Powerline along Coorow-Greenhead and Cockleshell Gully Roads - through Mount Lesueur National Park

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State Energy Commission of Western Australia

Report and recommendations
of the Environmental Protection Authority

Environmental Protection Authority
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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 recommendations.

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 assessment report 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
18th Floor, Allendale Square
77 St George's Terrace
PERTH WA 6000

CLOSING DATE

Your appeal (with the $10 fee) must reach the Minister's office no later than 5.00 pm on the date indicated below.

Summary and recommendations

The State Energy Commission of Western Australia proposes to construct a 33 kilovolt (kV) powerline to run within the road reserves of the Coorow-Greenhead and Cockleshell Gully Roads. A section of the Coorow-Greenhead Road route passes through the Mount Lesueur National Park.

The powerline would accommodate the long term needs of State Energy Commission of Western Australia for the provision of power to the two coastal towns of Leeman and Greenhead by replacing the existing line that passes through the Beekeepers Reserve which lies to the north of, but contiguous with, the Mount Lesueur National Park (Figure 1). Siting the line along the Coorow-Greenhead Road would serve the additional function of enabling the Water Authority of Western Australia to electrify the two bore pumps at Midway and Peron used to supply water to the two towns. These bore pumps are currently powered by diesel fuel.

Both Mount Lesueur National Park and Beekeepers Reserve were recommended for consideration by the Environmental Protection Authority as part of System 5. System 5, or Northern Sandheaths, is one of twelve regions into which Western Australia has been divided. It extends northwards from the Moore River to about 50km north of Kalbarri, and from the coast to about 100km inland. The near-shore islands are also included. Within each System, the Environmental Protection Authority has made recommendations regarding which areas are desirable for National Parks, Nature Reserves and major associated recreational areas.

Proposals potentially affecting either Mount Lesueur National Park or Beekeepers Reserve need to be fully assessed. Accordingly, the Environmental Protection Authority considered that a formal assessment at Consultative Environmental Review was appropriate for this proposal.

The proposal was outlined in a Consultative Environmental Review document prepared by State Energy Commission of Western Australia for the Environmental Protection Authority's assessment. A total of six submissions was received during the public review period.

The Consultative Environmental Review document offered four initial options for the siting of the powerline. As a result of extensive negotiations during the public review period, these options were significantly modified to produce the following final options:

1 The "status quo" option where the diesel powered pumps remain at the two Water Authority of Western Australia bore sites and, the existing powerline through Beekeepers Reserve is upgraded.

2 The existing powerline through Beekeepers Reserve is upgraded, a spur line is constructed down to the Peron site to electrify the bore pump, and the Midway bore stays diesel powered.

3 The powerline is constructed along the Coorow-Greenhead and Cockleshell Gully Roads, subject to certain conditions, and the existing powerline through Beekeepers Reserve is removed and the corridor rehabilitated.

The State Energy Commission of Western Australia has indicated that it prefers Option 3.

There were a number of key issues of concern identified by the public, in submissions, and the Authority in the assessment of this proposal.

The existing powerline through Beekeepers Reserve should be de-commissioned and the associated corridor suitably rehabilitated

Mount Lesueur National Park and the Beekeepers Reserve form part of a large continuous area of native vegetation with high conservation value extending for many tens of kilometres in a north-south direction. Significant breaks in the vegetation cover, as required for the construction of a powerline, cause substantial loss of environmental value.

Final option 3 is the only option that provides for a consolidation of services along one corridor and the downgrading/rehabilitation of the existing corridor.

The impact on the views along the section of the Coorow-Greenhead Road that runs through the Mount Lesueur National Park

Where powerlines are to pass through areas of high environmental value, including areas with significant vegetation and landscapes/viewscapes, measures should be put in place to minimise the environmental impacts of the powerline and to protect that environmental value. Placing the cable underground will only be recommended in the most important situations where other measures would still cause unacceptable damage, in particular:

- where the vegetation is of such a high value that any damage to that vegetation is unacceptable; or
- where a powerline would cross an area that makes up part of a significant viewscape, and an above ground powerline is likely to create a noticeable scar on, or break in, that viewscape.

In this case, while the vegetation likely to be impacted by this proposed powerline has high conservation value, the location of the powerline along the Coorow-Greenhead Road on the edge of the cleared section of the road reserve could be acceptable because the vegetation near the edge of the road is already disturbed.

There is, however, a significant viewscape from the ridge within the National Park along the Coorow-Greenhead Road, with views of the uncleared vegetation of the National Park, the salt lakes system, mobile sand dunes and the ocean. An above ground powerline along this section of the Coorow-Greenhead Road would compromise that view, and the option of placing the cable underground along this section should be pursued.

The State Energy Commission of Western Australia has expressed the opinion on a number of occasions that it does not favour the option of placing this powerline underground. This matter was covered in the Consultative Environmental Review document.

However, during the course of the Consultative Environmental Review, it became known that Telecom plans to run an optical fibre cable underground from Brand Highway to Leeman and Greenhead along the Coorow-Greenhead Road. The opportunity exits, therefore, for the State Energy Commission to share a trench with Telecom and so minimise the cost of placing its cable underground.

Constructing an above ground powerline consistent with the environmental values of the area

Siting the powerline along the north side of the road on the edge of the cleared road reserve provides the best protection for the environmental values of the area; in particular:

- the significant viewscapes are to the south; and
- in many places the vegetation near the edge of the road is disturbed and is of less conservation value than the vegetation further away from the road verge.

Protecting the occurrences of *Grevillea olivacea* and *Eucalyptus erythrocorys* can be addressed at the implementation stages of this proposal by careful siting of the easement and power poles, in consultation with Department of Conservation and Land Management.

Siting the powerline on the edge of the cleared road reserve causes some technical problems for the stability of the poles around bends in the road, in particular, the need for "aerial stays" to stabilise poles around certain corners. This matter can be addressed during the implementation stages of the proposal, on advice from the Roadside Conservation Committee and the Local Authority.

The maintenance of the "no net loss of environmental value" principle

As part of the Authority's assessment of the powerline for the Beenup Mineral Sands Mine, it recommended that a "no net loss of environmental value" principle be applied to the state forest. This means that for every hectare of that forest lost for the powerline another hectare of forest had to be created. This "no net loss of environmental value" principle should also be applied to this project.

In this case, providing that the rehabilitation of the existing corridor is carried out to the requirements of National Park and Nature Conservation Authority and the Department of Conservation and Land Management, there should be no net loss of environmental value.

Dieback control

The area is currently free of dieback, and strict measures need to be implemented to ensure that construction associated with this proposal does not introduce the disease.

Upgrading the existing powerline and associated corridor through Beekeepers Reserve

It is possible that the proponent may not choose final option 3, but elect for one of the options involving the upgrading of the existing powerline and corridor. The Consultative Environmental Review document gave few details as to how this upgrading would be carried out, and what the likely environmental impacts of this work would be on Beekeepers Reserve. The Authority is not in a position, therefore, to assess the environmental impacts of this proposal.

The Authority has found that, subject to certain modifications and additional requirements being placed on the proponent, the State Energy Commission of Western Australia's proposal to construct a powerline along the Coorow-Greenhead and Cockleshell Gully Roads is environmentally acceptable.

Recommendation 1

The Environmental Protection Authority has concluded that the proposal to build a powerline along the Coorow-Greenhead and Cockleshell Gully Roads, as modified during the process of interaction between the proponents, the Environmental Protection Authority, the public and the relevant government agencies, is environmentally acceptable.

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

- **the de-commissioning of the existing powerline through Beekeepers Reserve and the rehabilitation of the associated corridor;**
- **the impact on the aesthetics/landscape value of the area, in particular, the viewscape along the section of the Coorow-Greenhead Road that passes through the National Park;**
- **the construction and on-going management of the powerline be carried out in a manner consistent with the environmental values of the area;**
- **the presence of significant flora or fauna;**
- **the risk of dieback spreading as a result of the construction phase and any on-going maintenance required; and**
- **erosion risk and control, both during construction, and for any ongoing clearing required.**

Accordingly, the Environmental Protection Authority recommends that the proposal could proceed subject to the Environmental Protection Authority's recommendations and the commitments made by the proponents.

The Environmental Protection Authority has concluded that an important aspect of this proposal is the no net environmental loss associated with final option 3, as it provides for a consolidation of services along one corridor and the downgrading/rehabilitation of the existing corridor.

Recommendation 2

The Environmental Protection Authority recommends that, subject to the other recommendations in this report, the proposal to build a powerline along the Coorow-Greenhead and Cockleshell Gully Roads could proceed provided that:

2.1 the existing powerline through Beekeepers Reserve is de-commissioned following the construction of the new powerline; and

2.2 the proponent rehabilitates the existing powerline corridor through Beekeepers Reserve.

Both of the above provisions should be carried out to meet the requirements of the Minister for the Environment on advice from the National Parks and Nature Conservation Authority and the Department of Conservation and Land Management.

The Environmental Protection Authority has previously stated that where construction of powerlines would detract unacceptably from the conservation or scenic amenity values of land with very high conservation status, then the powerline should be placed underground in these special areas.

The Authority is of the view that the State Energy Commission of Western Australia should investigate this option thoroughly for the important area along the Coorow-Greenhead Road within the Mount Lesueur National Park (Figure 3). Only if placing the powerline underground is determined as being not feasible following the investigation, should it be considered acceptable for it to be placed above ground, subject to conditions. This is because there is the potential for net environmental benefits from putting all the services to the towns of Leeman and Greenhead in one corridor (viz. road, power, water and telecommunications), and removing and rehabilitating the other corridor through the Beekeepers Reserve.

Accordingly, the Authority makes the following recommendation:

Recommendation 3

The Environmental Protection Authority recommends that:

The State Energy Commission of Western Australia thoroughly investigate the feasibility of constructing that portion of the powerline shown in Figure 3 underground in a trench shared with Telecom Australia. If feasible, then the powerline should be constructed underground at this location. If not feasible in the opinion of the Minister for the Environment and the Minister for Fuel and Energy, then the powerline could be constructed above ground subject to Recommendations 4 and 5 of this report, and subject to the State Energy Commission of Western Australia conducting a trial in another environmentally sensitive location where a high tension powerline is placed underground. That trial should be carried out within 18 months of any approval for this proposal, to meet the requirement of he Minister for the Environment and the Minister for Fuel and Energy.

The Authority's view is that there are a number of advantages to siting the powerline along the north side of the road on the edge of the cleared road reserve, subject to avoiding some

populations of significant species of flora, and resolving some technical problems regarding aerial staying around certain corners.

Recommendation 4

The Environmental Protection Authority recommends that the above-ground parts of the powerline be constructed in the following manner to minimise the impact on the environmental values of the area:

4.1 the above ground powerline be located on the north side of the Coorow-Greenhead Road;

4.2 the powerline should be located on the edge of the existing cleared area of the road reserve;

4.3 the exact distance from the edge of the road verge, and the management of the corners requiring aerial stays should be determined to meet the requirement of Department of Conservation and Land Management on advice from the Roadside Conservation Committee and the Shire of Coorow; and

4.4 the final location of the easement and poles should be chosen to minimise the impacts on the occurrences of *Grevillea olivacea* and *Eucalyptus erythrocorys*, to meet the requirements of the Department of Conservation and Land Management.

The Authority recognises the importance of controlling dieback, and the need to have the Department of Conservation and Land Management oversee the implementation of these measures.

Recommendation 5

The Environmental Protection Authority recommends that the dieback disease control measures should be implemented to meet the requirements of the Department of Conservation and Land Management.

Should the State Energy Commission of Western Australia decide not to relocate the powerline to the Coorow-Greenhead Road, the benefits associated with creating one service corridor would not be available. In these circumstances, the construction of the powerline along the Coorow-Greenhead Road to service only the Water Authority's bores should be reviewed again.

Recommendation 6

The Environmental Protection Authority recommends that, should the State Energy Commission of Western Australia decide not to build its powerline along the Coorow-Greenhead Road, and opt for either of the options that require the existing powerline corridor through Beekeepers Reserve to be upgraded, such a proposal should be the subject of a separate assessment report by the Environmental Protection Authority to the Minister for the Environment.

1. Introduction

1.1 Project description

The State Energy Commission of Western Australia proposes to construct a 33 kV powerline to run within the road reserves of the Coorow-Greenhead and Cockleshell Gully Roads. A section of the Coorow-Greenhead Road route passes through the Mount Lesueur National Park (refer to Figure 1).

The powerline would accommodate the long term needs of State Energy Commission of Western Australia for the provision of power to the two coastal towns of Leeman and Greenhead by replacing the existing line that passes through the Beekeepers reserve to the north of the Mount Lesueur National Park (Figure 1). Siting the line along the Coorow-Greenhead Road would serve the additional function of enabling the Water Authority of Western Australia to electrify its two bore pumps at Midway and Peron used to supply water to the two towns. These bore pumps are currently powered by diesel fuel.

Both Mount Lesueur National Park and Beekeepers Reserve are System 5 areas[1] , and have high conservation value. Proposal potentially affecting either area need to be fully assessed. Accordingly, the Environmental Protection Authority considered that a formal assessment at Consultative Environmental Review was appropriate for this proposal.

This proposal was originally referred to the Authority in September 1991 in a more simplified form (refer to Section 1.2 below). The proposal was then modified before the public review period, and it is this modified proposal that is the subject of this report.

1.2 Background to the change in the proposal

The original proposal was for a 33 kV powerline to run from the existing line along the Greenhead-Leeman Road to the two Water Authority of Western Australia diesel powered bore pumps (Figure 2). It was initiated by the Water Authority of Western Australia as part of its ongoing programme of electrifying bore pumps.

Soon after the referral was made, discussions were held with Water Authority of Western Australia and State Energy Commission of Western Australia to identify options for the siting of the powerline. State Energy Commission of Western Australia indicated that, in the near future, substantial maintenance work would be needed on the existing 33 kV line, including upgrading the access through Beekeepers Reserve.

In response, the Environmental Protection Authority expressed the view that it would prefer a consolidation of services through the region along one corridor. The replacement of the existing powerline through Beekeepers Reserve, the subsequent rehabilitation of that corridor, and the siting of the line along an already cleared corridor, was seen as a net environmental gain.

The State Energy Commission of Western Australia and Water Authority of Western Australia were asked to consider alternatives to their proposal that achieved this consolidation of services. Both agencies agreed to this request, and the modified proposal is assessed in this report.

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[1] In 1976 the Environmental Protection Authority published a report called "Conservation through Reserves for Western Australia". This report divided the State into 12 Systems, or ecological regions. The Environmental Protection Authority has made recommendations regarding which areas are desirable for National Parks, Nature Reserves and major associated recreational areas. System 5, or Northern Sandheaths, extends northwards from the Moore River to about 50km north of Kalbarri, and from the coast to about 100km inland. The near-shore islands are also included.

2. Description of the options

The Consultative Environmental Review document offered 4 initial options for the siting of the powerline (Appendix 1). As a result of extensive negotiations during the public review period, these options were significantly modified to produce the following final options:

1 The "status quo" option where the diesel powered pumps remain at the two Water Authority of Western Australia bore sites, and the existing powerline through Beekeepers Reserve is upgraded.

2 The existing powerline through Beekeepers Reserve is upgraded, a spur line is constructed down to the Peron site to electrify the bore pump, and the Midway bore remains diesel powered.

3 The powerline is constructed along the Coorow-Greenhead and Cockleshell Gully Roads, subject to certain conditions, and the existing powerline through Beekeepers Reserve is removed and the corridor rehabilitated.

The State Energy Commission of Western Australia has indicated that it prefers Option 3.

3. Existing environment

The Consultative Environmental Review document adequately describes the existing environment of the two road reserves along the Coorow-Greenhead and Cockleshell Gully Roads.

Aspects of the environment particularly relevant to the environmental assessment of this proposal are:

- important vegetation, particularly east of the salt lake complex;
- presence of Declared Rare Flora, flora on Department of Conservation and Land Management's Reserve list, and other significant species;
- significant views (viewscape);
- presence of dieback; and
- erosion risks.

The vegetation east of the salt lake complex (on the Spearwood Dunes) is very diverse, and is described as heathland of *Banksia, Dryandra and Hakea* spp. In places, there are isolated woodland groves of *Eucalyptus erythrocorys* (Illyarrie) to a height of 3m.

No Declared Rare Flora has been found within the road reserves on the route of the proposed powerline. *Grevillea olivacea*, a species on the Department of Conservation and Land Management's Reserve Flora list, was found on the north side of the road near the Midway bore. The Consultative Environmental Review identified *Eucalyptus erythrocorys* as being a "significant" species and worthy of protection, although it is not a Declared Rare species or a Reserve species.

The landscape of the area is generally flat to gently undulating. There is an elevated ridge that runs north-south through the eastern section of the National Park. This ridge provides spectacular views to the coast along the Coorow-Greenhead Road. The views take in the uncleared vegetation of the National Park, the salt lakes system, mobile sand dunes and the ocean (refer to Figure 3).

No occurrences of dieback were confirmed along the road reserves, although two sites on the south of the road were identified as suspected dieback infection areas.

Erosion risks are thought to be minimal as State Energy Commission of Western Australia will not carry out substantial clearing of the vegetation. The predominance of sandy soils will also mean that water erosion is likely to be manageable .

4. Issues raised during the public review period

4.1 Overview

A total of six submissions received during the public review period and are summarised in Table 1.

Table 1: A summary of public submissions

	No of submissions in support	No of submissions opposed or which raised concerns	Total
Individuals	1	0	1
Organisations/companies	1	1	2
Government agencies	2	1	3
Total	4	2	6

4.2 A summary of the issues raised

The main environmental issues raised during the public review period were:

- protection of the viewscapes;
- concern that should the powerline be located underground, the construction work required to dig the trench would cause significant environmental degradation;
- concern about the introduction and/or spread of dieback;
- the need for erosion control during and after construction;
- metal sleeves should be required for the base of the power poles to avoid the need to poison or clear vegetation; and
- ongoing maintenance should be managed in a way that minimises the impact on the vegetation.

5. Environmental impacts and management

5.1 General

The Authority has found that, subject to certain modifications and additional requirements being placed on the proponent as described in subsequent Sections of this report, the State Energy Commission of Western Australia's proposal to construct a powerline along the Coorow-Greenhead and Cockleshell Gully Roads is environmentally acceptable.

Recommendation 1

The Environmental Protection Authority has concluded that the proposal to build a powerline along the Coorow-Greenhead and Cockleshell Gully Roads, as modified during the process of interaction between the proponents, the Environmental Protection Authority, the public and the relevant government agencies, is environmentally acceptable.

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

- **the de-commissioning of the existing powerline through Beekeepers Reserve and the rehabilitation of the associated corridor;**
- **the impact on the aesthetics/landscape value of the area, in particular, the viewscape along the section of the Coorow-Greenhead Road that passes through the National Park;**
- **the construction and on-going management of the powerline be carried out in a manner consistent with the environmental values of the area;**
- **the presence of significant flora or fauna;**
- **the risk of dieback spreading as a result of the construction phase and any on-going maintenance required; and**
- **erosion risk and control, both during construction and, for any ongoing clearing required.**

Accordingly, the Environmental Protection Authority recommends that the proposal could proceed subject to the Environmental Protection Authority's recommendations and the commitments made by the proponents.

The Authority's experience is that it is common for details of a proposal to alter through the detailed design and construction phase. In many cases alterations are not environmentally significant or have positive effect on the environmental performance of the project. The Authority believes that such not-substantial changes, and especially those which improve environmental performance and protection, should be provided for.

The Authority believes that any approval for the proposal based on this assessment should be limited to five years. Accordingly, 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 new referral to the Authority.

5.2 A rationale for the consolidation of services along one corridor

Final Options 1 and 2 (refer to Section 2) involve an upgrading of the existing powerline and associated corridor through the Beekeepers Reserve. Such an upgrade would likely involve a significant increase in the amount of vegetation required to be cleared, including the provision of a permanent access track.

Mount Lesueur National Park and the Beekeepers Reserve form part of a large continuous area of native vegetation with high conservation value extending for many tens of kilometres in a north-south direction. There are few places where the vegetation is not continuous, but it has been broken twice, once for the Coorow-Greenhead Road and once for the existing powerline corridor. Significant breaks in the vegetation cover, as required for the construction of a powerline, cause substantial loss of environmental value.

The Environmental Protection Authority has concluded that an important aspect of this proposal is the no net environmental loss associated with final option 3, because it provides for a

consolidation of services along one corridor and the downgrading/rehabilitation of the existing corridor.

Recommendation 2

The Environmental Protection Authority recommends that, subject to the other recommendations in this report, the proposal to build a powerline along the Coorow-Greenhead and Cockleshell Gully Roads could proceed provided that:

2.1 the existing powerline through Beekeepers Reserve is de-commissioned following the construction of the new powerline; and

2.2 the proponent rehabilitates the existing powerline corridor through Beekeepers Reserve.

Both of the above provisions should be carried out to meet the requirements of the Minister for the Environment on advice from the National Parks and Nature Conservation Authority and the Department of Conservation and Land Management.

5.3 Constructing the powerline consistent with the environmental values of the area

Where powerlines are to pass through areas of high environmental value, including areas with significant vegetation and landscapes/viewscapes, measures should be put in place to minimise the environmental impacts of the powerline and to protect that environmental value. Such measures include:

- re-routing the powerline to avoid the significant area;
- siting the powerline along an existing cleared corridor;
- modifications to the on-going clearing profiles required by the State Energy Commission of Western Australia; and
- placing the cable underground.

Placing the cable underground will only be recommended in the most important situations where other measures would still cause unacceptable damage. Two such examples of this are:

- where the vegetation is of such a high value that any damage to that vegetation is unacceptable; or
- where a powerline would cross an area that makes up part of a significant viewscape, and an above ground powerline is likely to create a noticeable scar on, or break in, that viewscape.

In this case, the vegetation likely to be impacted by this proposed powerline has high conservation value, but the option exists to locate the powerline along the Coorow-Greenhead Road on the edge of the existing cleared area (an existing cleared corridor). In many places, the vegetation near the edge of the road is already disturbed (due to run off from the road surface and past clearing), and is of lower conservation value than the vegetation further away from the road verge.

There is, however, a significant viewscape, as described in Section 3 of this report. It extends from the ridge within the National Park along the Coorow-Greenhead Road, with views of the uncleared vegetation of the National Park, the salt lakes system, mobile sand dunes and the ocean (refer to Figure 3). An above ground powerline along this section of the Coorow-Greenhead Road would compromise that view, and the option of placing this powerline underground along this section should be pursued.

The State Energy Commission of Western Australia has expressed the opinion on a number of occasions that it does not favour the option of placing this powerline underground, mainly for

reasons of cost and certain technical constraints. This matter was covered in the Consultative Environmental Review document.

However, during the course of the Consultative Environmental Review, it became known that Telecom plans to run an optical fibre cable underground from Brand Highway to Leeman and Greenhead along the Coorow-Greenhead Road. The opportunity exits, therefore, for the State Energy Commission to share a trench with Telecom and so minimise the cost of placing its cable underground.

The Environmental Protection Authority has previously stated that where construction of powerlines would detract unacceptably from the conservation or scenic amenity values of land with very high conservation status, then the powerline should be placed underground in these special areas.

The Authority is of the view that the State Energy Commission of Western Australia should investigate this option thoroughly for the important area along the Coorow-Greenhead Road within the Mount Lesueur National Park (Figure 3). Only if placing the powerline underground is determined as being not feasible following the investigation, should it be considered acceptable for it to be placed above ground, subject to conditions. This is because there is the potential for net environmental benefits from putting all the services to the towns of Leeman and Greenhead in one corridor (viz. road, power, water and telecommunications), and removing and rehabilitating the other corridor through the Beekeepers Reserve.

Accordingly, the Authority makes the following recommendations:

Recommendation 3

The Environmental Protection Authority recommends that:

The State Energy Commission of Western Australia thoroughly investigate the feasibility of constructing that portion of the powerline shown in Figure 3 underground in a trench shared with Telecom Australia. If feasible, then the powerline should be constructed underground at this location. If not feasible in the opinion of the Minister for the Environment and the Minister for Fuel and Energy, then the powerline could be constructed above ground subject to Recommendations 4 and 5 of this report, and subject to the State Energy Commission of Western Australia conducting a trial in another environmentally sensitive location where a high tension powerline is placed underground. That trial should be carried out within 18 months of any approval for this proposal, to meet the requirement of he Minister for the Environment and the Minister for Fuel and Energy.

5.4 Minimising the environmental impacts of the above-ground powerline

5.4.1 Which side of the Coorow-Greenhead Road to site the powerline?

The Consultative Environmental Review recommends that, after taking into account the engineering needs of the State Energy Commission of Western Australia and the environmental considerations, the power line should be located on the south side of the road.

In considering this matter, the Authority took into account the following factors:

- the most significant viewscapes are to the south of the road;
- the two areas of suspected dieback infection are on the south of the road;

- while there is a known population of the Department of Conservation and Land Management Reserve Flora species *Grevillea olivacea* , disruption to this population can be avoided by careful placement of the easement and power poles; and
- technical aspects of servicing the bore pumps which are to the south side of the road.

The Authority considers that, on balance, the location of the powerline on the north side of the road would minimise the environmental impacts.

5.4.2 Selecting the final corridor for the powerline

The State Energy Commission of Western Australia's preferred option, as presented in the Consultative Environmental Review, was to place the above ground powerline approximately 20m from the edge of the road verge along a new partly cleared corridor. The reasons given for this were:

- poles near the edge of the road verge are a safety risk for motorists, and, subsequently, an additional risk to the continuity of supply of electricity and water;
- visual impacts would be lessened; and
- "aerial staying"[2] across the road would not be necessary.

Discussions were held between officers of the Department of Conservation and Land Management, the Environmental Protection Authority, the State Energy Commission of Western Australia and the Roadside Conservation Committee to investigate this matter. There are a number of advantages to siting the powerline along on the edge of the cleared road reserve on the north side of the road, in particular:

- in many places the vegetation near the edge of the road is disturbed due to run off from the road surface and past clearing, and is of less conservation value than the vegetation further away from the road verge;
- most wildfires are driven by the prevailing south-westerly winds, and the road would offer the best possible firebreak to protect the powerline;
- only one cleared corridor would be needed to provide all the services for the region; and
- the State Energy Commission of Western Australia could carry out cleaning and maintenance of the line from the road without the need for an additional access track.

The need to protect the occurrences of *Grevillea olivacea* and *Eucalyptus erythrocorys* is supported, and can be addressed at the implementation stages of this proposal, in consultation with Department of Conservation and Land Management.

The Local Authority will need to be consulted to ensure that the final placement of the poles will not compromise on-going road maintenance work.

The issue of road safety, whilst acknowledged, was not something that could be separated from the other risks to motorists should they accidentally leave the main road surface.

It is the Authority's view that an above ground powerline should be sited on the edge of the existing cleared area of the road reserve at a distance from the road verge that does not cause problems for on-going maintenance to the road surface.

Siting the powerline on the edge of the cleared road reserve causes some technical problems for the stability of the poles around bends in the road. Aerial stays that cross the road may be

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[2] Where a power pole has the cables set on an angle rather than in a straight line (for example, on a corner), the cables tend to pull the pole over. "Stays" are used to stabilise the pole by providing a force pulling in the opposite direction to the cables. These stays are metal cables that usually run from the pole to the ground. If a road is nearby, and a stay is required in the direction of the road, then and "aerial" stay is needed to cross the road. Another pole is erected on the other side of the road and the stay is run between the two poles. The "stay pole" is stabilised having stays to the ground.

required. Alternatively, the line may have to cut across some corners to avoid the need for aerial stays. This matter can be addressed during the implementation stages of the proposal, on advice from the Roadside Conservation Committee and the Local Authority.

Recommendation 4

The Environmental Protection Authority recommends that the above-ground powerline be constructed in the following manner to minimise the impact on the environmental values of the area:

4.1 the above ground powerline be located on the north side of the Coorow-Greenhead Road;

4.2 the powerline should be located on the edge of the existing cleared area of the road reserve;

4.3 the exact distance from the edge of the road verge, and the management of the corners requiring aerial stays should be determined to meet the requirement of Department of Conservation and Land Management on advice from the Roadside Conservation Committee and the Shire of Coorow; and

4.4 the final location of the easement and poles should be chosen to minimise the impacts on the occurrences of *Grevillea olivacea* and *Eucalyptus erythrocorys*, to meet the requirements of the Department of Conservation and Land Management.

5.5 The maintenance of the "no net loss of environmental value" principle

As part of the Authority's assessment of the powerline for the Beenup Mineral Sands Mine[3] , it recommended that a "no net loss of environmental value" principle be applied to the state forest. This means that for every hectare of that forest lost for the powerline another hectare of forest had to be created. This "no net loss of environmental value" principle should also be applied to this project.

State Energy Commission of Western Australia's preferred option of building an overhead powerline through an uncleared corridor of vegetated road reserve would result in a total of 15 hectare of native vegetation being altered, but not totally cleared. The siting of the powerline on the edge of the existing cleared area of the road reserve will result in much less vegetation being lost.

The area of land under the existing powerline through Beekeepers Reserve that will be rehabilitated is approximately 8.5 hectares. Providing that this rehabilitation is carried out to the requirements of National Park and Nature Conservation Authority and the Department of Conservation and Land Management, there should be no net loss of environmental value.

5.6 Dieback control

The Authority recognises the importance of controlling dieback, and that State Energy Commission of Western Australia has made a number of commitments regarding the management of this issue. It is important, however, that the Department of Conservation and Land Management oversee the implementation of these measures.

---

[3] Environmental Protection Authority, 1991. Beenup Power Supply, Environmental Protection Authority, Perth. Bulletin 603, December 1991.

Recommendation 5

The Environmental Protection Authority recommends that the dieback disease control measures should be implemented to meet the requirements of the Department of Conservation and Land Management.

5.7 Upgrading the existing powerline through Beekeepers Reserve

It is possible that the proponent may not choose final option 1, but elect for one of the options involving the upgrading of the existing powerline and corridor. The Consultative Environmental Review document gave few details as to how this upgrade would be carried out, and what the likely environmental impacts of this work would be on Beekeepers Reserve. The Authority is not in a position, therefore, to assess the environmental impacts of this proposal.

Should the State Energy Commission of Western Australia decide not to relocate the powerline serving the coastal townsites, the benefits associated with creating one service corridor would not be available. In these circumstances, the construction of the powerline along the Coorow-Greenhead Road to service only the Water Authority's bores should be reviewed again.

Recommendation 6

The Environmental Protection Authority recommends that, should the State Energy Commission of Western Australia decide not to build its powerline along the Coorow-Greenhead Road, and opt for either of the options that require the existing powerline corridor through Beekeepers Reserve to be upgraded, such a proposal should be the subject of a separate assessment report by the Environmental Protection Authority to the Minister for the Environment.

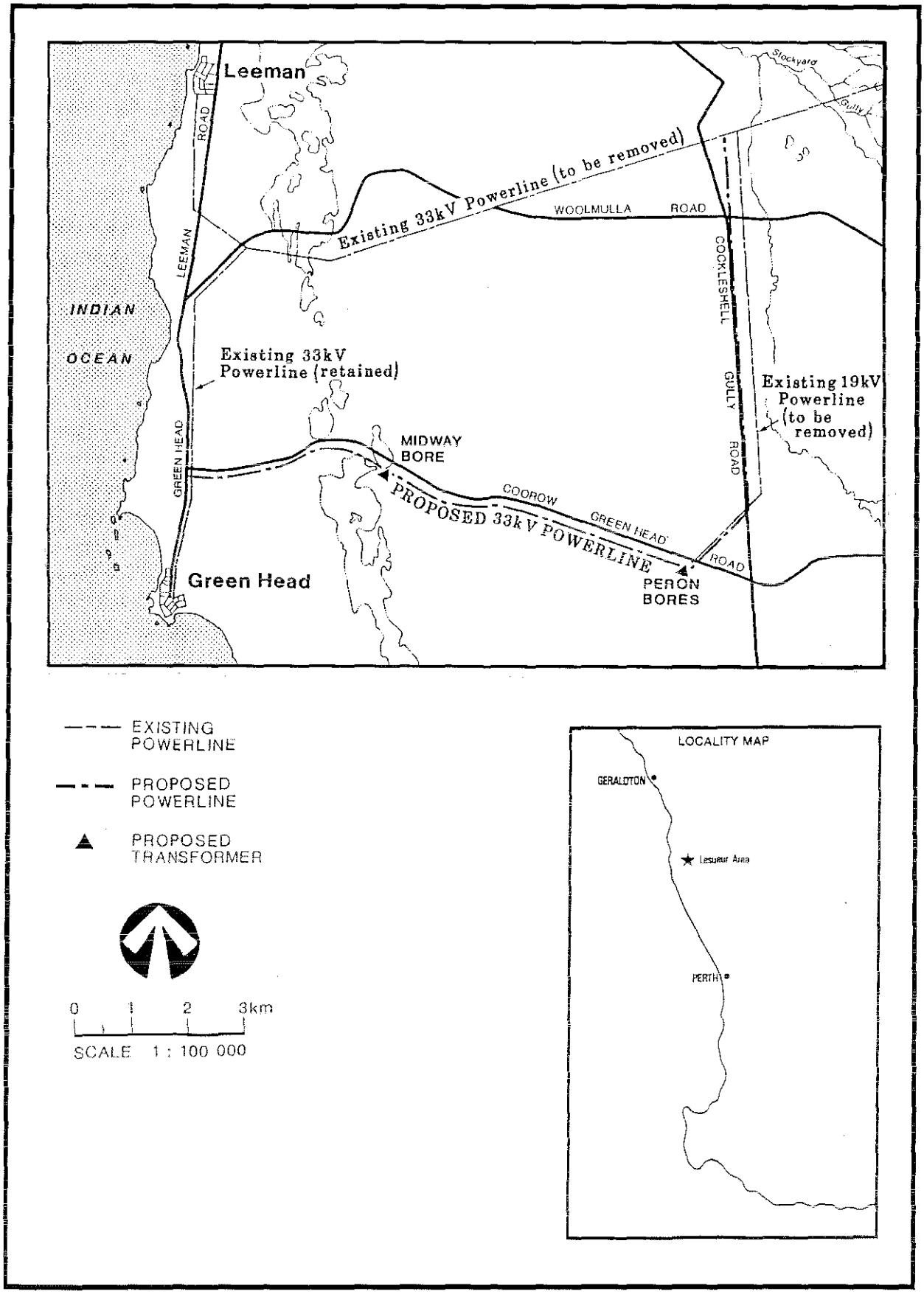


Figure 1: Location map

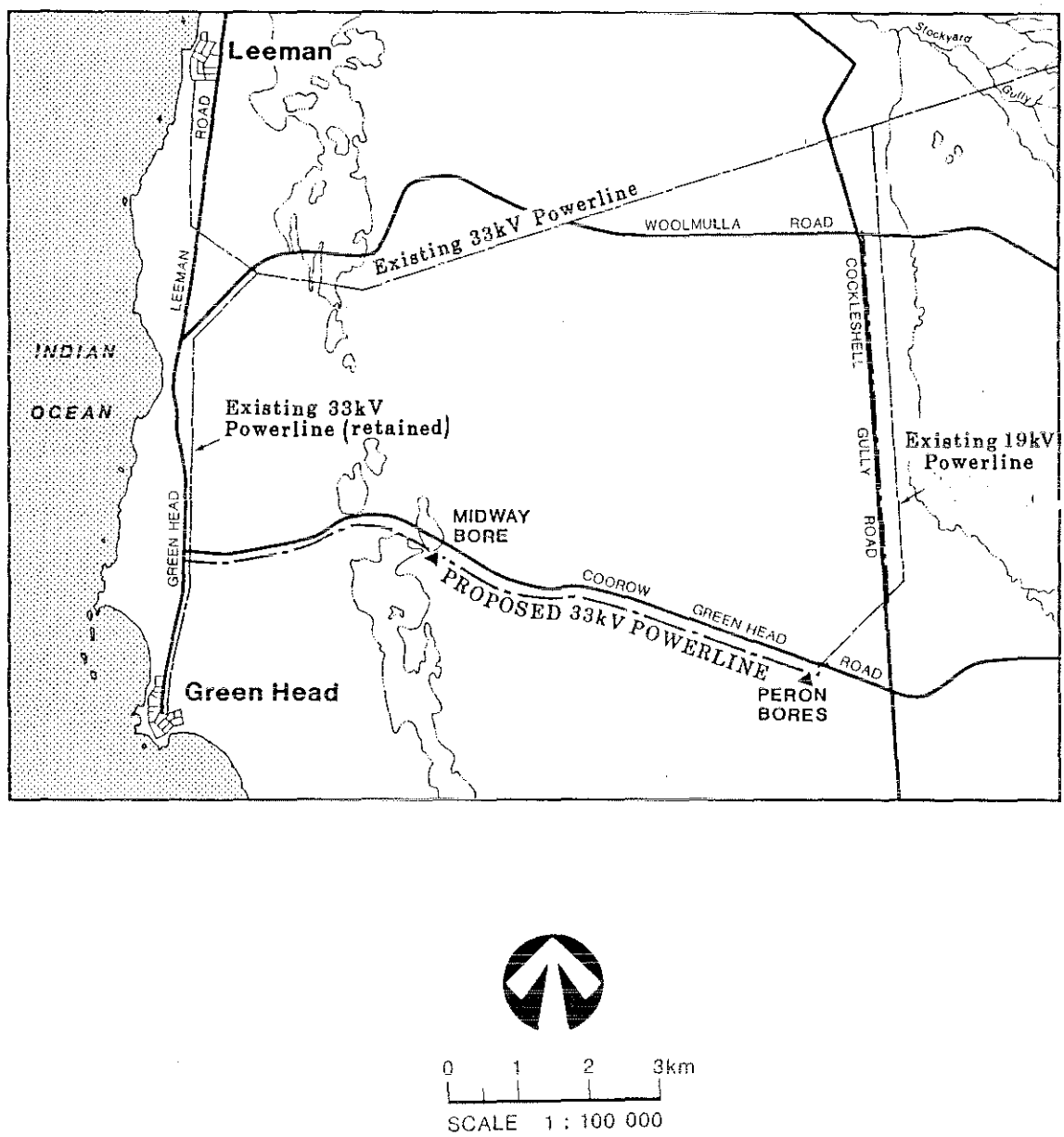


Figure 2: The original proposal referred to the Environmental Protection Authority

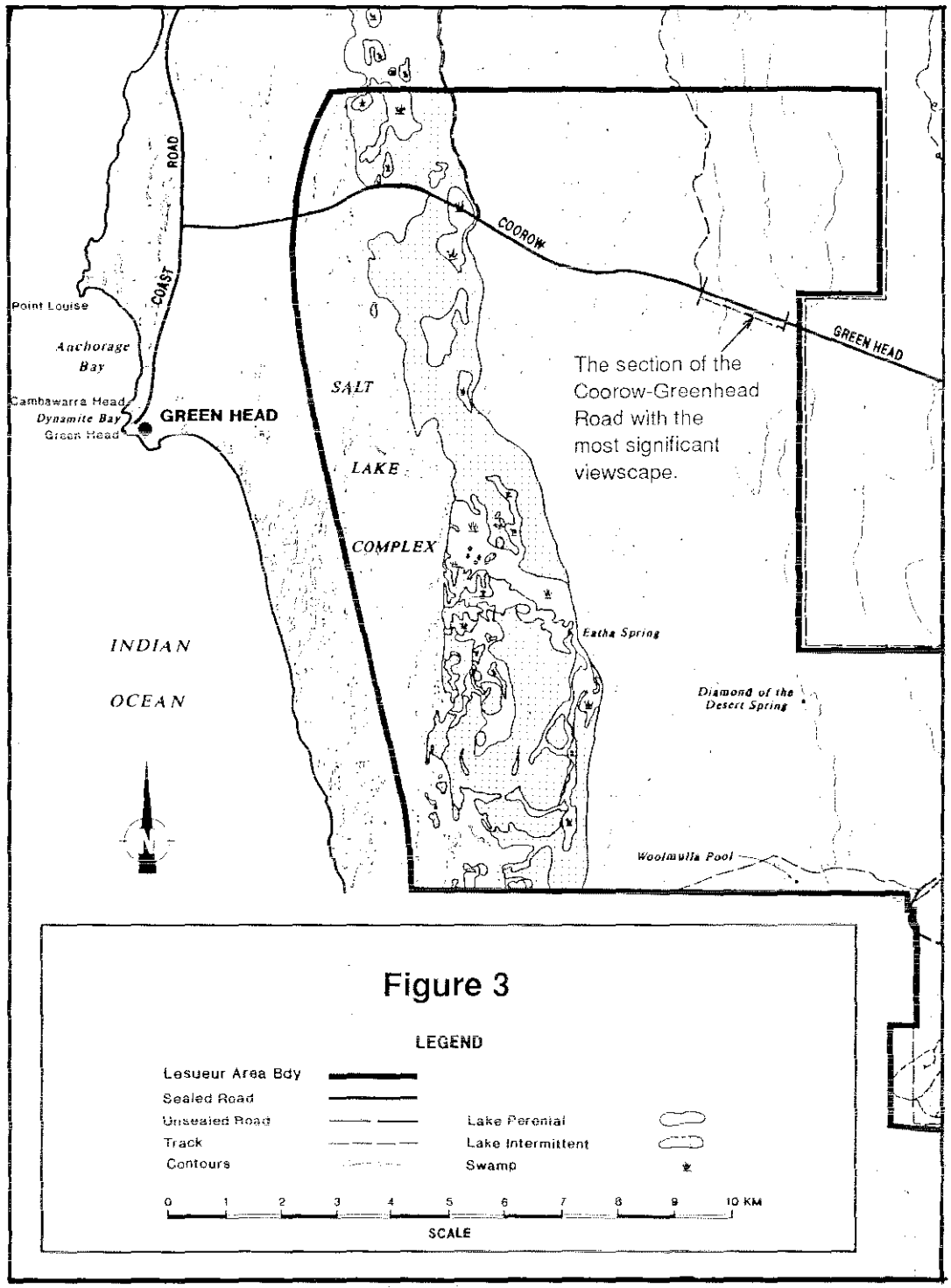
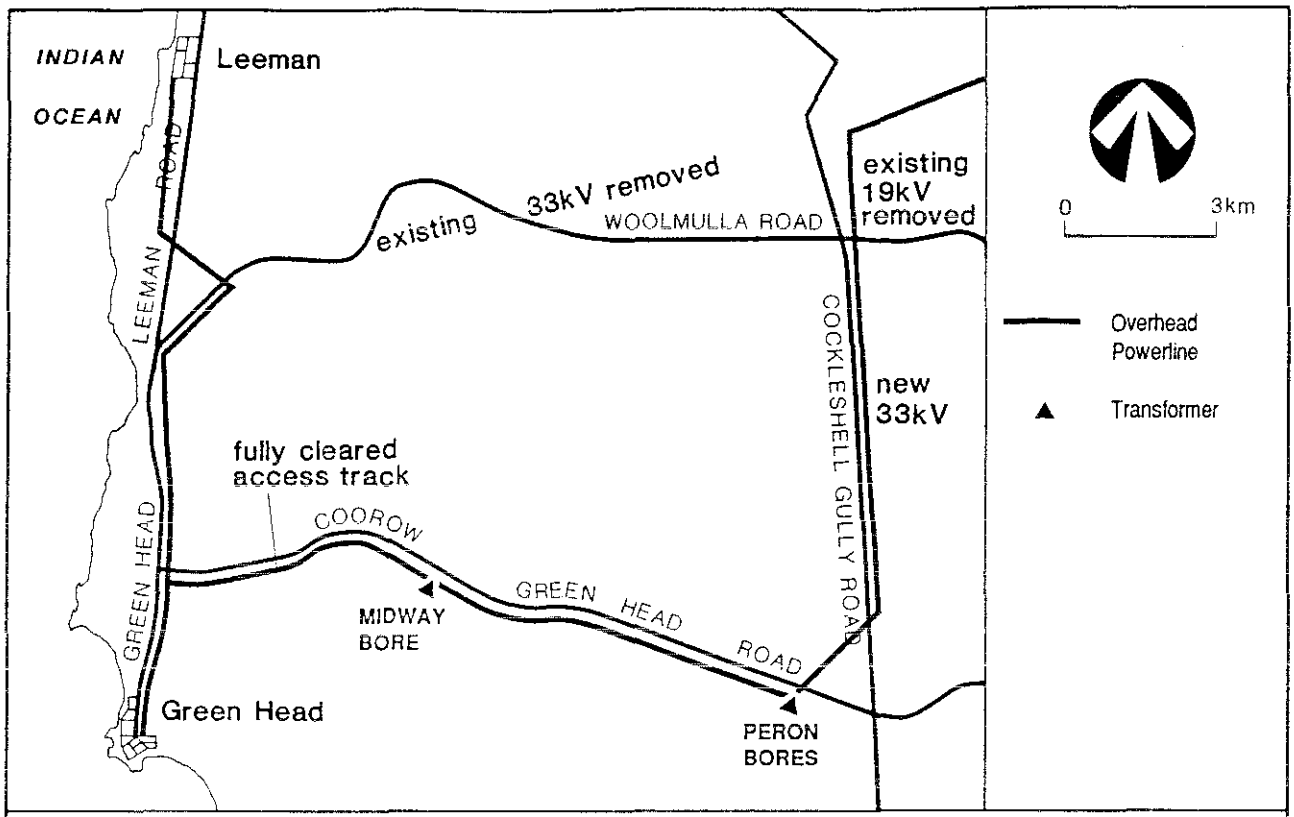


Figure 3: ***The section of the Coorow-Greenhead Road with the most significant viewscape***

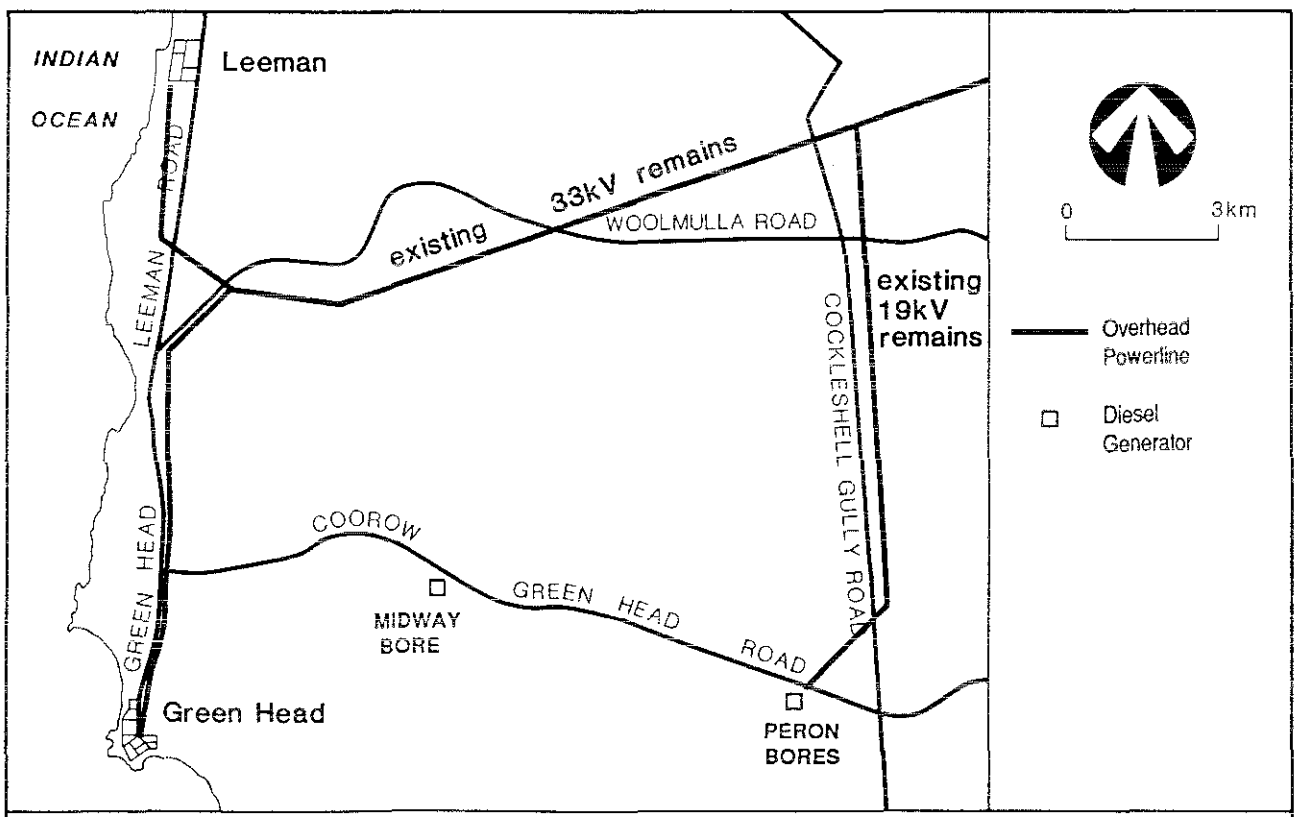
Appendix 1

The original options as proposed in the Consultative Environmental Review document

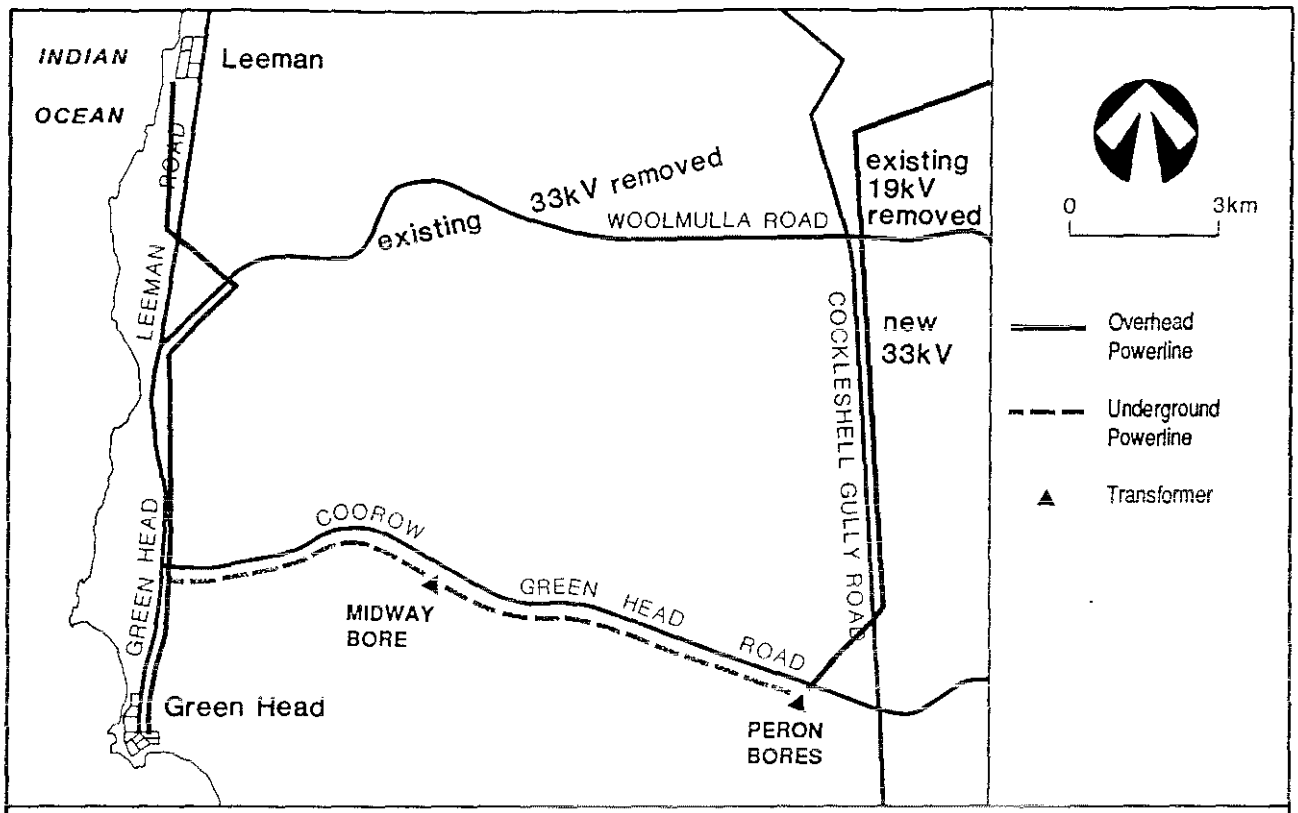


OPTION 1 OVERHEAD LINES IN ROAD RESERVES

FIGURE 3A

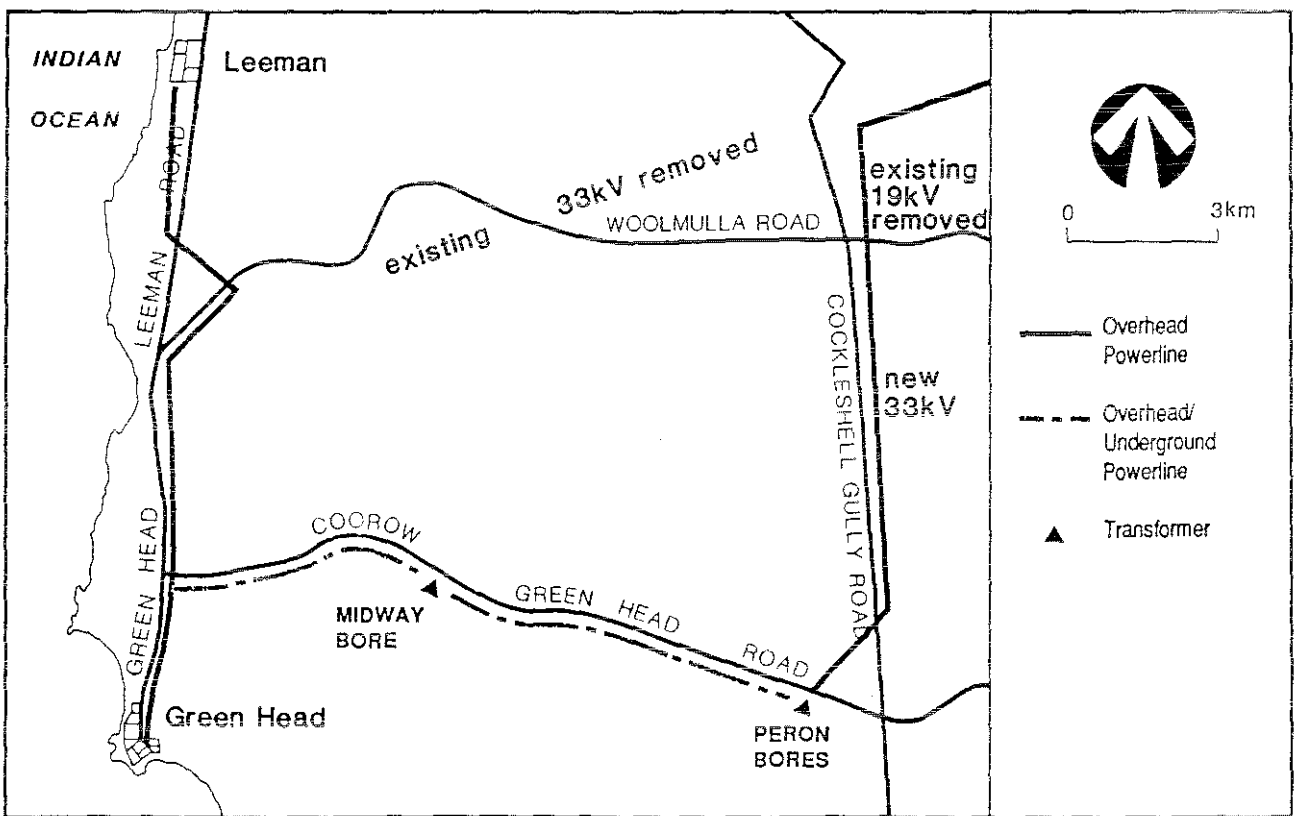


OPTION 2 DIESELS AT MIDWAY AND PERON



OPTION 3 **UNDERGROUND POWER THROUGH COOROW-GREENHEAD ROAD RESERVE**

FIGURE 3C



OPTION 4 **PART-OVERHEAD, PART-UNDERGROUND LINES THROUGH ROAD RESERVES**

Appendix 2

Issues raised during the public review period, including the submission from the Department of Conservation and Land Management

Appendix 2

Issues raised during the public review period, including the submission from the Department of Conservation and Land Management

1 The powerline should be above ground and along the Coorow-Greenhead Road verge because Leeman and Greenhead are rapidly growing towns that require good quality water, and a reliable supply of electricity.

2 Issues raised by the Department of Conservation and Land Management (refer over the page).

3 The powerline should be above ground and along the Coorow-Greenhead Road verge because the viewscape along that road is not significant (raised in two submissions).

4 The powerline should be above ground and along the Coorow-Greenhead Road verge because:

- it is the least cost option;
- it doesn't actually impact on the National Park;
- removal of the diesel generators will stop the possible pollution of the groundwater from spillages of diesel, and
- access is easier for State Energy Commission of Western Australia.

5 The road reserve is vested in the Local Authority, and they are likely in the future to carry out maintenance work which will also cause impacts on the vegetation. The siting of the power-line within the reserve is consistent with the reserve's purpose.

6 Placing the cable underground is preferable if viewscapes are the only consideration. It is recognised that for the cable to go underground in areas where caprock is at or near the surface considerable ripping or blasting would be necessary. The environmental impacts of this construction work is more significant than the protection of viewscapes. The line, therefore, should be placed above ground.

7 Control of dieback is critical. There needs to be rigorous monitoring of State Energy Commission of Western Australia's construction and rehabilitation works.

The Department of Conservation and Land Management's response to the proposed powerline

ii) **Rehabilitation (P30):**

As the old powerline route is currently used as a fire break, discussions with CALM are required as to the best use of the route. If it is decided that complete rehabilitation is the best option, the following method is recommended. Following removal of the powerline, the old route should be ripped and consideration given to erosion control. Brushing techniques developed for rehabilitation at Eneabba may be useful to encourage regeneration. Blocking, brushing and signposting the ends of the route should aid in restricting vehicle access which could otherwise prevent regeneration.

iii) **Dieback (P32):**

All soil needs to be removed from vehicles before movement between mini catchments. The undercarriages as well as the wheels and tyres need to be regularly washed down with sodium hypochlorite solution or cleaned with air as appropriate. A CALM approved dieback survey of the route will be required at the proponent's expense.

iv) **Visual Impact (P40):**

CALM offers to assist SECWA in determining the optimum placement for the powerline in terms of visual impact. Bearing in mind other possible environmental impacts, it may be possible to locate the line partly north and partly south of the road. A Scenic Quality Mapping inventory may be necessary.

3. As a third choice the preferred option, with poles situated within vegetated road reserve, would be generally acceptable with the following provisos:

i) **Timing (P3):**

The construction of the new powerline and the removal of the existing 33Kv line through Beekeepers Reserve must be undertaken in dry soil conditions.

ii) **Option 1 (P8):**

A vital component of the preferred option is the commitment to a partially cleared construction track which would be allowed to regrow.

To ensure that this commitment is not inadvertently broken, worker education and "no clearing or herbicide spraying" signposts on every pole would be useful.

Figure 3a showing the preferred option indicates a fully cleared access track. This figure and any working plans should be altered in line with the commitment.

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

HEAD OFFICE
HACKETT DRIVE CRAWLEY
WESTERN AUSTRALIA
Phone (09) 386 8811
Telex AA 94585
Facsimile (09) 386 1578

STATE OPERATIONS HEADQUARTERS
50 HAYMAN ROAD COMO
WESTERN AUSTRALIA
Phone (09) 367 0333
Telex AA 94616
Facsimile (09) 367 0466

Please address all correspondence to Executive Director, P.O. Box 104, COMO W.A. 6152

CALM Faxed 8-6-92.

Your Ref:
Our Ref: JA:DM\152
Enquiries: Ms J Allan
Phone: 367 0474

R A D Sippe
Director, Evaluation Division
Environmental Protection Authority
Westralia Square
38 Mounts Bay Road
PERTH WA 6000

ENVIRONMENTAL PROTECTION AUTHORITY
10 JUN 1992
226/72/6 Initials GM

Attention: Mr G Middle

PROPOSED POWERLINE ALONG THE GREENHEAD-COOROW ROAD THROUGH MT LESUEUR NATIONAL PARK (ASSESSMENT NO 660) CER.

Thank you for referring this CER to the Department of Conservation and Land Management (CALM) for comment. Officers of this department have examined the document and wish to raise the following points:

1. Telecom is planning to cut a trench for an optical fibre cable along the Greenhead-Coorow road in the near future. Consideration should be given to combining the two projects. Telecom have agreed in principle to this proposal.

   Burying the powerline in conjunction with the optical fibre cable would significantly reduce long-term visual degradation and long-term disturbance of vegetation, and also reduce the potential for bushfire problems.

   A joint project would also minimise both inconvenience to road users and public perception of disruption.

2. Should combination of the two projects prove impossible, then the CER preferred option would be generally acceptable to CALM. However siting of the poles within the cleared road verge would be preferable to siting within the vegetated road reserve. Disturbance of vegetation and maintenance, fire and dieback problems would be minimised by utilising the cleared verges. The following provisos would apply:

   i) Timing (P3):

   The construction of the new powerline and the removal of the existing 33Kv line through Beekcepers Reserve must be undertaken in dry soil conditions.

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iii) The CER proposal is for vegetation below the line to be trimmed to less than one metre. Is there room for some flexibility as to height? Retaining vegetation to approximately three metres would reduce disturbance to banksias and other shrubs, and may soften the visual impact of the line in places.

A height of three metres for vegetation would appear to be within the minimum clearance of three metres from conductors mentioned on P37.

iv) Whatever trimming is necessary should be done by hand without machine access.

v) Preferred Siting (P13):

For environmental reasons, siting of poles within the cleared road verge would be preferable. Is the road safety factor supported by documentary evidence? Has the difference in visual affects been quantified? If siting the poles twenty metres off the road is vital, this should be done with as little disturbance to vegetation as possible.

Justification for siting the line twenty metres from the road verge rather than within the cleared road verge includes a statement that the line will be close enough to the road for periodic inspection and maintenance to be carried out from the road. Cleaning of insulators should be included in maintenance done from the road verge. If this isn't possible, then such cleaning should be done by hand to remove need for vehicle access.

vi) Erosion (P19):

The possibility of high rainfall events playing a role in erosion is mentioned. Ensuring that the commitment not to clear under the line is adhered to will reduce the risk of erosion from high rainfall events.

vii) Structure of the Powerline (P27):

In order to remove the need for clearing or poisoning vegetation around the base of the poles, CALM requests that the bases of the wooden poles are sleeved with metal.

viii) Erection of Powerline (P28):

This must be carried out under dry soil conditions, as previously mentioned. A wheeled loader would be the preferred machine for flattening vegetation, and clumps of trees should be avoided.

ix) Maintenance (P30):

As previously mentioned, washing of the insulators should be done from the road verge or by hand.

x) **Rehabilitation (P30):**

As the old powerline route is currently used as a fire break, discussions with CALM are required as to the best use of the route. If it is decided that complete rehabilitation is the best option, the following method is recommended. Following removal of the powerline, the old route should be ripped and consideration given to erosion control. Brushing techniques developed for rehabilitation at Eneabba may be useful to encourage regeneration. Blocking, brushing and signposting the ends of the route should aid in restricting vehicle access which could otherwise prevent regeneration.

xi) **Dieback (P32):**

All soil needs to be removed from vehicles before movement between mini catchments. The undercarriages as well as the wheels and tyres need to be regularly washed down with sodium hypochlorite solution or cleaned with air as appropriate. A CALM approved dieback survey of the route will be required at the proponent's expense.

xii) **Alteration of Habitat (P34):**

Tree hollows are very important habitats in this region and therefore removal of even a few trees should be avoided if at all possible.

xiii) **Fire (P36):**

Metal sleeving of wooden poles has been requested.

xiv) **Visual Impact (P40):**

CALM offers to assist SECWA in determining the optimum placement for the powerline in terms of visual impact. Bearing in mind other possible environmental impacts, it may be possible to locate the line partly north and partly south of the road. A Scenic Quality Mapping inventory may be necessary.

Syd Shea
EXECUTIVE DIRECTOR

June 3, 1992

Appendix 3

The proponent's response to the issues raised during the Consultative Environmental Review

Your Ref
Our Ref JWM 3/3/9
Enquiries Mr John Manley
Telephone 099 210 333

State Energy Commission of Western Australia
363-365 Wellington Street
Perth Western Australia 6000
G.P.O. Box L921 Perth 6001
Telephone (09) 326 4911
Fax (09) 326 4595
Telex AA92674

SECWA

24 July 1992

The Manager
Environmental Protection Authority
Westralia Square
38 Mounts Bay Road
PERTH WA 6000

Att: Gary Middle

Dear Sir

PROPOSED POWER LINE - GREENHEAD - COOROW ROAD

Thank you for your letter of 25 June 1992.

In response to a site meeting on 15 June 1992, and your queries, our comments are as follows:

Issues Raised During the Public Review Period

Refers to your letter of 22 June 1992 to Telecom.

- Proposal to lay a section of 33kV underground power cable in common trench with Telecom's optic cable along the Coorow Greenhead Road.

  The main report has considered providing power with underground cable over the whole or part of the route:

  Option 3 - Underground cable along Coorow Greenhead Road

  Option 4 - Underground cable for a section of the Coorow Greenhead Road which is visually sensitive and overhead line for rest.

  Both of these options were rejected for cost and technical reasons.

- Sharing common trench with Telecom with trial section of underground power cable.

  As above, costs for undergrounding the supply would be considerably more than an overhead line system.

  The technical reasons for rejecting this proposal are based on reduced reliability a section of underground cable in a remote area would create. The area is prone to severe lightning storms, which would increase the risk of a fault on an underground cable. Repairs to an underground cable require specialised cable jointers from Perth, which will increase power outage time to days affecting customers in Greenhead and Leeman. A fault on an aerial power line can be repaired by local district staff in a very short time, eg. a few hours.

General Comments with Reference to CALM Letter

Our revised proposal is to locate the power line on the northern side of the Greenhead - Coorow Road - a distance of 5 metres from the sealed edge of the road. The distance is based on the recommendations of National Association of Australian State Road Authority's report for low volume roads (copy attached).

The following comments follow the same points of the CALM letter.

(i) Construction of the new powerline and removal of the existing 33kV line through Beekeeper's Reserve will be undertaken during periods of dry soil condition in conjunction with advice from CALM.

(ii) CALM office (Moora) has indicated a possibility of retaining the line clearing of the old powerline route as a firebreak. SECWA will be guided by the advice from CALM regarding the use of this area.

(iii) SECWA acknowledges the procedures necessary for the prevention, introduction or spread of dieback disease, including the development of an approved dieback survey of the route.

Construction vehicles will generally be able to operate from the road verge, reducing the risk of transferring dieback.

(iv) The proposal to locate the powerline on the northern side of Greenhead - Coorow Road, 5 metres from the sealed edge will overcome most if not all, CALM's concern.

3 (i) Same as 2 (i)

(ii) The powerline will be constructed from the road, which will require less vegetation clearing that if within the vegetated road reserve, future maintenance will be carried out from the road verge.

(iii) The positioning of the line close to the road verge eliminates the need for vegetation clearing. Since vegetation along the road verge does not have the potential to grow beyond 3 metres height, pruning of vegetation will not be required. Where upper stratum vegetation cover of Acacia occurs some localised pruning may be required.

Upper stratum Eucalyptus erythrocorys is not encountered along the northern side of the road.

(iv) Discussed above.

(v) Our revised proposal is to locate the power line on the northern side of the Greenhead - Coorow Road, a distance of 5 metres from the sealed edge of the road. The distance is based on the recommendations of the National Association of Australian State Road Authority's report for low volume roads.

(vi) Minimal clearing will reduce the risk of erosion.

(vii) The road verge will not be vegetated to the extend that control of vegetation will be required at the base of poles.

(viii) As in 3 (i)

(ix) As in 3 (ii)

(x) As in 2 (ii)

(xi) As in 2 (iii)

(xii) Acknowledged

(xiii) As in 3 (vii)

(xiv) As in 2 (iv)

Further Considerations

Drawings are attached, showing a plan view of two typical road curves where it is necessary for the power line route to cut the corner.

This is essential to reduce the number of aerial stays crossing the road and minimise the risk of vehicles hitting power poles if straying from roadways at bends.

Removing Existing Line from Beekeeper Reserve

The existing power line through Beekeepers will not be removed until the two sections of line - namely Coorow - Greenhead road and Cockleshell Gully Road - have been constructed. The line along the latter section has not been budgeted for and will probably not be built until 1993/94 financial year.

J W MANLEY
DISTRIBUTION ENGINEER
NORTH COUNTRY REGION

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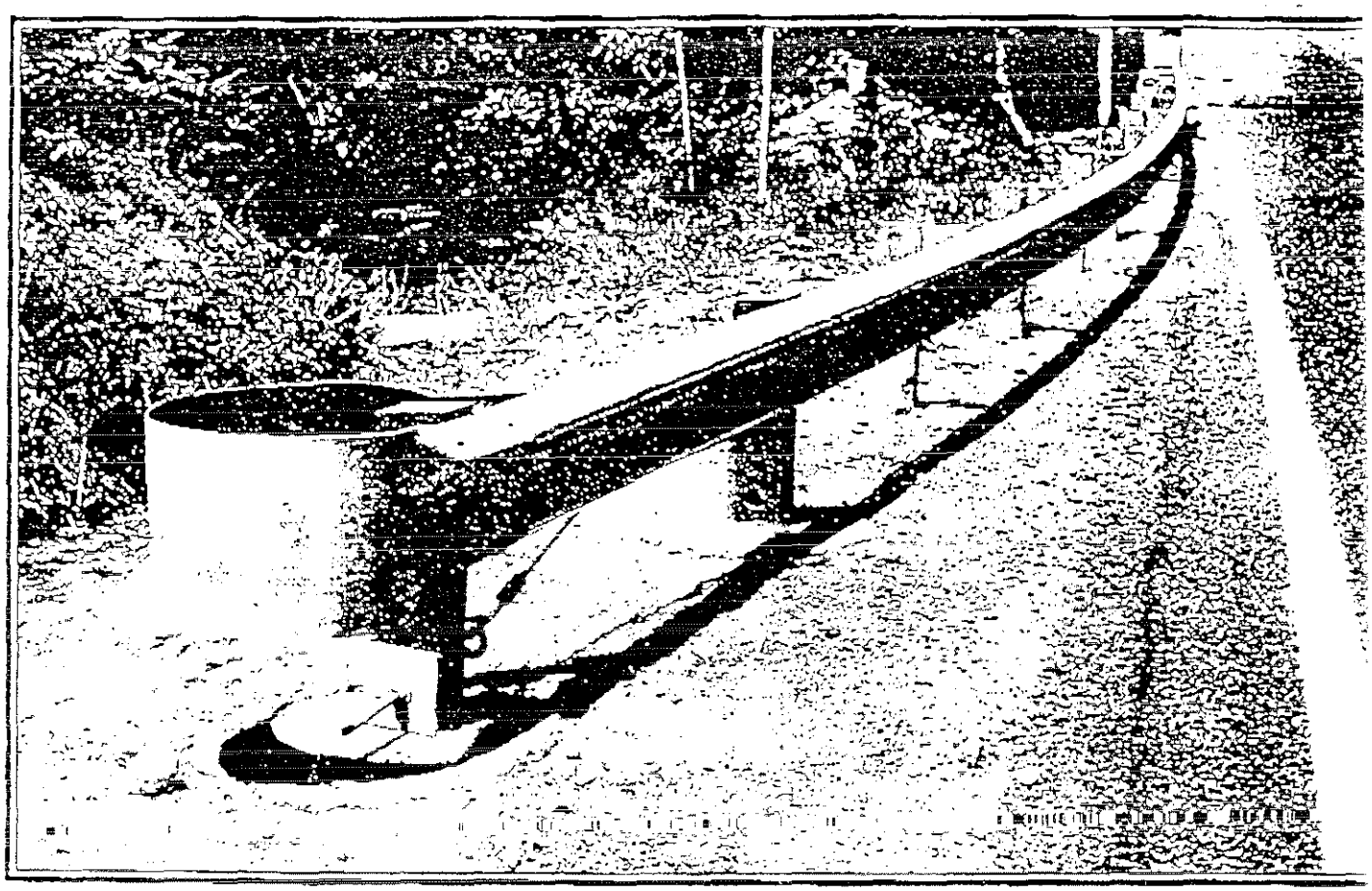
SAFETY BARRIERS



CONSIDERATIONS FOR THE PROVISION OF SAFETY BARRIERS ON RURAL ROADS

1987

NATIONAL ASSOCIATION OF AUSTRALIAN STATE ROAD AUTHORITIES

3 INSTALLATION EVALUATION

3.1 GENERAL

This publication presents the more important factors for consideration, some of which are difficult to quantify, and therefore the evaluation procedure presented here is of a general nature and should not be considered definitive or restrictive. Sometimes other factors will predominate and designers should use judgement to decide whether a barrier should be installed.

3.2 LATERAL CONSIDERATIONS

3.2.1 Recovery Width

Research in the US (AASHTO 1977) indicates that recovery widths may be up to 12 metres, or more, on straight roads with natural side slopes not steeper than about 1 in 10, and are related to a vehicle's unimpeded stopping or recovery distance. Recovery widths will be greater on the outside of curves (up to about 1000 m radius) and where embankments are steeper than about 1 in 10.

Clear recovery widths of this order are generally unattainable on other than freeways in flat terrain. However these widths should be kept clear of hazards if it is economically practicable to do so, and if the environmental consequences of retaining such widths free from major landscaping features is acceptable.

3.2.2 Clear Width

Clear widths less than the full recovery widths are normally adopted for practical, economic and environmental reasons. Figure 3.1 indicates the order of clear widths that are generally desirable, having regard to such practical considerations, and where there is no additional hazard from adjacent embankments.

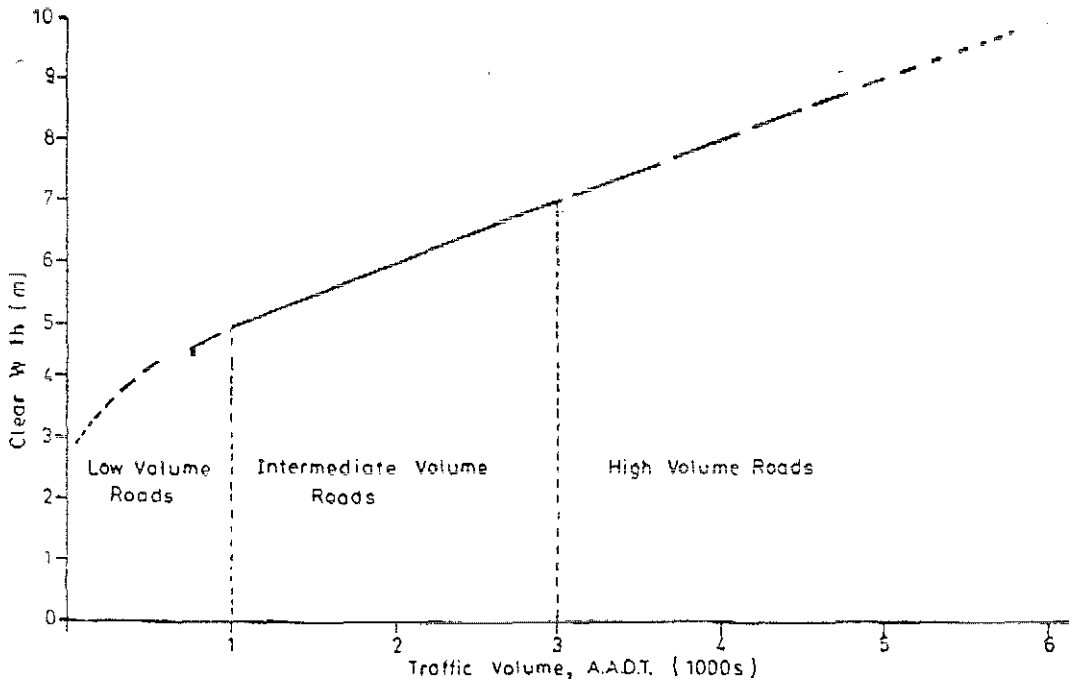


FIGURE 3.1 DESIRABLE CLEAR WIDTHS (Straight Roads, Side Slopes flatter than 1:10)

Note: This Figure should be used in conjunction with comments in Section 3.2

3.3 ROADSIDE HAZARDS

3.3.1 General

Table 3.1 lists some roadside hazards which should be considered. Each hazard will have a significance which depends on the type of road, the natural environment in which it is found, and its distance from the travelled way.

This publication categorises roads according to their speed and road environment, traffic volume and primary function. Such factors will influence the type of treatment appropriate for each particular hazard.

3.3.2 Embankments

Figure 3.2 indicates general comparisons of the hazard potential of normal (W-beam) barriers with that of traversing embankments with various height/slope combinations. It has been adapted from the embankment curves in AASHTO (1977), and extended to take account of the findings of Hall and Zador (1981), and Glennon (1981). Further, a 'band' has been shown instead of a single curve in recognition that:

(a) Vehicle and barrier designs have changed since the basic research was performed; and

(b) the tendency for a vehicle to roll-over on an embankment can be higher if;

  (i) the embankment is on the outside of a curve;

  (ii) the embankment surface is uneven or littered with debris or contains projecting sections of culvert headwalls; or

  (iii) the vehicle is narrow or has a high centre of gravity.

It should be recognised that even this band should not be regarded as having precise bounds. The treatment of slopes falling within (or near) the band must be based on engineering judgement having regard to the specific local conditions, practices or objectives.

TABLE 3.1 ROADSIDE-HAZARDS

- Abrupt drops greater than about 1.0 m in height
- Boulders and snags in rock cuts
- Bridge abutments and piers
- Creeks, Drainage Channels, Lakes and Rivers
  a) carrying substantial depths of water infrequently or only for short periods (hazard potential determined by that of the embankment
  b) carrying substantial depths of water frequently or for long periods (the water may constitute a hazard if deeper than about 1.0 m, in addition to the 'embankment' hazard in (a))
- Culverts with end or wing-walls forming abrupt drops greater than about 1.0 m in height, or having significant projections above the general plane of the batters.
- Embankments: examine using Figure 3.2., and Section 3.3.2.
- Poles or Posts:
  a) substantial metal and concrete poles or posts are hazards if not of 'breakaway' design;
  b) wooden poles or posts having cross-sectional areas greater than equivalent to about 100 mm diameter, if not made 'breakaway'
- Rock Cuts: if isolated
- Trees: if ultimate butt diameter greater than about 150 mm.

3.4 INSTALLATION CONSIDERATIONS

3.4.1 General

Safety barriers should be installed, to redirect errant vehicles from roadside hazards only when it is considered that the consequences of errant vehicle impact with the unshielded hazards (Tables 2.1 and 3.1) are likely to be more severe than those of impact with safety barriers, and that installation is economically justified, environmentally acceptable and physically practicable.

Sections 3.4.2 to 3.4.5 discuss the type of value judgements necessary to decide whether to install barriers on any of the wide range of rural roads encountered in Australia. The basis of these Sections is an assessment of the combined effects of traffic volumes, vehicle speeds, road geometry and environment, on normal driver behaviour and of the potential safety consequences of errant vehicle encroachments.

The suggested assessment procedure is:

(a) classify the road according to Section 3.4.2;

(b) survey an appropriate band of interest (i.e. the Survey width) to identify roadside hazards, (Table 3.1);

(c) assess likely consequences of errant vehicle impact with each hazard or combination of hazards;

(d) examine available accident data to identify specific areas for possible treatment;

(e) determine what remedial treatment(s) could be undertaken, consistent with the desirable safety aims of the road facility concerned, and with known budgetary limits; and

(f) resolve action to be taken: i.e. removal of hazards, rendering hazards safe, installation of barrier or 'do-nothing'.

3.4.2 Road Classifications

The following broad rural road categories are suggested as the basis for the barrier evaluation process:

(a) *High Volume Roads:-* where the AADT exceeds about 3000,

(b) *Intermediate Volume Roads:-* where the AADT is in the range 1000 to 3000,

(c) *Low Volume Roads:-* where the AADT does not exceed about 1000.

NOTE: There may be roads, or sections of them, where AADT is not the main or even an appropriate guide to the general evaluation category. eg. Low volume, high standard rural roads where the level of service perceived, or expected by drivers may demand a higher degree of roadside safety than that indicated by traffic volumes alone.

3.4.3 High Volume Roads

Rural roads with high traffic volumes are generally given relatively generous cross-section elements, in conformity with current NAASRA Guides and range from facilities with high geometric standards and operating speeds, (greater than 100 km/h), to those with intermediate geometry and speeds, (70 to 100 km/h). They encompass freeways and major arterials in a range of terrain.

High traffic volumes throughout this range of roads, may result in a potentially high incidence of errant vehicle encroachment. The incidence and extent of longitudinal encroachments will increase with increasing speed, and of lateral encroachments with increasing speed and curvature.

Encroachments from high volume roads having cross-section elements and geometry of lower standard than indicated in current NAASRA Guides may be more frequent and possibly more extensive than those from roads designed to current higher standards.

The cumulative consequences of errant vehicle encroachment from high volume roads is therefore likely to be high and may indicate the need for appropriate safety measures. Further, the economic importance of these roads in the overall road network may well justify expenditure on such measures.

It is therefore suggested that consideration be given to adopting a survey width on these roads equal to the recovery width (Section 3.2.1). All hazards identified within this survey width are considered for possible remedial treatment(s).

The importance of these roads suggests that it is desirable to:

(a) provide a clear width of about 7 to 10 metres, on straight sections, (for each direction in the case of medians); the adopted width depending upon the particular environment;

(b) shield hazards where (a) is unattainable;

(c) shield 'major' hazards (e.g. drops to railway tracks or high cliffs), within the full recovery width;

(d) avoid installing new hazards within the recovery width; and

(e) treat sections of, or locations on, existing roads where the accident rates are high enough to justify special consideration.

3.4.4 Intermediate Volume Roads

Intermediate volume rural roads are generally provided with cross-section elements in accordance with the NAASRA 'Guide to the Geometric Design of Rural Roads'.

The operating speeds on these roads cover the full range from 'intermediate' to 'high' speed values (70 to over 100 km/h) found on Australian arterial roads. The nature and consequences of encroachments are likely to be comparable with those expected on other types of road with similar operating speeds and geometry.

The incidence of encroachment from the roadway varies according to traffic volume, geometry and operating speed. This intermediate category is the most

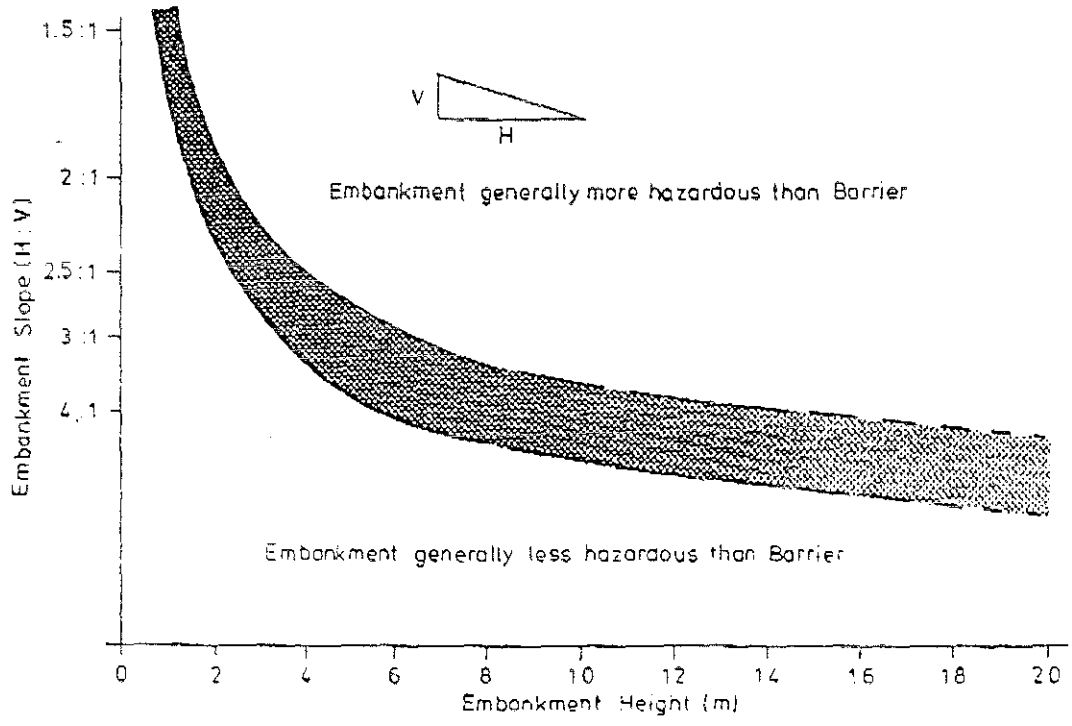


FIGURE 3.2 EMBANKMENT GUIDE

Note: Engineering judgement should be used in interpreting this Figure as what may be considered excessive lengths can result (refer Sections 1, 3.3.2 and 3.4.1)

difficult to assess in terms of potential accident rates and severity.

Seasonal variations (e.g. due to holiday traffic), may well alter the category of some of these arterial roads for limited periods, especially with traffic volumes towards the top of the range.

Most of the roads in this category are, or have been, constructed in stages, possibly reflecting a gradual change of classification. It is therefore suggested that this principle be extended to encompass the treatment of identified hazards, subject to budgetary constraints.

The appropriate survey width in this case is considered to vary between the recovery width (Section 3.2.1) and 7 to 10 metres, depending on the traffic volume and the nature of the road.

The desirable aim for the roads falling within this intermediate range is to:

(a) provide a clear width of 5 to 7 metres, on straight sections depending upon the particular environment;

(b) shield hazards where (a) is unattainable;

(c) give consideration to major hazards within 7-10 metres from the adjacent edge of traffic lane, (including evaluation of the operating history);

(d) avoid placing new hazards within about 7 metres of the adjacent edge of traffic lane; and

(e) treat sections of, or locations on, existing roads where the recorded accident rates are high enough to justify special consideration.

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3.4.5 Low Volume Roads

Low volume roads constitute most of the Australian road network, and generally have narrower cross-section elements than those of high or intermediate volume roads.

These roads range from those with high alignment and operating speed standards (in easy terrain) to the more restricted low speed (less than 60 km/hr) facilities in mountainous terrain; they encompass all standards of road ranging from interstate highways to local access roads.

Encroachment nature is likely to be similar to that of higher volume roads of similar operating speeds and geometry; therefore the consequences of errant vehicle impact with an unshielded hazard would be of similar severity. Upgrading the alignment of these roads beyond that generally dictated by the terrain may not be justified economically, so that the encroachment frequency and accident rate per unit of traffic volume may be higher than on the higher volume facilities. However, the overall accident rate per unit of time, resulting from impacts with unshielded hazards, is likely to be small in comparison with the rate for the total road network. Accordingly, it is difficult to justify substantial expenditure to treat all hazards on these roads.

The appropriate survey width for these roads should therefore be up to 7 metres. In these circumstances only hazards judged to be inconsistent are generally considered for remedial measures. An inconsistent hazard is one located closer to the traffic lane than most of the other hazards, e.g. a bridge end-post or an isolated tree.

The desirable aim for these roads is therefore to:

(a) **provide a clear width up-to 5 m, depending on the particular environment;**

(b) obtain a consistent roadway environment by removing or shielding inconsistent hazards;

(c) avoid placing any inconsistent hazards adjacent to the roadway; and

(d) treat existing roads where the recorded accident rates are high enough to justify special consideration.

3.5 SUMMARY

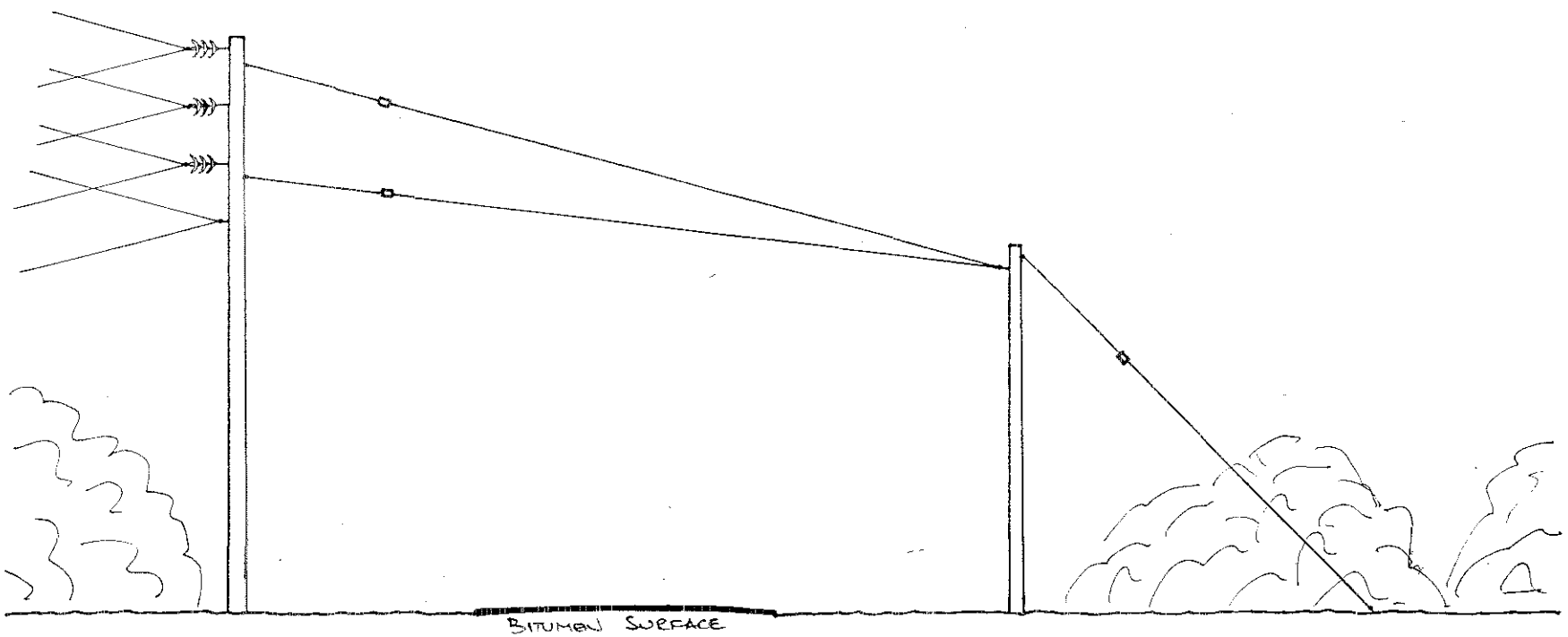
The key considerations for installation evaluation are summarised in Table 3.2 below.

TABLE 3.2 INSTALLATION EVALUATION SUMMARY

RECOMMENDATIONS	TRAFFIC-VOLUMES High AADT > 3000	Intermediate AADT 1000 - 3000	Low AADT < 1000
Clear-Width - remove or shield all hazards	7-10 metres	5-7 metres	up to 5 metres
Recovery-Width - shield major hazards	12 metres plus allowances for curves and embankments	7-10 metres	up to 7 metres obtain a consistent roadway environment by shielding exceptional hazards
Avoid installing new hazards	12 metres plus	within 7 metres	adjacent to roadway

Treat existing roads where recorded accident rates justify expenditure.

NOTE: Engineering judgement should be used in interpreting this table (refer other sections of this document).



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DATE			

. TYPICAL ARRANGEMENT —
OVERHEAD STAY ACCROSS ROAD
POWER LINE INSIDE
ROAD CURVE

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WESTERN AUSTRALIA
PROJECT SERVICES DIVISION

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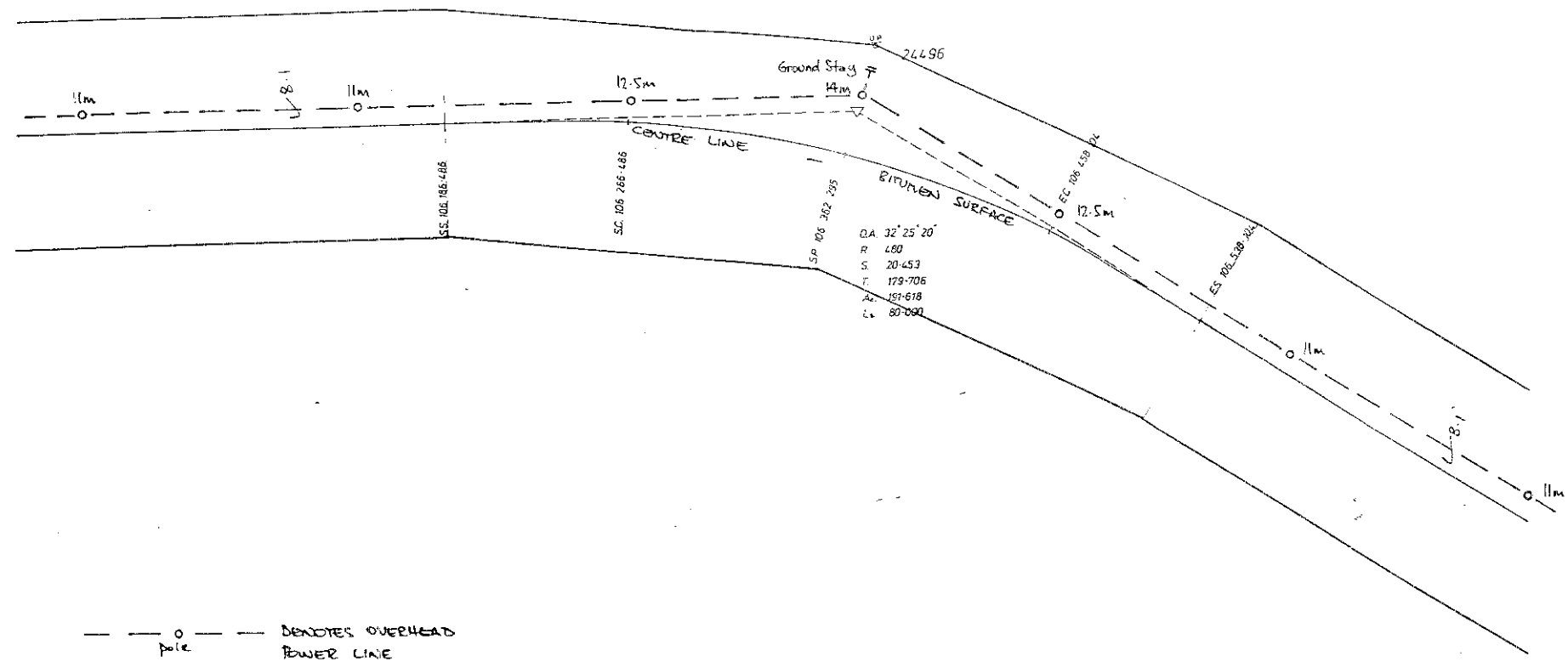

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TYPICAL ARRANGEMENT —
POWER LINE OUTSIDE
ROAD CURVE
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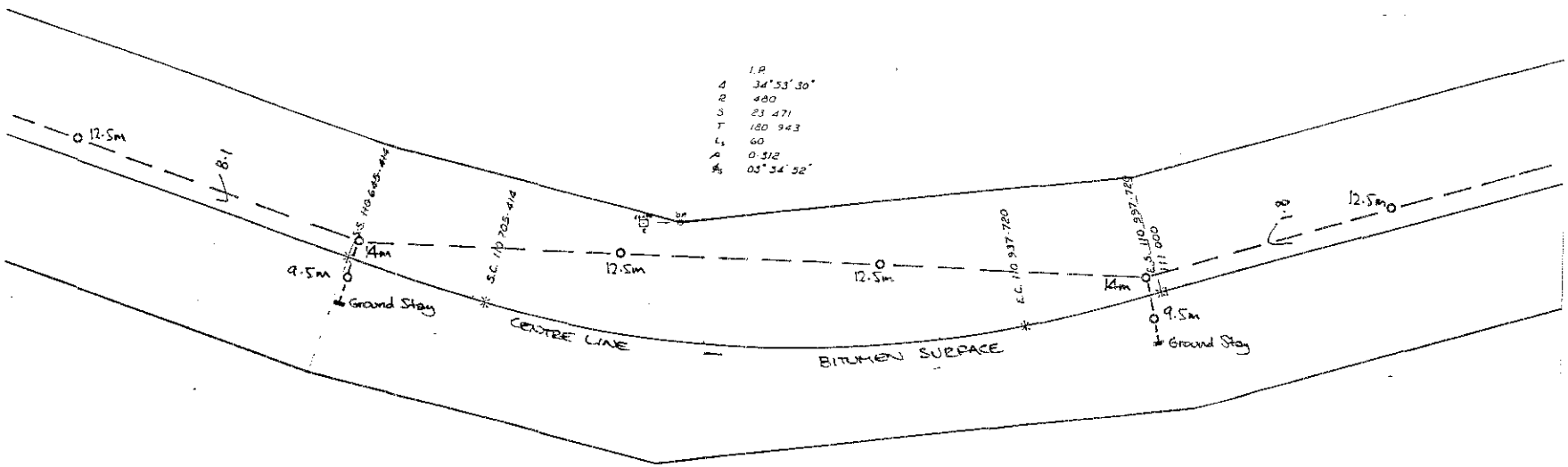

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TYPICAL ARRANGEMENT — POWER LINE INSIDE ROAD CURVE

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Appendix 4

The proponent's commitments

SECWA makes the following formal commitments with respect to the construction and operation of the powerline along the Coorow-Greenhead Road and Cockleshell Gully Road.

8.1 The powerline will be constructed in accordance with normal SECWA design procedures regarding height, spacing of poles, safety standards and fire protection.

8.2 The vegetation beneath the powerline will not be completely cleared but will be left to a height of 1m so as to preserve as much as possible of the shrub understorey and maintain erosion protection and fauna habitats.

8.3 SECWA will follow the procedures set out in the CALM Dieback Hygiene Manual (1986) for the prevention of introduction or spread of dieback and weeds. These procedures will be followed during construction, operation and maintenance of the powerline.

8.4 Following commissioning of the new powerline, the existing 33kv line in the Beekeepers Reserve will be dismantled and removed. The route of the existing line will then be rehabilitated and the track blocked to prevent vehicular access. This will offset the vegetation alteration required for the construction of the new powerline.

Likewise, the existing 19kv line located on private properties adjacent to Cockleshell Gully Road will be removed.

8.5 Where temporary clearings must be created for stockpiling materials or other purposes, the vegetation and topsoil will be scraped aside and stockpiled. When construction work is completed, these areas will be rehabilitated by scraping the topsoil and mulched vegetation back over the disturbed ground. This will be followed by ripping where necessary to a depth of at least 0.5m to loosen ground which might have been compacted by the passage of machinery.

8.6 SECWA will make every practical effort to avoid populations of Priority or significant plant species during construction of the powerline. Individuals and groups of *Grevillea olivacea* will be flagged prior to construction to facilitate their preservation.

8.7 SECWA will minimise, as far as is practicable, the visual impact of the powerline on the scenic values of the Coorow-Greenhead Road by careful siting of the powerline and, where possible, by the use of existing screening vegetation.