenous vegetation within the cut and fill batters as have been applied to the West Coast Highway near the Trigg Dunes area.

Other alignments could also be designed within these parameters. For instance a submission to the Environmental Protection Authority during the public consultation period, which included opinion from consulting engineers, indicated that commencing the realignment further south and encroaching into the dunes on the ocean side (west) of the existing West Coast Highway alignment, would result in less encroachment into the high conservation value areas of Bold Park. Significant management during the construction phase of the project is also required to ensure protection of these values. Issues such as access, storage of plant, equipment and materials, vehicular movement, disease and erosion control all require further detailed definition.

Option H prepared by Main Roads Western Australia and the Town of Cambridge, which is discussed above, meets most of these environmental objectives. Furthermore, detailed design work in preparation for construction of an alignment based upon Option H could investigate additional measures to reduce the impact on the high conservation value areas of Bold Park. For instance, in defining the land use requirements within the proposed amendments to the Metropolitan Region Scheme, options considered included minimising verge and median widths (ERM Mitchell McCotter, 1995). Design of batter treatments is also a significant factor in relation to reducing the encroachment of the Highway into the Bold Park area.

Modified Option C, however, would cause significant environmental impacts on the regional environmental values of Bold Park by requiring further encroachment into areas containing regionally significant species and vegetation community types; these impacts are avoided by other alignment acceptable to the Main Roads Western Australia (Options G and H).

The Environmental Protection Authority concludes that Option H is environmentally acceptable and recommends that an Environmental Management Programme should be required to ensure that the highly valued and significant flora populations and community types are protected by good design and controlled construction, however, Modified Option C is environmentally unacceptable because it would cause significant environmental impacts on the regional

environmental values of Bold Park, these impacts are avoided by other alignment acceptable to the Main Roads Western Australia (Options G and H) (Recommendation 1).

In addition, to compensate for any loss of regionally significant vegetation communities, the proponent can implement an Environmental Management Programme to rehabilitate the redundant portions of the existing alignment to replace any significant populations of flora which are lost and to restore a Quindalup 'type' vegetation community using species sourced from locally indigenous populations and plantings located in appropriate places within a reconstructed landform (Recommendation 2).

3.2 Effects on fauna and their habitats

3.2.1 Objective

The Environmental Protection Authority's objective is to protect habitats for unique and diverse fauna assemblages.

3.2.2 Evaluation framework

Existing policy framework

System Six report

As noted in Section 3.1 above, the area affected by the proposal has been identified as having a considerable diversity of fauna, with bird species being particularly well represented. Subsequent study by How and Dell (1990) of the Western Australia Museum has provided details of a particularly rich and diverse reptile fauna in Bold Park. The Western Australia Museum maintain a research site within the Quindalup Dune vegetation complex adjacent to the area affected by the proposed realignment of West Coast Highway. Fauna habitats for both bird and reptile species in this locality is founded upon vegetation communities. Other orders of fauna have not been studied to the same extent as birds and reptiles, although indigenous mammals (other than bats and possibly possums) are no longer found in the area (Mitchell McCotter and Ecoscape, 1993).

Therefore, the main criteria for evaluation of impacts from the proposal is to protect the habitats which support the rich and diverse assemblages of birds and reptiles.

Technical information

The richness and diversity of the reptile fauna of Bold Park is the highest recorded for urban bushland in the Perth metropolitan area (How and Dell, 1990). Because of its relatively large area, Bold Park provides essential habitats for resident and migratory bird species and a rich mixture of reptiles (How and Dell, 1990). During a survey of Bold Park by the Western Australian Museum, between 1986 and 1989, How and Dell (1990) recorded 61 species of birds, three species of frogs and 29 species of reptiles. Bold Park and Mount Claremont Bushland contains several species of birds that are now threatened with local extinction (How and Dell, 1990). Together these areas also provide a corridor which links the coastal dune system with Bold Park and may be important for migration of some bird species (Wykes, 1990).

Impacts from Modified Option C

The Western Australia Museum has a fauna research site within the Quindalup vegetation complex at Bold Park (see Figure 2), but this site is not directly affected by the proposed realignment. The area affected by Modified Option C does contain similar habitats, although in some areas weed invasion may limit the habitat potential for reptiles (How, personal communication, 1994).

Impacts from Option H

Option H will have a less impact on fauna, than Modified Option C, by virtue of being located further west and impacting on less intact vegetation communities.

3.2.3 Public submissions

Submissions indicated concern for loss of fauna habitats (both birds and reptiles) and that fauna would not relocate elsewhere because other habitats were likely to be occupied already.

Public submissions indicated that the reptile fauna capture and release programme proposed by the Town of Cambridge during construction of the Highway, should not be used as a justification for the project. Submissions also questioned the viability of using bulldozers to excavate in layers and find reptiles.

3.2.4 Response from the proponent

The proponent indicated acknowledgment of the fact that removal of some habitat for birds and reptiles would occur, however, the opinion of their consultants was that only a small portion of habitat would be removed and the species affected are not rare or endangered (see Items 4.1 to 4.5 in Appendix 3).

The proponent indicated that they did not intend to justify the destruction of habitat on the basis of it would aid research or would be compensated for by the research findings. Rather it was intended that when environmental modification was likely to occur it is both prudent and sensible to monitor the environmental change. Furthermore, the proponent reiterated that the WA Museum advised removing soil in layers is possible and provides can provide useful information on reptiles in the area.

3.2.5 Evaluation

The Environmental Protection Authority is informed that there would be some value in being able to capture the reptile fauna which will be disrupted by the construction of the alignment, however, this programme is a serendipitous benefit for herpetological research and should not be perceived as being a justification for the proposal (How, personal communication, 1994).

As is indicated in Section 3.1.5 above, the Environmental Protection Authority's preference is to limit the construction to areas which are already disturbed, thus reducing the potential for impacts upon vegetation systems which provide a habitat function for the rich and diverse assemblages of fauna species. The reconstruction of a Quindalup Dune 'type' formation with plantings of locally indigenous flora species (as indicated in Recommendation 1), would provide potential habitat for reptile and bird species in the longer term.

The Environmental Protection Authority concludes that fauna populations and habitats can be protected through the recommendations for environmental management contained in Recommendation 1. The Environmental Protection Authority further recommends that the reptile trapping exercise proposed by the proponents in the text of their document supporting the request for a Section 46 amendment is worthwhile and should be carried out during construction (see Recommendation 1 requirements for an Environmental Management Programme).

3.3 Effects on the landscape of Bold Park

3.3.1 Objective

The Environmental Protection Authority's objective is to conserve regionally significant areas of geological and geomorphic variety and to provide for the human use values associated with these areas.

3.3.2 Evaluation framework

Existing policy framework

System Six report

As identified in Section 3.1 above, the System Six report identified that the Swanbourne Beach and Rifle Range (M46) and Bold Park (M47) have considerable local and regional significance for conservation, including representing natural values and as a location of importance for education, scientific and recreational purposes (Environmental Protection Authority, 1983b). The criteria for assessment of the effects of the proposal upon landscape and human use values are related to protecting the quietness and views within Bold Park which are contained by the Quindalup Dune systems in the south western corner of the area.

Technical information

Quindalup Dunes are the most recently formed of the Swan Coastal Plain dune systems. Much of this dune system is under pressure for development of coastal housing. A diverse array of vegetation formations are associated with varied geomorphology and geological features within the Quindalup Dunes. The Quindalup Dune system is poorly represented in conservation reserves (Semenuik, Cresswell and Wurm, 1989). The nearest secured 'regional' reserves incorporating Quindalup Dunes are at Nambung National Park near Cervantes and Yalgorup National Park south of Mandurah.

The Quindalup Dunes in the south western corner of Bold Park contain high ridges which enclose the viewscape and exclude noise from West Coast Highway within this portion of Bold Park adding to the amenity of the area.

Impacts on landscape values

For both Modified Option C and Option H, significant cuts are required through dunes; between 600 and 800 metre milestones and 900 and 1,000 metre milestones (see Figures 1 and 3). Between these areas a substantial amount of fill will be required to raise the carriageway to meet geometric design standards.

Because of the effect of Modified Option C on the high Quindalup Dune formations, these earthworks may bring West Coast Highway further into the viewsapes of Bold Park, lead to intrusion of additional noise and views of the road from within the main body of Bold Park.

3.3.3 Public submissions

Submissions indicated concern that the proposed realignment would cut through the dunes in an area of 30 metre contours at the south western corner of Bold Park, removing a landscape aspect which is unique and which has contributed significantly to the diversity of flora and fauna. The topographic high point provided by the dune ridge also functions as a noise and visual buffer from the Highway for park users. However, no visual assessment was undertaken. Concern was expressed regarding the proponents indication that they would replace the Quindalup Dune elsewhere and questioned the feasibility of this approach.

3.3.4 Response from the proponent

The proponent agrees that the physical impact of the realignment will occur. Whilst the proponent has agreed to remove and re-contour the existing portion of the West Coast Highway which will no longer be required, they acknowledge that it will not be a replacement, but rather *'it is intended that it be a "type" Quindalup dune landscape'*. Furthermore, the Town of Cambridge indicated that the road as proposed in Modified Option C would be in cut for most of its length and hence the views and quietness within Bold Park would be substantially the same as at present.

3.3.5 Evaluation

The requirements for cut and fill earthworks are similar for both Option H and Modified Option C. However, the earthworks required for Option H would intrude into Bold Park opposite Challenger Parade by approximately 35 metres less than Modified Option C. Additionally, in the south western corner of Bold Park, the dune ridges are retained through environmental management methods proposed by the proponent, whereby stepped batters are used to reduce the impact of the cut and fill requirements for Option H (see Figure 4). Furthermore, West Coast Highway can be kept to the west of the dune ridges which currently provide a buffer to noise from West Coast Highway and contain the bushland views which are available from within Bold Park. Construction methods which reduce the amount of area disturbed can be implemented; for instance the use of Gabions and mattresses will enable steeper sloped batters thus reducing the encroachment into the high dune systems in the south west corner of Bold Park.

The Environmental Protection Authority recommends that the proponent should provide detailed design which includes methods of construction which allow steeper cut and fill batters, where possible, in order to protect the quietness and views contained within Bold Park, within the Environmental Management Programme recommended in Recommendation 1.

4. Conclusions and recommendations

The Environmental Protection Authority concludes that Option H for the realignment of West Coast Highway is environmentally acceptable subject to the Environmental Protection Authority's recommendations and the proponent's commitments which are incorporated within those Environmental Protection Authority recommendations. The Environmental Protection Authority's recommendations acknowledge the need for detailed design, careful environmental management during construction and the replacement of any regionally significant flora communities, to be carried out by the proponent. A summary of the Environmental Protection Authority's views are set out in Table 4.

In reaching this conclusion the Environmental Protection Authority identified the main environmental issues requiring consideration as:

- the effects on regionally significant flora and vegetation communities;
- the effects on fauna and their habitats; and
- the effects of landform changes on views and quietness within Bold Park.

The Environmental Protection Authority believes that these issues are adequately addressed by the commitments made by the proponent, in the text of the document supporting the Section 46 amendment, the proponent's response to the issues raised in public submissions, and the Environmental Protection Authority's recommendations in this report.

Environmental management commitments made by the proponent

The Environmental Protection Authority notes that Commitment 1 from the 1992 assessment (see Appendix 1) has been completed through the Public Environmental Review for Land Use Strategy for Bold Park and Environs' (Mitchell McCotter and Ecoscape, 1993). The Environmental Protection Authority recommends that this commitment should now be cleared.

The proponent has made a number of new environmental commitments within the text of the document which was distributed to members of the public in support of this Section 46 amendment. These commitments have been accepted by the Environmental Protection Authority in good faith. However, the commitments are not in a form which makes them amenable to environmental auditing. Therefore, the Environmental Protection Authority has incorporated the intent of the proponents environmental commitments within its draft recommended environmental conditions. Commitments from the previous assessment have also been incorporated into the following recommendations of the Environmental Protection Authority. These commitments from the 1992 assessment have therefore been superseded by

ISSUES	OBJECTIVES	EVALUATION FRAMEWORK CRITERIA	PROPONENT'S COMMITMENT	EPA RECOMMENDATION
Effect on regionally significant flora and vegetation.	Impacts to be avoided, where possible. Rehabilitation of portions of existing road required.	Protection of populations of flora at their limits of ecological range and vegetation complexes which are poorly represented.	Reduction of batter slopes and implementation of construction techniques to reduce impacts on vegetation. Rehabilitation to create Quindalup 'type' landform and vegetation complex.	Environmental Management Programme required for detailed design and construction. Environmental Management Programme required to manage rehabilitation to ensure use of locally indigenous species.
Impacts on fauna and habitats.	Protection of habitats for unique and diverse fauna assemblages.	Protection the habitats which support the rich and diverse assemblages of birds and reptiles.	Minimal impact on bird habitats, replacement of <i>Dryandra sessilis</i> community in rehabilitated landscape. Capture and release program for reptiles.	Required to be addressed as components of the above Environmental Programmes.
Effects on the landscape views and quietness within Bold Park.	Conservation of regionally significant areas and provide for human use values.	Concern over loss of the protection offered by the high Quindalup Dune in the south west corner of Bold Park.	Minimal intrusion because road will mostly be in cut.	Incorporated in Environmental Management Programmes for construction and rehabilitation.

Table 4. Summary of Environmental Protection Authority recommendations.

the current assessment and will not be audited by the Environmental Protection Authority, or the Department of Environmental Protection. It is intended that the proposed statement of environmental conditions will replace the previous statement in its entirety.

The Environmental Protection Authority is satisfied that, using information currently available, the following recommendation may be made to the Minister for the Environment.

Recommendation 1

The Environmental Protection Authority concludes that Option H for the realignment of West Coast Highway at south City Beach is environmentally acceptable and recommends that an Environmental Management Programme should be required to ensure that the highly valued and significant flora populations, vegetation community types, fauna habitats, and landscape views and quietness contained within Bold Park, are protected by good design and controlled construction, however, Modified Option C is environmentally unacceptable because it would cause significant environmental impacts on the regional environmental values of Bold Park, these impacts are avoided by other alignment acceptable to the Main Roads Western Australia (Options G and H).

The Environmental Protection Authority also recommends that prior to any further ground-disturbing activity (including surveying), the proponent should prepare an Environmental Management Programme for detailed design and construction activities to the requirements of the Department of Environmental Protection on advice of the Main Roads Western Australia and the Kings Park Board. This Environmental Management Programme should address though not necessarily be limited to the following elements:

- detailed design plans for the realignment (including any pedestrian underpass), indicating the methods used to reduce the width of the carriageway and cut and fill batters to that required for safe operation;
- access for surveying and road works equipment and construction of fencing to confine vehicular movement and ground-disturbing activity;
- management of disturbance to landforms and vegetation;
- procedures for conserving top soil for later reuse in rehabilitation and to enable reptiles to be collected;
- locations for materials storage;
- procedures for management of the risk of spreading dieback disease;
- erosion and dust control; and
- induction in environmental management methods for all personnel employed on the project.

The Environmental Protection Authority also recommends that the Town of Cambridge implement the above Environmental Management Programme during all phases of ground-disturbing activity including surveying for the detailed design of the final alignment.

See Recommended Environmental Condition 3.

Recommendation 2

The Environmental Protection Authority concludes that, the proponent should replace any regionally significant vegetation complexes which are disturbed due to the realignment of West Coast Highway and recommends that prior to the commencement of clearing or construction activities for the realignment of

West Coast Highway, the proponent should prepare an Environmental Management Programme for the rehabilitation of the redundant portion of the existing alignment to create a vegetation complex consistent with the landscape formations of the area and containing locally indigenous flora of the Quindalup Complex in their appropriate positions within the landscape, to the requirements of the Department of Environmental Protection on advice of the Kings Park Board. The Environmental Management Programme should address though not necessarily be limited to the following elements:

- methods for regenerating locally indigenous species;
- stockpiling of top soil and specific sources of locally indigenous flora;
- detailed design plans, including reconstruction of landscape contours;
- detailed botanical specifications, including flora selections and planting configurations;
- catch and release program for reptiles;
- use of cleared vegetation for mulch;
- road verge plantings;
- definition of completion criteria for determining success of the rehabilitation of landscape and vegetation complexes; and
- weed and fire control and monitoring of vegetation and landscape until completion criteria are met.

Implementation of this Environmental Management Programme should commence concurrently with construction of the realignment.

See Recommended Environmental Condition 4.

5. Recommended environmental conditions

Based on its assessment of the proposal and the recommendations in this report, the Environmental Protection Authority considers that the following Recommended Environmental Conditions are appropriate for the realignment of West Coast Highway at south City Beach. The following recommended environmental conditions would replace the Minister's original Statement (Appendix 1) and apply conditions to reflect the recommendations in this report and ensure a continued review of the environmental performance of the development.

PROPOSAL: REALIGNMENT OF WEST COAST HIGHWAY AT SOUTH CITY BEACH (407 / 884)
CURRENT PROPONENT: TOWN OF CAMBRIDGE
CONDITIONS SET ON: 2 FEBRUARY 1993

Options A, B, C, G and H of this proposal may be implemented subject to the following conditions:

1 Proponent Commitments

The proponent has made a number of environmental management commitments in order to protect the environment.

- 1-1 In implementing the proposal, the proponent shall fulfil the commitments made the Public Environmental Review (1992) published in Environmental Protection Authority Bulletin 655; provided that the commitments and environmental management measures are not inconsistent with the conditions or procedures contained in this statement.

2 Implementation

Changes to the proposal which are not substantial may be carried out with the approval of the Minister for the Environment.

- 2-1 Subject to these conditions, the manner of detailed implementation of the proposal shall conform in substance with that set out in any designs, specifications, plans or other technical material submitted by the proponent to the Environmental Protection Authority with the proposal. Where, in the course of that detailed implementation, the proponent seeks to change those designs, specifications, plans or other technical material in any way that the Minister for the Environment determines on the advice of the Environmental Protection Authority, is not substantial, those changes may be effected.

3 Detailed design and construction

- 3-1 The proponent shall, as much as possible, avoid impacts from realignment of the highway upon the highly valued vegetation complexes, flora, fauna, landform and visual amenity of Bold Park.
- 3-2 Prior to any further ground-disturbing activity (including surveying), the proponent shall prepare an Environmental Management Programme for detailed design and construction activities, to the requirements of the Minister for the Environment on advice of the Department of Environmental Protection and the Kings Park Board. This Environmental Management Programme shall include, though not necessarily be limited to:
- 1 detailed design plans for the realignment (including any pedestrian underpass), indicating the methods used to reduce the width of the carriageway to that required for safe operation;
 - 2 access for surveying and road works equipment and construction of fencing to confine vehicular movement and ground-disturbing activity;
 - 3 management of disturbance to landforms and vegetation;
 - 4 procedures for conserving top soil for later reuse in rehabilitation and to enable reptiles to be collected;
 - 5 locations for materials storage;
 - 6 procedures for management of the risk of spreading dieback disease;
 - 7 erosion and dust control; and
 - 8 induction in environmental management methods for all personnel employed on the project..
- 3-3 During all phases of ground-disturbing activity, including surveying for the detailed design of the final alignment, and during construction, the proponent shall implement the Environmental Management Programme required by condition 3-2.

4 Environmental rehabilitation of redundant alignment

- 4-1 The proponent shall transfer the high conservation values of the impacted area should be to the redundant portion of the existing alignment.
- 4-2 Prior to the commencement of construction, the proponent shall prepare an Environmental Management Programme for the rehabilitation of the redundant portion of the existing alignment, to create a vegetation community consistent with the landscape formations of the area and containing locally indigenous flora of the Quindalup vegetation complex in their appropriate positions within the landscape, to the requirements of the Minister for the Environment on advice of the Department of Environmental Protection and the Kings Park Board.

This Programme shall address, though not necessarily be limited to the following elements:

- 1 methods for regenerating locally indigenous species;
 - 2 stockpiling of top soil and specific sources of locally indigenous flora;
 - 3 detailed design plans, including reconstruction of landscape contours;
 - 4 detailed botanical specifications, including flora selections and planting configurations;
 - 5 catch and release program for reptiles;
 - 6 use of cleared vegetation for mulch;
 - 7 road verge plantings;
 - 8 definition of completion criteria for determining success of the rehabilitation of landscape and vegetation complexes; and
 - 9 weed and fire control and monitoring of vegetation and landscape until completion criteria are met.
- 4-3 Commencing concurrently with construction of the realignment, the proponent shall implement the Environmental Management Programme required by condition 4-2.

5 Proponent

These conditions legally apply to the nominated proponent.

- 5-1 No transfer of ownership, control or management of the project which would give rise to a need for the replacement of the proponent shall take place until the Minister for the Environment has advised the proponent that approval has been given for the nomination of a replacement proponent. Any request for the exercise of that power of the Minister shall be accompanied by a copy of this statement endorsed with an undertaking by the proposed replacement proponent to carry out the project in accordance with the conditions and procedures set out in the statement.

6 Time Limit on Approval

The environmental approval for the proposal is limited.

- 6-1 If the proponent has not substantially commenced the project within five years of the date of this statement, then the approval to implement the proposal as granted in this statement shall lapse and be void. The Minister for the Environment shall determine any question as to whether the project has been substantially commenced. Any application to extend the period of five years referred to in this condition shall be made before the expiration of that period, to the Minister for the Environment by way of a request for a change in the condition under Section 46 of the Environmental Protection Act. (On expiration of the five year period, further consideration of the proposal can only occur following a new referral to the Environmental Protection Authority.)

7 Compliance Auditing

To help determine environmental performance, periodic reports on progress in implementation of the proposal are required.

- 7-1 The proponent shall submit periodic Progress and Compliance Reports, in accordance with an audit programme prepared by the Department of Environmental Protection in consultation with the proponent.

Procedure

- 1 Unless otherwise specified, the Department of Environmental Protection is responsible for assessing compliance with the conditions contained in this statement and for issuing formal clearance of conditions.
- 2 Where compliance with any condition is in dispute, the matter will be determined by the Minister for the Environment.

6. References

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- Main Roads Western Australia (1995). Letter to the Department of Environmental Protection. 2 February 1995.
- Main Roads Western Australia (1995). Letter to the Department of Environmental Protection. 9 March 1995.

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- Trudgen, M.E. (1984). 'Leschenault Peninsula - A flora and vegetation survey with an analysis of its conservation value and appropriate uses'. Bulletin 157. Department of Conservation and Environment, Perth, Western Australia.
- Trudgen, M.E. (1994). A botanical survey of areas affected by the proposed south-west corridor amendment with comment on conservation values. Bowman Bishaw and Gorham for the Department of Planning and Urban Development. Department of Planning and Urban Development, Perth, Western Australia.
- Western Australian Planning Commission (1995). Metropolitan Region Scheme: Amendment No. 967/33. Bold Park and Environs. Western Australian Planning Commission, Perth, Western Australia.
- Wykes, B. (1990). A case for conserving the System Six M46 area of Mount Claremont within a Regional Park. Submission to Minister for the Environment, Environmental Protection Authority, Department of Planning and Urban Development, City of Perth, Nedlands City Council, Claremont City Council.

Appendix 1

**Statement of Environmental Conditions
published 2 February 1993**



Ass # 407

Bull # 655

State # 301

WESTERN AUSTRALIA
MINISTER FOR THE ENVIRONMENT

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

REALIGNMENT OF WEST COAST HIGHWAY AT SOUTH CITY BEACH (407)

CITY OF PERTH

Options A, B, C and G of this proposal may be implemented subject to the following conditions:

1 Proponent Commitments

The proponent has made a number of environmental management commitments in order to protect the environment.

- 1-1 In implementing the proposal, the proponent shall fulfil the commitments (which are not inconsistent with the conditions or procedures contained in this statement) made in the Public Environmental Review and in response to issues raised following public submissions. These commitments are consolidated in Environmental Protection Authority Bulletin 655 as Appendix 4. (A copy of the commitments is attached.)

2 Implementation

Changes to the proposal which are not substantial may be carried out with the approval of the Minister for the Environment.

- 2-1 Subject to these conditions, the manner of detailed implementation of the proposal shall conform in substance with that set out in any designs, specifications, plans or other technical material submitted by the proponent to the Environmental Protection Authority with the proposal. Where, in the course of that detailed implementation, the proponent seeks to change those designs, specifications, plans or other technical material in any way that the Minister for the Environment determines on the advice of the Environmental Protection Authority, is not substantial, those changes may be effected.

3 Protection of Valued Flora, Fauna, Landform and Visual Amenity

- 3-1 The proponent shall ensure that impacts from realignment of the highway upon the highly valued vegetation complexes, flora, fauna, landform and visual amenity are minimised.
- 3-2 Prior to any site works and in consultation with the Environmental Protection Authority, the proponent shall prepare and submit to the Minister for the Environment final alignment design and construction plans, to meet the requirements of condition 3-1.
- 3-3 In the preparation of the plans required by condition 3-2, the proponent shall address, but not be limited to the following:

Published on

- 2 FEB 1993

- 1 assessment of the visual and landform impacts arising from cut and fill operations required to re-contour the Quindalup Dunes in the Rifle Range area;
- 2 measures to minimise impacts upon the landform, visual amenity and bushland viewscape, in particular from Bold Park;
- 3 measures to minimise impacts upon valued flora and fauna; and
- 4 a management and monitoring strategy to ensure successful reduction of the impacts upon the bushland viewscape.

3-4 The proponent shall implement any management and monitoring requirements arising from the plans required by conditions 3-2 and 3-3.

4 Proponent

These conditions legally apply to the nominated proponent.

4-1 No transfer of ownership, control or management of the project which would give rise to a need for the replacement of the proponent shall take place until the Minister for the Environment has advised the proponent that approval has been given for the nomination of a replacement proponent. Any request for the exercise of that power of the Minister shall be accompanied by a copy of this statement endorsed with an undertaking by the proposed replacement proponent to carry out the project in accordance with the conditions and procedures set out in the statement.

5 Time Limit on Approval

The environmental approval for the proposal is limited.

5-1 If the proponent has not substantially commenced the project within five years of the date of this statement, then the approval to implement the proposal as granted in this statement shall lapse and be void. The Minister for the Environment shall determine any question as to whether the project has been substantially commenced. Any application to extend the period of five years referred to in this condition shall be made before the expiration of that period, to the Minister for the Environment by way of a request for a change in the condition under Section 46 of the Environmental Protection Act. (On expiration of the five year period, further consideration of the proposal can only occur following a new referral to the Environmental Protection Authority.)

6 Compliance Auditing

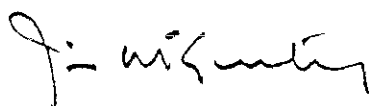
In order to ensure that environmental conditions and commitments are met, an audit system is required.

6-1 The proponent shall prepare periodic "Progress and Compliance Reports", to help verify the environmental performance of this project, in consultation with the Environmental Protection Authority.

Procedure

The Environmental Protection Authority is responsible for verifying compliance with the conditions contained in this statement, with the exception of conditions stating that the proponent shall meet the requirements of either the Minister for the Environment or any other government agency.

If the Environmental Protection Authority, other government agency or proponent is in dispute concerning compliance with the conditions contained in this statement, that dispute will be determined by the Minister for the Environment.



Jim McGinty, MLA
MINISTER FOR THE ENVIRONMENT

PROPONENT'S COMMITMENTS

REALIGNMENT OF WEST COAST HIGHWAY AT SOUTH CITY BEACH (407)

CITY OF PERTH

The proponent has made the following environmental commitments:

- 1 System 6 Areas.
 - 1.1 Within 12 months of the release of the Public Environmental Review for the realignment of the West Coast Highway, City Beach, plan a study on the management of long-term issues affecting System Six Recommendation Areas M46 and M47.
 - 1.2 Subsequent to 1.1, and within 12 months of the release of the Public Environmental Review for the realignment of the West Coast Highway, City Beach implement the approved study and report on its findings.
- 2 Construction Plan.
 - 2.1 Prior to any site works, prepare a Construction Plan for the realignment. The Plan will provide designs, specifications and locations and include, but not necessarily be limited to:
 - management of vehicular movement in vegetation adjacent to the easement and cut and fill areas;
 - management of disturbance to landforms and vegetation;
 - erosion and dust control;
 - pedestrian underpass (subject to public support); and
 - induction of all personnel employed on the project in environmental management methods.
 - 2.2 Subsequent to 2.1, implement the approved Construction Plan.
- 3 Rehabilitation Plan.
 - 3.1 Prior to any site works, prepare a Rehabilitation Plan for the realignment and the old road alignment. The Plan will provide designs, specifications and location and include, but not necessarily be limited to:

- criteria for successful rehabilitation;
- use of cleared vegetation for mulch;
- topsoil removal, stockpiling and replacement;
- direct seeding, planting and use of hydromulching;
- replanting of local species from seed collected from M46 and M47;
- road verge planting; and
- use of fertilisers.

3.2 Subsequent to 3.1, implement the approved Rehabilitation Plan.

4 Dieback Management Plan.

4.1 Dieback hygiene procedures as recommended by the Department of Conservation and Land Management will be implemented to control the spread of dieback disease and weeds along the route.

5 Fire Management Plan.

5.1 The City of Perth's Fire Management Programme will be adopted subject to advice by the EPA. Weeds and grasses on verges will be controlled to reduce fire hazards.

Appendix 2
List of submitters

JW & EM Shannon

B Mack

D Boase-Jelinek

M P Revington

Mrs E W Vis

Mrs F Wray

Mrs S R Loney

Mrs F S B Woods

D and J Beattie

Mr A D Giles, Chairman, City Beach Highway Safety Action Group

Mr M P and Mrs M M Drayson

Ms M Watson

Mr J D Williamson

Ms V Payne

D W and J M Franks

Mrs K Smith, Honorary Secretary, Coast Ward Ratepayers Association (Inc)

Mrs P O'Connor, Honorary Secretary, Wembley Ward Ratepayers Association (Inc)

The Sanderson Family

Ms S A Clegg

Ms J Fisher

Ms K Reading

Miss M L Park

Mr S W Fisher

Ms M C Thompson

A W Robinson

Ms J H Robinson

Mr G Owen

Ms K Tullis, Secretary, Urban Bushland Council (WA)

C and M Avery

Mr T Graham-Taylor

M Priestage

K H Gates

J and L R Dodd

M S Boland

Ms L Jackson

Mrs P O'Connor

R Prestage

R Banyard

T Prestage

Mr D J McMillan

H and E Jarman

A and H Esbenshade

H and B Clegg

K Walch

Mrs J F Conway

Mr B Perriam

Ms S Brown

Ms B Tyson

R Banyard

Ms N Calcutt, Chairperson, Friends of Bold Park Bushland (Inc.)

Mr J S and Mrs M G Smithson

K Boland

Ms K E Kneuss

S and R Boulten

Mr A Hayes

Mr J Crandell

Mr T Saraullo

Mrs J Watson

Mr G R Shellam

Mr R Davies

Mr H F de Jong

Ms M Shipley

Mr I Crawford

Appendix 3

**Summary of public submissions and
the proponent's response**

Summary of public submissions and responses

The reply to submissions is the combined Town of Cambridge, Dames and Moore and Main Roads WA response to the summary Public comments provided by the Department of Environmental Protection (DEP).

1. Justification for the proposal / safety concerns / road standards

- 1.1 The Dames and Moore report contains a justification at Section 2.2, which is difficult to understand and superficial. The road is not more than 20 years old. It is difficult to understand the attention devoted by City Engineers to this particular issue. This road has been listed as 911th on the list of accident bad spots in Western Australia roads (see Environmental Protection Authority Bulletin 655 Appendix 1.1). Why are the other 910 not being dealt with before this one?

1.1 Reply - Town of Cambridge and MRWA

The justification for realignment of West Coast Highway was given in the Public Environmental Review and in the responses to the public comments.

The explanation by Main Roads WA in EPA Bulletin 655, with respect to the accident rating, is restated below:-

"The intersection ranking alone does not give true indication of the actual accidents on this section of West Coast Highway. The accidents on the section of carriageway 200 metres north and south of Challenger Parade are not included in the overall accident listings (only the intersection itself is ranked).

For example the 200 metre section of West Coast Highway north and south of Challenger Parade in the period January 1985 and December 1991 recorded the following accidents :-

- 2 fatal
- 14 injury
- 22 major property damage
- 8 various other

Included in this total were 27 accidents (59%) involving a single vehicle leaving the roadway and hitting roadside objects. These accidents involve driver difficulties to recognise and negotiate the existing bend ."

No detailed evaluation of accidents since the above have been made because the current proposal is not seeking justification per se for the realignment but a modification to the alignment(s) already approved. However, it is known that accidents are continuing to take place in this section of West Coast Highway .

The Town of Cambridge would support the stated Main Roads WA position that a realignment is necessary to address the continuing accident trend.

In reference to other accident spots it can be stated that many of these have or will be addressed. However, in some cases limited if any, opportunities exist to overcome the causes of accidents. In the case of West Coast Highway it is possible to address the accident problem.

- 1.2 In their report of September 1994 to the Friends of Bold Park Bushland (Inc) BSD Consultants recommend that 'Before any decision is made on the realignment route to be used, speed profile surveys should be undertaken to the north and south of the section of West Coast Highway in question, to determine the prevailing speed environment'. The design of the realigned section should then be undertaken in accordance with the National

Association of Australian State Road Authorities (NAASRA) 'Guide to the Geometric Design of Rural Roads', so as to minimise the intrusion into Bold Park.

An immediate commitment between the Commissioners (Town of Cambridge) and the Main Roads Western Australia to consider the findings of BSD Consultants could see a resolution of this issue in a short time. Engineering advice suggests a time frame of no more than 6 to 8 weeks, including measuring the speed environment, designing and preparing construction details.

1.2 Reply - Town of Cambridge and MRWA

Speed profile survey for West Coast Highway was carried out by the Town of Cambridge over a period of one week commencing 1:00 pm Tuesday 26 September 1994, concluding 8:00 am Tuesday 4 October 1994.

Due to counter malfunction this was repeated for the north bound traffic, north of Challenger Parade, between 11:00 am Friday 7 October 1994 and 10:00 am Friday 14 October 1994.

The results are summarised in the table below: -

Location	Traffic Direction	85% Speed (km/hr)			Vehicle Count (No)
		Min	Max	24 Hr Moving Average	
100m north of Helston Avenue	Southbound	79.0	102.5	91.1	56,335
	Northbound	79.8	104.0	93.0	63,047
70m south of Helston Avenue	Southbound	83.9	103.6	94.9	60,554
	Northbound	76.7	103.3	85.7	61,784
100m north of Challenger Parade	Southbound	78.6	102.0	89.4	58,804
	Southbound	(68.6)	(103.6)	(94.4)	(63,231)
100m north of Rochdale Road	Southbound	(63.3)	(105.0)	(102.6)	(64,366)
	Northbound	78.1	100.0	85.0	65,106
50m south of Rochdale Road	Southbound	71.0	99.5	76.6	65,242
	Northbound	77.7	101.9	79.9	58,107
250m south of Rochdale Road	Southbound	75.7	104.9	79.7	62,732
	Northbound	90.2	105.5	101.8	59,378
250m south of Rochdale Road	Southbound	77.5	104.7	95.9	62,487
	Northbound				

The figures in brackets refer to the counts taken between 7 and 14 October 1994.

Speed measurements by Main Roads WA at 100 m north of Helston Avenue found the 85th percentile speed to be 90 km/hr or less except for the 3am to 4am period.

The early resolution of the realignment proposal is supported by the Town of Cambridge and MRWA. To this end both MRWA and the Town of Cambridge, whilst believing that minimum radius of 400m is preferable, acknowledge that 350m minimum radius curve would be acceptable.

1.3 The 400 metre radius advocated by the Main Roads Western Australia and the Town of Cambridge engineers is no holy dictum in the road engineering profession. Furthermore,

300 metre radii have been used on newer sections of the West Coast Highway between Rochdale Road and Servetus Street and through the Trigg Dunes. Would it not be undesirable for southbound traffic to change suddenly south of Rochdale Road from 400 to 300 metre curves? Why not a consistent design over the entire road? Why not close the Challenger Parade intersection and fix the camber of the curve to make it meet the Austroads standards for a design speed of 90 kilometres per hour. Signposting of the curve should also be improved. At present there is only a small diamond sign with an indicator.

1.3 Reply - Town of Cambridge and MRWA

It is agreed that the advocated 400m radius minimum curve is not a holy dictum in the road engineering profession.

As the AUSTROADS 1989 "Guide to the Geometric Design of Rural Roads" puts it "The practise of good road design, especially under constraints, involves judgement as well as calculation. It involves compromises between conflicting goals. Experience assists the designer to arrive at an appropriate compromise that cannot be met by a system of mathematical rules. Therefore, the Guide gives range of values within which the designer has reasonable flexibility to produce an appropriate design for any specific problem, while retaining a reasonable overall level of uniformity."

The 400 m radius was selected by Main Roads WA, based on their experience, as the appropriate minimum for roads like West Coast Highway to cater, in particular, for intersections. The superelevation on radii less than 400m would give an adverse crossfall for the turning movements on and off the Highway which would not be entirely satisfactory.

The speed counts tabulated under comment number 1.2 also lends support to the selection of 400m minimum radius curve. However, it is acknowledged that 350 m minimum radius curve would be acceptable.

It is not always appropriate to compare curves at different locations. The 300m curve at the southern end of West Coast Highway at Servetus Street is located within lower speed (residential) environment. The curve at Rochdale Road was seen as temporary on the assumption that the Stephenson Highway would realign this particular section. The 300m radius curve through the Trigg dunes may again be satisfactory due to the speed environment existing at that location.

Consistency in design with respect to all aspects is unnecessary as stated in the quote above from AUSTROADS 1989. The design parameters of a road can vary along its length depending on the speed environment within which it is located and the constraints placed upon it.

The Challenger Parade intersection could be closed, although this could cause some adverse impacts on the local residents. However, the closure would not remove the need to realign West Coast Highway. The superelevation required on the existing curve to meet 90km/h design speed would be too high for the class of road and type of traffic using it.

Experience has shown that signposting will not significantly lower operating speeds given the existing road environment. The approaches to the problem curve are well identified with speed limit, advisory speed limit and intersection signs. The north bound traffic is further warned of the curve by series of chevron boards.

- 1.4 This whole exercise is predicated on an assumed need to have a minimum curve radii of 400 metres on West Coast Highway. This may be desirable, but it is not mandatory. There are no compelling reasons stated in the report for having to achieve this radius,

therefore alternative options which are less destructive to Bold Park should be followed. What safety standard or law does the present curve contravene?

1.4 Reply - Town of Cambridge and MRWA

See responses to comments under 1.2 and 1.3.

The Town of Cambridge and MRWA have a duty of care for road users. The present curve has excessive number of accidents which requires attention. The realignment is seen as the means of rectifying the problem.

- 1.5 Whilst the community is entitled to an improved and safe alignment, it is not necessary to have a 400 metre curve radius. Option B from the previous assessment is sufficient. It is not the road which causes accidents, rather, it is the people who drive on it. If there has to be a realignment, then it should be done with less impact on Bold Park. In addition the expense which will be required to construct this alignment is an unfair financial burden upon ratepayers and tax payers; especially when engineering advice indicates that a lower radius is quite acceptable and meets national standards.

1.5 Reply - Town of Cambridge and MRWA

See responses to 1.2, 1.3 and 1.4 .

- 1.6 The safety problem in this area, if it does exist, has been publicly discussed for some five years. In that time the City of Perth has not done one act to mitigate the so-called problem. There have been no visible attempts to improve the safety of this bend through cheaper means such as :

- erecting warning signs of the approach of the bend;
- painting transverse lines with reducing separation across the carriageway on the approach bend;
- installing crash barriers to prevent cars which are not under proper control from running off the road or rolling over;
- adjustment of the camber of the curved road for the northbound lane which is currently in opposite crossfall;
- adjust the vertical profile of both north and southbound lanes so as to reduce suggested road noise complaints from local residents, which will also assist with transitioning super-elevation; and
- reducing the speed limit from 80 kilometres per hour to 70 kilometres per hour as it would then be similar from Servetus Street to the lights at Oceanic Drive.

Perhaps this total inaction is a true indicator of the real need to re-align the road (i.e. there is no need). If there was a genuine concern for safety some interim measures would have been adopted. A two year deferral should be placed upon the realignment pending the trialing of the above alterations. If there is still a problem then, the option prepared by Sinclair - Knight and Partners, or Option G should be implemented.

1.6 Reply - Town of Cambridge and MRWA

Existence of a safety problem in this area could not be seriously questioned. This is a proven fact and was the only reason for the PER on the West Coast Highway realignment.

Over the last five years the Council has attempted to have the matter resolved for once and for all.

Experience has shown that the erection of warning signs, posting lower speed limits and painting of transverse lines do not significantly lower operating speeds given the existing road environment.

The speed survey carried out by the Council demonstrates the above given the fact that the approaches to the problem curve are identified with speed limit, advisory speed limit and intersection signs. The north bound traffic

is further warned of the curve by series of chevron boards. These boards have been there for many years.

The installation of crash barriers do not reduce the number of accidents. Although, the installation of crash barriers may, in some cases, reduce the severity of damage.

The crossfall on the north bound carriageway is in the correct direction and is adequate for the posted 70 km/hr speed limit. However, the curve has an unacceptable history of fatal and serious injury accidents.

The existing posted speed limit has always been 70 km/hr, not 80km/hr as claimed.

- 1.7 BSD Consultants have prepared a centreline design for an alternative alignment on behalf of the Friends of Bold Park Bushland (Inc.) It could be constructed partly west of Option C (Sinclair Knight and Partners alignment) with a radii of 350, 300 and 350 metres. It commences west of West Coast Highway near Rochdale Road and for a considerable distance remains to the west using up part of the existing road reserve thus preserving more bushland to the east of the current alignment. Any future designs considered necessary as a result of BSD's findings should also start to the west of the highway commencing near Rochdale Road.

1.7 Reply - Town of Cambridge and MRWA

The proposal by BSD, which is based on assumed speed environment, is noted.

Given the actual speed environment the use of 350m minimum radius curves is acknowledged to be acceptable. Although the 400m minimum radius curve would be preferred.

The realignment of West Coast Highway needs to find a balance between construction costs as well as environmental and safety issues. The BSD proposal appears to encroach too far into the large sand dune opposite the Rochdale Road intersection thereby impacting on the aesthetics and cost of the realignment.

- 1.8 If it is considered necessary to realign the Highway then the original Option C prepared by the reputable consultants Sinclair - Knight and Partners to the engineering standards of Austroads (previously NAASRA) for the road speed of 90 kilometres per hour is all that is required. Three road engineering consultants (Sinclair-Knight and Partners, retired Main Roads Western Australia senior design engineer Mr R Purdie and BSD Consulting) are convinced that a 300 metre radius would achieve that desirable safety characteristics, meet the Austroads safety standards and reduce the intrusion into Bold Park by 50 %. In Appendix 2 of the Environmental Protection Authority's Bulletin 655, the Main Roads Western Australia under Section 2.5 page 9 states 'the 280 metre minimum radius would be acceptable for a design speed of 80 kilometres per hour if there where no intersections on the back of the curve provided that other general design standards were maintained'. The alignment prepared by Sinclair - Knight and Partners originally met these requirements. Why not move the Challenger Parade intersection north, as in modified Option C, then apply this design?

1.8 Reply - Town of Cambridge and MRWA

The realignment proposal follows Sinclair Knight and Partners proposal as closely as possible using the preferred 400m minimum radius curves. As noted above, it is acknowledged that 350m minimum radius curve would be acceptable. See also comments under 1.2 and 1.3.

- 1.9 Cost is defined as being the main reason that Option G, which was acceptable to the City of Perth, the Hon Ministers for Transport, Planning and Environment and their respective Departments, is not being implemented. Yet no indication of the relative cost of the current option is given. It would appear that the earthworks required to construct the

modified Option C alignment are equal to that for Option G. What volumes of material need to be shifted under each alignment option?

1.9 Reply - Town of Cambridge

The cost estimate for the present proposal is \$ 1.7m. The cost estimate for Option G was \$ 2.3m. The cost of earthworks is estimated at \$208,000 for the present proposal and was estimated to be \$410,000 for Option G.

- 1.10 The only justification for the proposal is to improve the safety of road users. The modified proposal appears to achieve this. Whilst the submitter has not had any difficulty negotiating this section of road, they accept the Main Roads Western Australia are the experts and their advice should be heeded. If such a hazard existed upon private property the family of victims could sue for vast damages. It appears that the Town of Cambridge (Perth City Council) and the Environmental Protection Authority have been avoiding, with impunity, taking responsible action to improve the safety of this road.

1.10 Reply - Town of Cambridge

The support for the realignment is noted.

The Council has not avoided taking responsible action on the issue but has had and continues to have an interest in the early resolution of the problem in the best interest of all concerned parties.

- 1.11 The reduction of noise to nearby residents is not an issue of concern. It is known that there are a group of about 5 residents from Launceston Avenue who have been lobbying to have the road moved away from their houses. The houses were bought in full knowledge of the existence of this road. In fact the construction of the existing alignment of West Coast Highway has benefited these residents. Prior to that the road was right in front of their homes. The old road still exists as Launceston Avenue, it is separated from the north bound lanes of West Coast Highway by a wide median strip with trees and shrubs. Noise is an unavoidable fact of life for people who build or move into houses alongside busy roads. It is only when it is planned to re-route roads into previously quiet areas that residents have real cause for complaint. Modification of the noise environment could be achieved by other means such as heavier tree plantings and earth bunds. It is objectionable that public funds are used to improve the value of private residences.

1.11 Reply - Town of Cambridge

The realignment proposal was not initiated to reduce noise impact on the nearby residents but to solve the bad safety record of the Highway.

In the case of the present realignment proposal it was merely pointed out that the design can be carried out in a manner which would minimise noise impact not only on the Bold Park users but also on the nearby residents.

- 1.12 Local submitters indicated their concern at having to attend vehicle accidents in this area, which seem to happen particularly at night, or in wet or congested conditions. It was also commented that a straightening of the Highway at the southern bend might transfer the danger spot to the north, unless this curve is also improved. It is not reasonable defence to state that the engineering will safely cater for 70 kilometres per hour traffic when the penalty arising from an accident due to travelling at 90 to 100 kilometres per hour is serious or fatal injury. Some traffic will always move along the highway at higher speeds. There really cannot be that much at stake environmentally in this minor realignment to justify a decade of discussion, debate and repetitive professional studies.

1.12 Reply - Town of Cambridge

Agreed that the design should cater for the actual speed environment and that the matter should be resolved as soon as possible.

- 1.13 The new road surface should be noise reducing asphalt with all drains and service access points at surface level. It is essential that access to the South City Beach precinct via the south end of Challenger Parade is preserved. Otherwise the remaining western accesses

of Helston Avenue and Launceston Avenue which are presently heavily loaded with traffic will become intolerably so for residents.

1.13 Reply - Town of Cambridge and MRWA

The intention is to retain access to Challenger Parade.

Detail design has not been completed. The points raised will be considered at the final design stage.

1.14 Logically from this proposal, do the Commissioners or Consultants intend to straighten every road which has a bend? Will the Old Brewery be removed to straighten Mounts Bay Road?

1.14 Reply - Town of Cambridge

No. Even the present proposal does not remove bends.

1.15 The curve in Stephenson Avenue is far greater and a number of accidents, including fatal ones have occurred at the south end of Perry Lakes. This should be fixed first.

1.15 Reply - Town of Cambridge

Not relevant to the current proposal to realign West Coast Highway. However, Stephenson Avenue upgrade/realignment forms part of Bold Park PER currently under consideration.

1.16 In a similar situation in New South Wales, under their Local Government Act, a Section 538 Committee called for an independent Engineering report from consultants to consider the possibility of an alternative design to reconstruct a road so that the need for realignment could be eliminated. A satisfactory alternative was devised by the consultants and the recommendations by the Committee to use it was implemented. In other words, the road surface was redesigned within the existing alignment, satisfying the environmental concerns and the community concerns about road safety. This approach should be used for West Coast Highway.

1.16 Reply - Town of Cambridge

The improvement of safety and the manner in which this should be carried out was considered thoroughly in the Public Environmental Review. It is generally acknowledged that existing alignment and its geometric standard is inadequate. The basic dispute is based on the appropriate geometric standard to be adopted and the location of the realignment.

See also comments under 1.2 and 1.3.

2. System Six recommendations

2.1 It is of great concern that the System Six report which stresses the importance of the area for regional conservation of representative flora, fauna and other values has been completely ignored in this assessment. It is not possible to accept the claim that 'the level of impact of the proposal on the existing local representativeness of the Quindalup Dunes would be insignificant'. The System Six Report is one of Western Australia's most significant planning documents - the work of a large and prestigious group of highly experienced and qualified Western Australians who consulted the community widely at institutional and individual levels.

2.1 Reply - Dames & Moore

The System 6 Report is, without question, a significant document. The technical author of the Town of Cambridge's report was directly involved in the preparation of many of the System 6 Report's recommendations during its preparation in the 1970s, in particular the delineation of virtually all System 6 areas within the Perth Metropolitan Region. The same individual was involved in the planning and management of the Region's open space system for ten years, from 1976 to 1987. In the course of the Corridor Review Study (1986, 1987) he undertook an analysis of the representativeness of all geomorphic/vegetation systems

subject to the System 6 recommendations using original data from the System 6 Study itself. This information was made freely available to consultants, and has been referenced on several occasions, including in Mitchell McCotter Ecoscape's PER for Bold Park (1993, Figure 2.3). On the basis of this information Dames & Moore reiterates that, in our technical opinion, the overall representativeness of Quindalup Dunes in all types of conservation and open space/recreation reserves will not be significantly affected by the Town of Cambridge proposal to realign the West Coast Highway. The reduction in representation will be in the order of 5% or less, especially if implementation of the Northwest Corridor Structure Plan (northward to Guilderton) achieves the setting aside of nominated System 6 areas, as is intended.

2.2 By reducing the overall size of the Bold Park bushland it puts the area at greater risk by the encroachment of weeds and the physical effects of the further fragmentation. The removal of even lower significance vegetation removes protection from other more significant flora. The removal of these buffers has a cumulative effect and by a process of attrition the quality of the vegetation in this area and within the greater Bold Park is reduced.

2.2 Reply - Dames & Moore

It is correct that reduction of the total area of a park (or reserve) and its physical fragmentation may "weaken" it, and render it more vulnerable to various types of impact. It is also correct that the realignment of the West Coast Highway represents further attrition of the total park area. For this reason the Town of Cambridge's report (and the PER, Dames & Moore 1992, before it) clearly emphasises the need for expert rehabilitation of modified areas, environmentally responsible engineering roadworks, and minimum impact on adjacent park vegetation at all times during the construction and post-construction periods. There will be encroachment of buffers, but it will not be profound and impacts can be minimised by both good design and good management.

2.3 The area's scientific, educational and recreational values were not discussed in relation the System Six document. The System Six Recommendations and the 'implication for ... M46 and M47' were a principle reason for the Environmental Protection Authority reaching its conclusion on the realignment proposals in 1992 (Bulletin 655).

2.3 Reply - Dames & Moore

These issues were discussed at length in the original PER (Dames & Moore, 1992) for the various other realignment options. It is considered that these issues will not be affected in any materially different way as a result of the current proposal, and hence do not require greater coverage in the Town of Cambridge report.

Drawing upon our professional training and expertise in environmental science and recreation planning, together with site assessment and reference to survey data on use patterns in Bold Park, we find it difficult to see how these issues are as pivotal as is claimed. Whilst a sand track that clearly takes regular pedestrian and horse traffic will be severed, it is quite possible for the destroyed alignment to be reinstated in a different alignment if the community so wishes. This would, of course, introduce further impact to previously undisturbed areas nearby and may not be considered desirable for that reason.

Scientific research occurs adjacent to the proposed alignment, but this area will not be affected. There has been no evidence received that the proposed realignment will affect any current or planned scientific research project, or educational programme.

- 2.4 The Bold Park Bushland environment should be maintained as an urban remnant representative of vegetation associations which once covered the Swan Coastal Plain and therefore components of each association within the park must be protected.

The importance of Bold Park is its large size and therefore its ability to support a wide variety of flora and fauna. It contains a large variety of species in one location, and its heritage value as an unspoilt example of what our original coastal landscape once looked like cannot be ignored. If a new realignment is considered necessary then it is important that, unlike the current new proposal, a new realignment should take into account these values.

2.4 Reply - Dames & Moore

The sentiment expressed in the first three sentences is supported. The claim in the last sentence that the values referred to were not taken into account in the current proposed realignment is simply not true; they were.

- 2.5 The area of land described on pages 4 and 5 of the current Dames and Moore report, despite its level of disturbance, functions as a buffer zone to adjacent urban impacts. This is reflected in the decrease in the level of deterioration with distance from the present road reserve. The further the proposed alignment encroaches in the park, the greater the impact on a currently well preserved ecosystem due to the reduction in the width of the present buffer area. The success of the survival of Bold Park as an area of conservation, recreation and education value depends on it maintaining its overall size. Reductions in its area seriously stress its integrity.

2.5 Reply - Dames & Moore

It is true that the further any alignment is located away from the existing road reserve, the more there will be a tendency to impact on comparatively undisturbed vegetation. However, approximately 60% of the length of the proposed alignment (from milestones 400m to 1,100m) either straddles or crosses the existing bridle path/sand track, and native vegetation on either side of this is already disturbed at various points.

In consideration of this issue, the Town of Cambridge report stresses the need for rehabilitation of the old West Coast Highway alignment, and the impacted margins that represent the buffer area referred to in this question. Essentially, the point being made and the undertaking being offered is that there is a need to ensure that the impacted buffer area not be allowed to spread eastwards to the new alignment and thereby create an excessive zone of impact.

3. Vegetation and the Quindalup Dunes association

- 3.1 The removal and disturbance of vegetation in the study area has serious implications for the ecological integrity of the Bold Park bushland ecosystem as the proposed road realignment option will transverse the only area of Quindalup vegetation in M47. The report presents a map of the soils and topography of Bold Park bushland (Figure 4) which demonstrates the extent of the Quindalup soil sequence however, does not provide an equivalent map of the vegetation communities discussed in Section 4.2.2. The vegetation communities which are described as associated with Quindalup Dunes are not coincident with this soil type as the only criterion. They are predominantly based upon floristic associations. The associations which are contained in this Quindalup Dune area are not well represented elsewhere in Bold Park.

3.1 Reply - Dames & Moore

Whether the extent of Quindalup vegetation in Bold Park is defined broadly (Figure 4) or narrowly (Figure 3), it is equally true that the proposed road realignment traverses the only area of Quindalup vegetation in M47.

If the unclear phrase in Item 3.1 "serious implications for the ecological integrity" means that the project would seriously disrupt the functioning of ecosystems, not only in the project area but also in the rest of the study area and other parts of Bold Park, then we disagree. We have no information to suggest that ecological impacts will be anything other than local.

Contrary to the concern about a vegetation map "equivalent" to the Town of Cambridge report's soils and topography map (Figure 4), the report's Figure 3 shows most of the extent of Quindalup vegetation (Units 3A and 4B) in Bold Park. Moreover, Figure 3 is at a larger scale and in more detail than the map of equivalent size and scale (*e.g.* Mitchell McCotter and Ecoscape 1993, Figure 2.2). The part not shown is the eastern end of Vegetation Complex 3A/Af, which extends no more than 100m eastwards off the Figure 3 map.

Although it is now recognised (*e.g.* by Mitchell McCotter, 1993) that the Quindalup soils association extends over the major portion of Bold Park (Churchward and McArthur's 1978 map - in DCE's 1980 atlas - shows the eastern boundary crossing only the western edge of Bold Park), Figure 3 in the Dames & Moore report recognises that Quindalup vegetation (Units 3A and 4B) in the park is essentially restricted to the area shown on the figure (the southwestern corner), a much smaller area than that covered by the soils association.

However, the Mitchell McCotter Ecoscape vegetation map shows patches of dune heath - one type of dune heath is a Quindalup vegetation type - in central and eastern, as well as western, parts of Bold Park.

The removal and disturbance of native Bold Park vegetation by the project will reduce the size of the continuous area of Bold Park covered in native vegetation by less than 5%. Moreover, if rehabilitation of the area west of the new alignment is successful, there would be a decrease in heavily disturbed vegetation (Unit 6) and an increase in Quindalup vegetation (mainly Unit 3A) relative to the current proportions.

Less than 50% of the part of Modified C alignment in Bold Park traverses Quindalup vegetation and, as stated in the report, occurrence of Quindalup vegetation in Bold Park extends well to the east of the alignment ("project area") (see Figure 3).

It is estimated that the continuous area of Quindalup vegetation (Units 3A and 4B) in Bold Park, both within the alignment and west of it, would be reduced by less than 15% by the project.

- 3.2 The fact that the realignment passes through five vegetation associations in this small area indicates the ecological diversity of the area. There is no indication of whether these five vegetation associations occur together elsewhere. It is this diversity which makes this vegetation association and the rest of Bold Park special. The seeds of unknown species, which are not in display in this area at this stage, are also at risk from this proposal.

3.2 Reply - Dames & Moore

The fact that the realignment passes through five vegetation associations indicates, not so much that the area is ecologically diverse but, that the scale of the mapping is large compared to other vegetation maps of Bold Park, viz. Keighery et al. (1990) and Mitchell McCotter Ecoscape (1993). The two smaller scale maps show the alignment crossing two native vegetation associations - Banksia woodland and *Acacia rostellifera* shrubland - and possibly just touching a third - dune heath. Mitchell McCotter Ecoscape (1993) identified eight major native vegetation formations in M46 and M47.

It is not likely that "seeds of unknown species" will ever be displayed or expressed in the area of the alignment since their expression, presumably after fire or other disturbance, would be smothered by veldt grass and other weedy or pioneer growth. The natives that would appear after fire or other disturbance would most likely be *Acacia rostelifera* and other species that are already "known".

3.3 Modified Option C will destroy the Quindalup Dunes and reduce the bushland size, walking trails and the peace and quiet which is so valued by the users. The bird life, insects and reptiles and the distinctive vegetation of the Quindalup Dunes will be reduced unacceptably.

3.3 Reply - Dames & Moore

As acknowledged earlier (response to Item 2.3) there will be a loss of one walking trail, and quiet solitude in the immediate vicinity of the new alignment will be lost. This quality of experience will, however, be available and unaffected in locations relatively nearby, especially if the cuttings in which the road carriageway is to be constructed are designed in such a way as to minimise noise intrusion into the adjacent park environment, as the report suggests will be the case. The acceptability of the relatively small reduction in native wildlife and vegetation depends upon weighting of the benefits and costs of the project.

3.4 The report states that the Quindalup Dunes are the 'least well known of any systems on the Swan Coastal Plain', yet they suggest destroying the extremely diverse vegetation of that area.

3.4 Reply - Dames & Moore

The quote is taken out of context. It refers, quite definitely and specifically, to the fauna and not, as the Item 3.4 statement implies, to the vegetation (see the bottom paragraph on Page 16 of the Town of Cambridge report).

In fact, the Quindalup vegetation is probably better-known and more studied than other Swan Coastal Plain vegetation systems, thanks to E.A. Griffin, the Semeniuks and others whose studies are referred to in a draft report on Quindalup Dunes flora by Griffin for the Central Coast Planning Study Steering Committee.

3.5 The references to other locations where *Acacia rostelifera*, *Calothalmus quadrifidus* and *Chamelaucium uncinatum* occur are misleading. The areas referred to are either degraded or under threat from development (e.g. Mount Claremont Bushland, Port Kennedy, Secret Harbour and the coastal portions suggested for inclusion in Yalgorup National Park), they are certainly not secured reserves and most are not within the immediate metropolitan area. The fact that the Quindalup Dunes formation extends over the whole of the Mount Claremont Bushland is irrelevant, since the Council wish to put houses over that area.

3.5 Reply - Dames & Moore and Town of Cambridge

Contrary to statements and implications made in Item 3.5, the Dames & Moore report:

1. makes no specific reference to *Acacia rostelifera*, *Calothamnus quadrifidus* or *Chamelaucium uncinatum* species occurring in Yalgorup National Park or coastal portions suggested for inclusion in it;
2. makes no claim that one or more of the three types of Quindalup vegetation in the Project Area extend over the whole of Mount Claremont Bushland (in fact, it does the opposite, in noting that tuart woodland also occurs there); and

3. refers to a number of areas with Quindalup vegetation of one or more of these three types which are less degraded and are not under threat from development in the short term, some of which are in the Metropolitan Area (e.g. System 6 Recommendation M2).

The Council does not have environmental or planning approvals to put houses in the Mt Claremont Bushland. The Mt Claremont Bushland is subject to separate consideration under the current Bold Park PER. Consequently, the reports reference to Quindalup vegetation occurring there is not irrelevant.

- 3.6 The fact that species occur elsewhere and are represented in the region is a zoo mentality. The fact that there is a functioning ecosystem which will be severely impacted does not appear to have been addressed. The biogeographic variations which exist between areas have not been considered either.

3.6 Reply - Dames & Moore

Variation, e.g. in *Chamelaucium uncinatum*, has been considered and it is recognised that the structure, condition, nature and proportion of species in vegetation units varies from site to site. For instance, native vegetation of the Project Area, particularly the *Acacia rostellifera* units, has suffered from weed invasion and other urban-associated impacts. Consequently, such habitat tends to have fewer and more wide-ranging species than larger comparable units north and south of the Metropolitan Region.

4. Fauna and their habitats

- 4.1 The small dense stand of *Dryandra sessilis* between milestones 950 and 1,100 (Ref 4.2.5) supports an amazing number of small nectar and insect eating birds. As a significant proportion of this area will be destroyed, a substantial sized stand of *Dryandra* should be included in the area of the existing alignment which is to be rehabilitated. These birds seem to be particularly dependent upon this area and could not be considered to be 'generalists' (Section 4.3.1) which will take well to removal of this habitat. Even if they are generalists, the destruction of their habitat will occur before the rehabilitation of the old alignment will provide any suitable habitat. The report seems to ignore the fact that this rehabilitation process will be long and difficult.

4.1 Reply - Dames & Moore

There is more *Dryandra sessilis* in Bold Park than the small scale vegetation maps of Keighery et al. (1993) and Mitchell McCotter Ecoscape (1993) indicate. For instance, neither shows the *Dryandra sessilis* shown on Dames & Moore's Figure 3.

The rehabilitation programme will include one or more areas of *Dryandra sessilis* heath as well as areas of *Acacia rostellifera* shrubland and representative areas of the other types of native vegetation and flora that will suffer impacts from the Project.

Thickets of *Dryandra sessilis* also disappear under natural conditions, due to factors such as fire and senescence. In these circumstances, the fauna associated with the thickets also disappear from the site. As new thickets develop they are colonised from existing thickets in the area. In the case of the rehabilitation, colonisation will be from other thickets in Bold Park or the area west of the alignment.

It is not clear to which species the statement "these birds seem to be particularly dependent upon this area and could not be considered to be 'generalists'" refers.

The framer of the comment allows for the possibility of being wrong in stating that the birds of the Dryandra thicket "could not be considered to be generalists" by adding "even if they are generalists".

A WA Museum team has had a fauna sampling and observation programme in Bold Park under way for the last seven years. A bird expert on the team has observed that, in the area of the *Dryandra sessilis* the avifauna is indeed "generalist", not "specialist". The birds are mobile, are not habitat-specific and feed on both nectar and insects. They are seasonal in the area (i.e. they are in the Dryandra thicket only when it has flowers) then move to other areas - of Banksias, Calothamnus, etc. - when they are in flower.

4.2 The bird life has increased in the south City Beach area over the past thirty years. Indeed, there was no such drawn out examination of the multiplicity of alternatives when the original narrow Challenger Drive was converted to the dual carriage West Coast Highway. Nonetheless, the birds, snakes, goannas and green growth survived and thrived.

4.2 Reply - Dames & Moore

The statements summarised under Item 4.2 appear to accept that fauna are able to adapt to modification of the environment in an urban context, and to survive and thrive if given a chance.

However, the statement that bird life in the area has increased over the last thirty years is open to question, although birds that adapt well to areas of disturbance, such as Singing Honeyeaters, Magpies, Ravens and Ring-necked Parrots, have increased. This increase is due at least in part to the birds learning to use exotic food resources.

4.3 Reptile fauna should be discouraged from attempting to move between the area of rehabilitation and the majority of Bold Park. Would it be possible to have kerbing which will limit their ability to gain access to the road. Also is it feasible to have below road pipes through which such fauna could migrate in safety from area to area?

4.3 Reply - Dames & Moore

It is the advice of experts in reptilian fauna at the WA Museum that reptiles in the Quindalup system tend to have extremely limited territories in physical extent, do not travel far, and are easily dissuaded from exploring further afield by any form of obstacle, particularly steep inclines. Reptiles are therefore not easily persuaded to cross constructed road carriageways and their associated earthworks. A 50cm high embankment on either side of the carriageway would keep out most reptiles.

4.4 The reptile fauna of this Quindalup Dune system contains species which were thought to be no longer existing within the Swan Coastal Plain area. These species have only recently been sampled in this area. The proposed project area has not been sampled despite this fact. No attempt has been made to determine the distribution and abundance of their habitat and what proportion will be destroyed.

4.4 Reply - Dames & Moore

The content of Item 4.4, especially the first statement, is wrong. No reptile fauna species recorded in Bold Park is (or was) thought to no longer occur within the Swan Coastal Plains area. *Vermicella calonotus* was previously listed as rare and in need of special protection but is actually widespread and common in Bold Park, and has recently been taken off the rare and endangered list.

Although some species of reptiles are rare in the city area, none of those recorded in Bold Park (including the five species of *Vermicella* and the Bardick) is rare within the Swan Coastal Plain area.

The single recording of the Bardick (*Echiopsis curta*) in 1994 by a WA Museum team member was made only after the area where it was found had been sampled for over seven years (not "only recently"). This is the only reptile which has been recorded in no other part of Bold Park other than the Quindalup vegetation area.

Though rarely recorded in the city area, the Bardick is relatively common in Yanchep, Burns Beach and Neerabup and southward near the coast. It is common along the south coast. Because the chance of a sampling programme finding the snake in the project area would be minimal, there would be little point in undertaking a survey for it.

Research of the type suggested under Item 4.4 is expensive and requires considerable time to undertake. It was not a part of the brief to the consultant to undertake original (and in this case sophisticated) fauna field research. However, the research proposed in the Town of Cambridge report could help to provide answers.

4.5 To suggest that the rare reptiles could be caught and shifted is not sensible. Where will the animals be relocated? The Quindalup Dunes are of major importance to these animals otherwise they would be found elsewhere in Bold Park.

4.5 Reply - Dames & Moore

The statements contained in Item 4.5 are irrelevant as:

- the only Quindalup vegetation system reptile not found elsewhere in Bold Park is the Bardick (see Item 4.4 response);
- no rare reptiles are recorded in Bold Park; and
- catching of animals and relocating them are discussed in the Town of Cambridge report's Section 5.2. Animals would be released into habitats of the same types as those in which they are caught.

It was the advice of WA Museum Zoologists that a "catch and release" programme was the most practical and sensible action to take at the time of construction. In framing this particular advice the issue of where the captured animals would be released was raised. The advice from the Museum is that the reptiles involved readily adapt their territories to accommodate new individuals introduced into any given location, and that new territories are available in the areas of similar habitat adjacent to those to be eradicated by construction.

4.6 It is preposterous for Dames and Moore to suggest that the destruction of habitat for important species would aid research. The conclusions in Section 5.2 of the report as to the hazards to fauna are apparently at best only un-informed speculation and are not supported by those persons who could bring some expertise to the assessment. Recent advice from the Western Australia Museum is that no research data exists to back up the suggestion that relocation could be achieved 'with a good expectation of successfully establishing new territories'. For Dames and Moore to promote the destruction of a habitat area which includes rare and endangered species, as an opportunity to conduct research is a contradiction in terms.

4.6 Reply - Dames & Moore

The Town of Cambridge report did not intend to advocate that "destruction of habitat for important species would aid research" in the sense that it either justifies such destruction or that subsequent research findings would compensate for destruction of habitat. What was meant is that at any occasion when environmental modification is likely to occur it is both sensible and prudent to monitor environmental change, and to take advantage of the opportunity for a worthwhile research programme and the funding which may be available.

Other expectation of success is provided by the observations that populations of most types of reptiles found in Bold Park fluctuate enormously under natural conditions. They have high reproduction potentials and build up their populations rapidly after catastrophes such as fire.

On the issue of hazards to fauna (Section 5.2) it was the advice of the WA Museum that reptilian fauna are not highly mobile in the sense that they do not travel large distances exploring outside their own territories. In addition, reptiles are dissuaded from moving further afield by relatively minor physical obstructions such as steep slopes and minor changes in elevation (e.g. 30 to 50cm step).

Although there may be no specific research data supporting successful relocation, CALM's success with translocating mammals, e.g. Quendas, provides good expectation of success.

As indicated above (Item 4.5) new territories are considered to be available in adjacent habitats that are not to be affected by construction. The advice of the WA Museum is that, unlike other highly territorial fauna, reptilian fauna are understood to have relatively "elastic" territories and tend to accommodate new individuals requiring new territories relatively easily. The technical author was particularly aware of this issue as he was involved with the capture and relocation of fauna programmes associated with other development projects, has had previous experience in wildlife management and field research into animal behaviour in the wild (mainly overseas), and previous experience in the planning and design of broadacre country zoo sites for the breeding of endangered animals.

4.7 Who can make the Town of Cambridge undertake all of the work required by Section 5.1 of the report and how will it affect rates of residents? It would be more sensible to have a less environmentally degrading and cheaper realignment such as that prepared by Sinclair-Knight and Partners for the Friends of Bold Park Bushland.

4.7 Reply - Town of Cambridge

The works identified would be part of the works requiring EPA approval and auditing.

The works would have no impact on the rates of the residents. The project will be funded from State/Commonwealth Government sources. MRWA would manage the project.

The option proposed by Sinclair Knight & Partners is unsatisfactory from traffic safety point of view. See also comments under 1.2, 1.3 and 1.8.

5. Physical effects of the project

5.1 The significant earthworks which will be required will cause much disturbance beyond the road construction area and even the road reserve. The cut into the large dune formations opposite Challenger Parade will provide significant visual and noise intrusion into the adjacent bushland. Noise intrusion into the Western Australian Museums' study area that will border the new alignment.

5.1 Reply - Town of Cambridge and MRWA

The issues stated are addressed on page 5 of Section 3.0 and in Sections 4.4 and 5.0 of the Town of Cambridge report prepared by Dames & Moore.

Care will be taken during construction to minimise impacts outside the immediate area of construction. As stated under comment 4.7 above the works will be subject to audit by EPA.

The Western Australian Museum study area will not be impacted significantly, if at all, by noise from the realignment of West Coast Highway.

5.2 The proposal will greatly affect the topography of the area and will add even more to the noise and visual intrusion into the Bold Park area. A 20 metre and a 30 metre high dune will be lost through the construction of the modified Option C.

5.2 Reply - Town of Cambridge

No dunes will be totally lost, although the dunes will be impacted by the construction of the road. The fact that the road will be in cut for most of its length will minimise visual and noise intrusion into the Bold Park area.

5.3 Modified Option C will also transect the existing Quindalup Dune system causing a loss of slope in an area where steep contours have an important ecological function. The geomorphological aspect of the proposed physical effects outlined in Section 3.0 of the report has not been considered sufficiently. The proposed realignment will cut through an area next to 30 metre contours. The unique conditions provided by the slope and aspect of this tertiary Quindalup sand dune system is reflected in the diversity of flora and fauna it supports. The proposed landscape rehabilitation on the redundant section of West Coast Highway, outlined on Page 15, will not be able to provide an ecological, nor landscape replicate of a complex and unique dune ecosystem.

5.3 Reply - Dames & Moore

There is no denying the actual physical effect of construction and there has been no attempt to hide or disguise what is a matter of fact. The exact topographic features affected are obviously, in a purist sense, unique and can not practicably be recreated in their exactness. There is therefore no intention to infer that the proposed recreated topography on the redundant section of the West Coast Highway would be an exact replica of that which would be lost, and with the complexity of the original dune ecosystem; rather it is intended that it be a recreated "type" Quindalup dune landscape. At the very least this would restore some measure of the original landscape character of the park, and it is argued that with sufficient effort and technical expertise there is no reason why an ecosystem of considerable value could not be established. In due time the landscape value of the recreated dunes should be high.

5.4 The topographic high provided by the dune ridge also functions as a noise and visual buffer from the highway for park users. This is a feature that has been lost in many other remnant urban bushlands due to gradual encroachment of peripheral activities. However, no visual assessment has been completed for the proposed alignment to justify the statements on page 14 of the report.

5.4 Reply - Dames & Moore

The first part of this item is not clear. With respect to the last part of the item, there has not been a visual analysis as this was not included in the brief. The meaning behind the assertion that no visual assessment has been undertaken to support statements made on page 14 is unclear, and we reiterate the sentence "the proposed alignment cuts through dunes of sufficient height such that the road would be hidden from both sides for most of its length". Our view is that this is a reasonable statement and that a visual analysis is not warranted.

5.5 The intrusion into Bold Park would not be countenanced if the area was residential housing. The fact that the area is bushland does not warrant a cavalier approach as represented by the modified Option C.

5.5 Reply - Town of Cambridge

That might be. However, the approach taken is not cavalier by any means. The approach taken has been to solve a known problem which

would satisfy as far as possible the environmental, traffic safety and construction cost issues.

6. Environmental management

6.1 It will be most important that the earthworks during construction be contained within the limits of embankment batters. The retention of existing dunes and their vegetation beyond these limits will require close construction supervision of earthworks equipment operators. It will also be necessary to limit access to the site during construction. The suggested use of the gabion-matresses to secure embankments and facilitate revegetation and reduce traffic noise is commendable.

6.1 Reply - Town of Cambridge

Comments noted. The intention is to keep activities within the immediate area of the works.

6.2 The utmost care should be taken in constructing the realignment. Dieback and weeds must be prevented from spreading. Bush clearing and tree pruning should be controlled to ensure that the minimum disturbance occurs. Storage of plant and equipment or stockpiling of materials should be on already cleared ground. Department of Conservation and Land Management level standards of design, construction, restoration and ongoing management should be employed. This should apply not only to construction, but also for fencing, embankments, revegetation, weed control.

6.2 Reply - Town of Cambridge

The intention is to take all due care. Construction activities will be subject to EPA audit.

6.3 The lack of detail and feasibility studies done in conjunction with the Museum on practicalities is a major concern. The use of 'bulldozers' to excavate in layers so as to find reptiles (some as small as pencils) is unrealistic and cannot be taken seriously.

6.3 Reply - Dames & Moore

The advice given on this aspect of proposed environmental management was devised with the direct advice of the WA Museum. It was precisely the advice of experts at the WA Museum that as construction vehicles undertake earthworks, they do so excavating in a series of layers in order to allow fauna and information on their burrows to be collected. The report is definitely not intending to suggest that bulldozers be used solely for the purpose of finding reptiles, as the item suggests.

6.4 No description of the Gabion Matresses is provided. Are they made of honeycombed flexible concrete. These are visually intrusive if they are regular surfaced and light grey in colour. Limestone rubble would be a better alternative. Unfortunately local species tend not to revegetate in them quickly, as is evidenced at Trigg Dunes.

6.4 Reply - Town of Cambridge

The Gabions and mattresses, if used, will be made of limestone filled gages. The use of limestone rubble is an option that will be considered in lieu of the use of gabions or of the mattresses.

6.5 There is no statement of how the rehabilitation will be monitored for success and what actions will be taken to ensure that local indigenous species will be collected from seed stocks or cuttings to ensure that the area of rehabilitation provides suitable habitats for both the flora and fauna which will be lost under this proposal.

6.5 Reply - Dames and Moore

The report could not go into this level of detail and, at the same time, fulfil the requirement of being brief and expeditious in its preparation. Commitments to monitoring were provided in the original PER and are contained in the original Statement of Conditions.

6.6 No information is provided on where the soil material will be stockpiled to avoid causing damage and to ensure that it is viable for rehabilitation.

6.6 Reply - Town of Cambridge
Such details are yet to be finalised .

6.7 Modified Option C presents a possibility for local people to join with the Department of Conservation and Land Management and the Council to rehabilitate the replanting and reconstruction of the existing alignment.

6.7 Reply - Town of Cambridge
Agreed.

6.8 The conclusion that a special fauna management and research programme be conducted and that recreation and amenity aspects can readily be managed by good design and appropriate site rehabilitation should become mandatory requirements and subject to approval at the design stage and included in the project specifications. Quality job supervision should also be a requirement to ensure that the environment is protected.

6.8 Reply - Town of Cambridge
Agreed.

7. Information in the supporting documentation

7.1 The documentation supporting the Section 46 Amendment request is considered to be totally inadequate for the following major reasons. This lack of technical detail makes it impossible for the community to assess this proposal particularly in relation to the existing carriageway, the Option C and the new proposal (i.e. Amended Option C).

Poor physical presentation of the technical information. There is no technical description of the geometric design of the new proposal; there is no obvious scale on the plan view of the proposal; the scale on the hand drawings is stated as 1:20,000 making it too small to be used for any measurement to be obtained for comparison purposes.

Justifications requiring further explanation. Three main points of justification are given by Dames and Moore:

- 1 A need to improve the safety standards of the road at this location - whilst not disputed - the Friends of Bold Park Bushland have attempted to assist and their design for Option C has been endorsed by two recognised authorities Sinclair - Knight and Partners and retired Main Roads Western Australia senior design engineer Rod Purdie, additionally BSD Consultants have reported that the alignment that results from their report could be constructed to the west of Option C.
- 2 The need to raise the design standard of this portion to conform with the prevailing standard of the West Coast Highway to the north and south of the project location - the curve radius of Option C is the same as curves designed and constructed by the Main Roads Western Australia to the south between Rochdale Road and Alfred Road. Mr Purdie has stated that to construct West Coast Highway south of Rochdale Road physical constraints had to be placed on the design of the above curves so that the road would fit between the Cottesloe Golf Course and the Swanbourne Rifle Range, BSD Consultants have also reported this fact. In addition, the Austroads Guide says that 'Environmental considerations ... must be considered as an essential part of the design process' (Section 1.4.7, page 3). Mr Purdie in comparing Options C and D concluded that '(i)t therefore follows that if a preference for Option C is established on other grounds (e.g. environmental) there is no significant reason in terms of road geometry and safety why it should not be acceptable as the preferred solution. Furthermore, the Main Roads Western Australia's statement on page 9 of Appendix 2 gives support to Option C providing the Challenger Parade intersection is moved to its location on Modified Option C.
- 3 Western Suburbs Highway - The comments on pages 3 and 17 that the construction of this particular alignment 'will delay' the construction of Stephenson Highway through Bold Park is a red herring. The Road Reserves Review Committee have indicated that

this road is not necessary and that West Coast Highway will suffice. this would in fact result in a considerable saving to the Government and the community. Some of this saving could be applied to the realignment of West Coast Highway in south City Beach in an environmentally acceptable manner.

7.1 Reply - Town of Cambridge

The documentation was kept simple because the proposal is only a variation of the proposals already dealt with in detail under the Public Environmental Review.

Large scale plans were available for viewing at the Council Office as were Council Officers to explain the proposal. This opportunity was taken up by some people.

As stated previously the 400m minimum radius is preferred but it is acknowledged that a 350m minimum radius is acceptable. See also comments under 1.2 and 1.3.

For the very reason that the Road Reserves Review stated the West Coast Highway could do away with the Stephenson Highway there is a requirement that it is of adequate standard along its full length. West Coast Highway has a poor safety record in the vicinity of Challenger Parade, hence the need for the realignment.

- 7.2 The words 'not significant(ly)' appear frequently throughout the document without appropriate quantification. What is meant by this phrase. No more than 5 %? Less than 50 %? Precision is clearly not feasible but some estimation would be helpful. It would be comforting if the Town of Cambridge put as much effort into the quality of the report as they have in the engineering content. Superficial attention appears to have been given to the Environmental Protection Authority's requirements for adequate environmental assessment in the belief that the minimum road radius argument is paramount and will prevail.

7.2 Reply - Dames and Moore and Town of Cambridge

The word "significant" in the Town of Cambridge report is used mainly in association with explanatory text concerning vegetation systems, but even then only "in summary". Exact quantification is extremely difficult, and in the context of representativeness of vegetation systems in geographically varied locations is well beyond the scope of the original PER, let alone the Town of Cambridge report. However, as a guide, Dames & Moore believes that 10% or less change/modification is "insignificant", and that above 20% is "significant". We believe that if a thorough analysis were undertaken in each instance the percentage change/loss actually referred to in the report as "insignificant" would be of the order of 5% or less.

The Council has not given only superficial attention to the environmental assessment. Environmental assessment has been the most extensive part of the whole project. Council, however, has had to pay attention to the traffic safety and construction cost aspects of the project as well. Council's aim has been to find a solution to a known problem which would satisfy as far as possible the environmental, traffic safety and construction cost concerns.

See also comments under 1.2, 1.3 and 7.1.

- 7.3 The suggestion that the 'project has the potential to contribute environmental benefits' is designed to mislead. No project that disturbs an area of bush that System Six and the Environmental Protection Authority have identified as regionally significant could possibly be environmentally beneficial.

7.3 Reply - Dames and Moore

Dames & Moore holds the view that in the case of a project that will modify the environment there is always potential benefit "to the environment in general" by learning more about successful environmental management techniques and better environmental design approaches. For example, the bauxite mining company Alcoa has contributed enormously to the field of environmental science and natural resource management as a result of its operations, as have numerous other industries and individual companies.

Dames & Moore does not intend to suggest that the project's "potential to contribute environmental benefits" justifies the project, but rather that at least there are some positives which could flow from the exercise, and that this is a more productive way of approaching the issue.

- 7.4 The document does not indicate how much land will be excised from Bold Park.
- 7.4 Reply - Town of Cambridge**
This cannot be accurately assessed until detail design has been completed.
- 7.5 The ongoing costs of the environmental rehabilitation of the existing alignment appears to be ignored. Costs of the cutting through the very high Quindalup Dunes and the construction of elevated carriageways, the use of gabion mattresses, resiting of underground services and above ground lighting and relocation of reptiles (feasibility of which is questioned) is all hidden.
- 7.5 Reply - Town of Cambridge**
These cannot be worked out until detail designs have been completed. The project cost is estimated to be \$1.7m.
- 7.6 There is no research to support the conclusion that captured reptiles could be relocated with a 'good expectation of successfully establishing new territories'.
- 7.6 Reply - Dames and Moore**
This is answered by comments for Items 4.3, 4.5 and 4.6.
- 7.7 The Dames and Moore report totally disregards community opinion. The community's overwhelmingly expressed preferences are not once referred to in the report. It also does not mention the differing professional opinions of road engineers regarding the need for a 400 metre radius on the bend. As a professional and objective report it falls well short of acceptable standards.
- 7.7 Reply - Town of Cambridge**
The report has met the requirements of the brief given to Dames and Moore which was to provide environmental assessment of the given realignment proposal.
- 7.8 The report is an objective assessment of the likely effects of the proposed realignment. It is also gratifying that the report anticipates reduced traffic noise levels affecting nearby residents, an environmental aspect which had not been considered in previous studies.
- 7.8 Reply - Town of Cambridge**
Support for the proposal noted.

8. Section 46 amendment process

- 8.1 Many submitters protested about the short two week period for submissions.
- 8.1 Reply - Town of Cambridge**
Longer period for submissions would not have changed the type of comments received which are polarised between those objecting and those supporting the proposal.
- 8.2 It was concluded by some that the Environmental Protection Authority does not want to consider this matter in the light of public opinion.

8.2 Reply - Town of Cambridge

Totally unfounded conclusion. The EPA advertised the proposal as early as 18 June 1994. Also EPA insisted that the report on the proposal be mailed to all people who provided written comments to the PER.

8.3 Many submitters indicated that the modified Option C appears to be very similar to the previously assessed Option D or F, both of which the Environmental Protection Authority found to be unacceptable. In view of this fact and that there is no further justification in the document by Dames and Moore, this alignment should not be considered environmentally acceptable.

8.3 Reply - Town of Cambridge

At the small scale the options appear fairly similar. However, there are significant differences in that the Modified Option C is located further west i.e. closer to the existing West Coast Highway alignment than Options D and F.

The Dames and Moore report makes the point that the Modified Option C could be considered environmentally acceptable.

8.4 The suggestion that this alignment will delay the need for the Stephenson Highway is false (it appears to be a carrot to a reluctant donkey or perhaps a veiled threat). Evidence from all over the world suggests that upgrading roads creates a public demand for more roads. In any case Stephenson Highway is a completely separate issues and is not relevant to assessing this proposal.

8.4 Reply - Town of Cambridge

It is agreed that the Stephenson Highway (Western Suburbs Route) is a separate issue. However, there is a link in that the Road Reserves Review of 1988 recommended that the Stephenson Highway should be deleted in this particular vicinity and replaced by the West Coast Highway. The recommendation also recognised the need for some realignment of the West Coast Highway.

The original proposals considered in the PER for the West Coast Highway realignment were seen not only to cater for the present needs of the West Coast Highway but also the future needs for an alternative to the Stephenson Highway (Western Suburbs Route). This is currently under review as part of the total rationalisation of the Bold Park Area.

8.5 The alignment contained in the Dames and Moore document is substantially different to all previous proposals and is therefore an entirely new proposal which should be assessed on that basis. It is an act of 'sophistry' to refer to the proposal as a 'modified Option C'. The new proposal encroaches a further 40 metres into Bold Park over that which was approved by the Environmental Protection Authority in 1992.

8.5 Reply - Town of Cambridge

The alignment is new but it meets the requirements of Section 46 Amendment process. The label given to this option was based on the fact that it resembled Option C in that it utilised reverse curves but of larger radii.

8.6 We live in a democratic society where the realignment of West Coast Highway has already been assessed by the Environmental Protection Authority and been through Parliamentary processes with several options approved. The elected Council of the City of Perth agreed with the previous assessment and approvals. It is disturbing that the unelected Commissioners of the new Town of Cambridge is starting this whole business again. These Commissioners are totally unaccountable and unresponsive to ratepayers.

8.6 Reply - Town of Cambridge

The options approved as environmentally acceptable were Options A, B, C and G. Only Option G satisfied traffic safety concerns. However, on closer investigation Option G turned out to be very costly and

consequently the Council in consultation with MRWA and DEP started to investigate a suitable alternative. The Commissioners inherited and continued with the investigations started during the time of the elected representatives. It should also be noted that the Council preferred Option D whilst MRWA preferred Option E.

- 8.7 Why is it that the public have to go through this 'again, protesting about the proposed incursion of the road on Bold Park. Surely there have been enough protests, enough political commitment for this issue to have been put to rest. I thought it had been resolved, but now the Commissioners for Perth have presented an unacceptable option and at the same time appropriating the terminology adopted by the Friends of Bold Park (ie calling its plan option C) so that people reading of the proposal will be confused. Sneaky stuff, but what does one expect from unelected commissioners!'
- 8.7 **Reply - Town of Cambridge**
It is incorrect to claim that the Commissioners originated the present proposal. See previous comments in 8.5 and 8.6.
- 8.8 It would have been hoped that the unelected Commissioners would have been thinking of ways to enhance the value of such a valuable resource as Bold Park, for instance, by devising plans for weed eradication and perhaps some presentation of the historic areas such as Camel Lake and the old limestone quarries. Instead, one finds them spending time devising ways to reduce it. Yes disappointing!
- 8.8 **Reply - Town of Cambridge**
The issue is to resolve a known traffic problem. The future of Bold Park and improvements therein are being addressed separately. See also comments under 8.6.

9. Other Matters

- 9.1 Why was Option G submitted by the Perth City Council as a potential and viable option for the realignment of West Coast Highway if funding for this option was not available? The time lapse between when realignment options were first submitted and then decided upon, and the resultant cost rise, should of course, have been a recognised and built in factor. No doubt, any option ultimately decided upon will have grown in construction costs since they were first proposed in 1989.
- 9.1 **Reply - Town of Cambridge**
Number of options were submitted for the PER for evaluation purposes. The option preferred by the Council was Option D. None of the options were costed at the PER stage.
- 9.2 The area south of Rochdale Road (Mount Claremont Bushland) should be preserved for it's high environmental value and should certainly never be zoned residential.
- 9.2 **Reply - Town of Cambridge**
Not relevant to this proposal.
- 9.3 The proposal appears to assume that the Stephenson Highway will be built at some stage. When are the various levels of government going to heed public demand that Bold Park be set aside as a special parkland reserve and the old plans to have the Stephenson Highway through this area and the Wembley Golf Course should be scrapped.
- 9.3 **Reply - Town of Cambridge**
The issue of Stephenson Highway is subject to a separate study currently under way.
- 9.4 What are the proposed funding source? Has there been any loss of funding since the change in situation regarding the City of Perth restructure? How much is this loss, if there is any loss?
- 9.4 **Reply - Town of Cambridge**

Funding will be provided from State/Commonwealth Government sources. Loss of funding is unlikely, particularly if construction is started prior to June 30,1995.

9.5 The sparsity of technical information about the proposal is inadequate and does not assist in making an informed assessment of the matter. Members of the public have made hundreds of submissions on this issue and others affecting Bold Park. How many more are needed? The brevity of the comment period is also objectionable.

9.5 Reply - Town of Cambridge

It is precisely because of the number of submissions previously received and the level of knowledge of the issues that the submission period was kept short and the technical detail was kept to a minimum necessary.

9.6 It is time that the Stephenson Highway alignment was removed from the maps. The inference that this road will be built through Bold Park is not acceptable, particularly since the Environmental Protection Authority has recently recommended against this again.

9.6 Reply - Town of Cambridge

See comment under 9.3

9.7 Modified Option C provides an opportunity for the inclusion of a pedestrian and equine underpass at approximate milestone 850. It is hoped that its inclusion during construction would not involve a large additional cost, and would provide unrestricted access from Perry Lakes, through Bold Park and then through preserved M46 bushland west of the highway to the beach.

9.7 Reply - Town of Cambridge

Agreed. The inclusion of the underpass would be subject to need and general support for such facility and the availability of funds.

Appendix 4

**Correspondence between the Department of Environmental
Protection and Main Roads Western Australia.**



Commissioner
Main Roads Western Australia
PO Box 6202
EAST PERTH WA 6004

Your Ref 72-394-54
Our Ref 2/90
Enquiries Simon Smalley

ATTENTION: MR B A CLARKE, DIRECTOR METROPOLITAN OPERATIONS
REALIGNMENT OF WEST COAST HIGHWAY AT SOUTH CITY BEACH

As you are aware the Environmental Protection Authority is currently conducting an environmental assessment of a modified option for the realignment of West Coast Highway at south City Beach.

Since this is an area of high conservation value with regional significance, there is a preference for impacts to be minimised whilst ensuring that road safety requirements are of an appropriate standard.

The Department of Environmental Protection understands that as a result of enquiries from the community and in response to a series of engineering opinions provided from the community, the Main Roads Western Australia is reviewing the road geometry requirements for this section of West Coast Highway. To enable completion of it's assessment, the Environmental Protection Authority should be provided with the direct advice of the Main Roads Western Australia as to the road standards and safety requirements necessary to ensure safety on this section of highway. Could you please forward this information to the Department of Environmental Protection as soon as it can be made available.

Thank you for your assistance with this matter.

Yours faithfully

for R A D Sippe
DIRECTOR
EVALUATION DIVISION

8 November 1994



MAIN ROADS
Western Australia

Metropolitan and Traffic
Operations
2 Adams Drive
Welshpool WA 6106

Enquiries: Mr Hough on 311 8315
Our Ref: 72-394-54
Your Ref: 2/90

Safe & Efficient Roads

Mr R A D Sippe
Director
Evaluation Division
Department of Environmental Protection
Westralia Square
141 St George's Terrace
PERTH WA 6000

- 6 FEB 1995

2/90

REALIGNMENT OF WEST COAST HIGHWAY AT SOUTH BEACH

I refer to your January 9 1995 letter in which you requested advice as to the road standards and safety requirements necessary to ensure safety on this section of West Coast Highway.

Main Roads Western Australia will become responsible for this section of road on July 1 1995.

In the meantime the Town of Cambridge will continue to have responsibility for the road and the Section 46 Amendment under the Environmental Protection Act 1986.

With regards to road standards and safety requirements Main Roads, under normal circumstances would use a minimum radius of 400 metres with 4% superelevation on major urban arterial roads such as West Coast Highway where intersections are involved. However to minimise the impact on Bold Park it is considered that a radius of 350 metres would be acceptable.

Trusting this information will be of assistance in your assessment of a modified option for the realignment of West Coast Highway at South City Beach.

B A Clarke
DIRECTOR METROPOLITAN & TRAFFIC OPERATIONS

February 2 1995

CC: City of Perth (attention: Mr R Karvenin)
Town of Cambridge (attention: Mr K Poynton)
Director Strategic Road Planning (attention: Mr P Trichilo)

83291



Department of Environmental Protection

Commissioner
Main Roads Western Australia

Your Ref 72-394-54
Our Ref 2/90 : 83291
Enquiries Simon Smalley

ATTENTION: MR HOUGH (METROPOLITAN AND TRAFFIC OPERATIONS)

REALIGNMENT OF WEST COAST HIGHWAY AT SOUTH CITY BEACH

Thank you for your letter of 2 February 1995 regarding the road geometry requirements to ensure safety on the above section of road.

I understand the Main Roads Western Australia position regarding 'normal' geometric requirements and the acceptability of a 350 metre radius for the section of West Coast Highway between Challenger Parade and Helston Avenue.

However, could you please advise under what circumstances it is acceptable to use alternative geometric standards and what precedents there are for using a geometric standard of around 350 metre radius for this type of major urban arterial road.

Could you please also confirm that the application of a 350 metre radius for this road does not represent an unacceptable safety risk.

I seek your advice regarding these matters at your earliest convenience, so that the Environmental Protection Authority can finalise its assessment of this proposal. Should you have any enquiries, please call Simon Smalley (222 7143 direct line) in the first instance.

Yours sincerely

for
Colin Murray
ACTING DIRECTOR
EVALUATION DIVISION

14 February 1995

MRWA Std 140295 SSm



MAIN ROADS
Western Australia

Metropolitan and Traffic
Operations
2 Adams Drive
Welshpool WA 6106

Enquiries: Mr Hough on 311 8315

Our Ref: 72-394-54

Your Ref: 2/90:83291

Safe & Efficient Roads

Director
Department Environmental Protection
Westralia Square
141 St Georges Terrace
PERTH WA 6000

15 MAR 1995

ATTENTION: MR S SMALLEY

2/90

SSM 6

Dear Mr Smalley

REALIGNMENT OF WEST COAST HIGHWAY AT SOUTH CITY BEACH

I refer to your letter of February 14 1995 which sought further advice regarding the road geometry requirements to ensure safety on the above section of West Coast Highway.

The following advice is provided on the three questions you have raised:

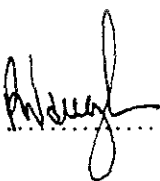
- There are no specific circumstances for using alternative geometric standards as such. The proposed radii are at the minimum end of a range of radii that could be used. In general, highway design engineers tend to stay away from minimums as it is not good practice. Good practice is to use higher than the minimums so as to provide a forgiving environment to allow for emergency situations where the drivers attention is momentarily distracted or there is an unexpected obstacle in the vehicles travel lane. Main Roads Western Australia's normal practice is to provide a speed limit of at least 80 km/hour and curve radii of at least 400 metres for major arterial roads such as West Coast Highway. However, in special cases, the use of minimums is acceptable. Special cases would be where the competing use of the land is assessed to have greater community value than the provision of higher than minimum safety margins, less frequent disruption to traffic flow and decreased frequency and cost of road works due to the increased service life of the pavement surface. It is noted the EPA has ruled the land in the path of the 400 metre curve alignment has greater community value as parkland than as an arterial road. Main Roads under these circumstances recommends that the radii for the curves be not less than 350 metres.
- Precedents for using a geometric standard of around 350 metre radius are the Tonkin Highway/Roe Highway connection and the proposed Burswood project through the East Perth area.
- Assuming the design of the road is technically correct, the 350 metre radii would not represent a legally unacceptable safety risk for the designated speed limit.

84298 INFO

I hope that this information is of assistance. If you require any further details, please contact Mr David Hough on 311 8315.

Yours faithfully

B A Clarke
EXECUTIVE DIRECTOR METROPOLITAN & TRAFFIC OPERATIONS

Per 

March 9 1995