Beenup power supply

State Energy Commission of Western Australia

Report and recommendations
of the Environmental Protection Authority

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Contents

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 p.m. on the date indicated below.

Summary and recommendations

The State Energy Commission of Western Australia (SECWA) has submitted a proposal to construct and operate a 132 kilovolt (kV) transmission line between either the Picton or Manjimup substations and Mineral Deposits Limited proposed mineral sands mine at Beenup. SECWA's preferred option is for an overhead supply at 132kV from the Manjimup substation.Two other options from Picton(Great North Road and Margaret River) are also proposed.

The proposal was outlined in a Consultative Environmental Review (CER) prepared by SECWA for the Environmental Protection Authority's assessment. The CER drew 75 submissions. In addition, 14 submissions were received prior to the review period arising from the consultation undertaken in the preparation of the CER.

The original three corridor options as outlined in the CER raised significant environmental concerns especially in relation to clearing of State forest and native vegetation.

For this reason the Authority sought details on alternative energy sources including on site generation using diesel, wind, wood or gas supplied by a pipe line.After having sought expert advice, the Authority concluded that while alternative energy supplies were technologically advanced, their ability as a stand alone system to provide a reliable and continual source of power to meet Mineral Deposits Limited needs was not satisfactory.However the Authority found that the wind resource in the area of the proposed mine could be used to generate power and encourages SECWA to consider installing a wind system in addition to any electrical grid connection in order to offset the greenhouse gas emissions associated with supplying the Beenup project.

In its initial assessment of the proposed corridors as outlined in the CER, the Authority attempted to rank the options to determine if any were acceptable and to indicate the degree of environmental impact associated with each. The Authority found this difficult to do because each corridor has a range of associated environmental costs which are hard to compare.

After determining that each corridor had significant environmental impacts, the Authority then turned its attention to seeking modifications to the original proposal. In response to the public submissions and following interaction with the Authority, SECWA revised its proposal. The Authority has found that all revised options could be made environmentally acceptable, subject to the proponent's changes, and commitments, and the Authority's recommendations in this report. The modified Manjimup option provided particular difficulties in order to ensure its environmental acceptability, and can only be made acceptable by constructing the line underground in specific locations.

In reaching this conclusion, the Authority was particularly aware of the stated preferences and positions of key government agencies, shire councils, various organisations, and individuals who made submissions. For example, some Government agencies stated their position as one of opposing the Manjimup option, while preferring the Margaret River option. In direct contrast, a number of shire councils, organisations and individuals stated their opposition to the Margaret River and Great North Road options, while stating a preference for the Manjimup option.

Whilst the Authority appreciated being advised of the individual preferences, it still had a responsibility to examine the potential environmental impacts associated with each corridor.

The recommendations contained in this report have been made following an assessment of the original proposal detailed in the CER, changes to that proposal arising from the public review period, responses and additional information provided by the proponent, and issues raised in public submissions.

The Authority would like to acknowledge the extensive nature of SECWA's consultation process and the constructive involvement in that process by the various organisations, groups and individuals potentially affected by, or with an interest in, the proposal.

Changes to proposal

The following summarises the key changes which would have to be made to each corridor option to make them environmentally acceptable.In addition SECWA has proposed an extensive set of commitments (see Appendix 1) to minimise and manage environmental impacts. The changes reflect the main environmental issues associated with SECWA's proposal. The issues are:

-impact on conservation and heritage areas

-impact on the State Forest Estate

-potential loss of forest of a high conservation value

-social

-electromagnetic radiation

In assessing the original proposals outlined in the CER and the amended proposals, the Authority has established a number of principles which have been developed to make the corridors more acceptable. These principles will be used to assess future proposals for transmission lines. The principles are:

- selection of corridors should include the review of all relevant impacts
- transmission lines and associated infrastructure should be sited on cleared land where-ever possible including being sited along existing roads and tracks in order to reduce clearing
- vegetation cleared should be replaced, both in quantity and value
- undergrounding of transmission lines should occur in areas having a high conservation value
- poles of a reduced height and foundation should be used instead of towers in environmentally sensitive areas
- dieback disease management should be stringent and strictly adhered to at all times in areas of risk

Specific comments on the corridors are:

Manjimup to Beenup Corridor

Conservation value - the Authority has recommended that no clearing of certain areas of forest of a high conservation value occur. In certain areas shown in Figure 3, it will be necessary for the transmission line to go underground.

Clearing profile - use of logging haul roads and foregoing tall tree clearing practice in existing, and proposed conservation areas and all other forest areas will minimise clearing. The use of logging haul roads will reduce clearing to 20m.(See Figure 2.)

Poles - use of wooden or concrete poles (approximatly 20m in height) with a pole top configuration.(See Figure 2).The Authority has recommended use of poles for the whole corridor.This will minimise visual impact and result in less ground disturbance.

Forest replacement - the Authority has recommended that the area, and conservation value of forest cleared be replaced to maintain the integrity of the State Forest Estate. On private land areas of significant bushland should be avoided.

Nature Reserves.- The Authority has recommended that no part of the Chester and Paget Nature Reserves be affected.

Electromagnetic fields - the Authority has recommended that a minimum distance be maintained from residences consistent with international guidelines.

Picton to Great North Road to Beenup and Picton to Margaret River to Beenup

Conservation areas.- The Authority has recommended that no part of the Mowen, and Rapids Conservation Parks be affected. Where the corridors cross the proposed Blackwood Conservation Park, siting of the tower/pole structures should be at the maximum possible distance so as to avoid impact on the proposed park.

Clearing profile - The Authority has recommended that the revised clearing profile proposed for the Manjimup option (Figure 2) apply to these corridor options as well.

Poles - The Authority has recommended that the poles proposed to be used for the Manjimup option be used for these corridor options as well.

Forest replacement - the Authority has recommended that the area, and conservation value of forest cleared be replaced to maintain the integrity of the State Forest Estate. On private land areas of significant bushland to be avoided.

Electromagnetic fields - the Authority has recommended that a minimum distance be maintained from residences consistent with international guidelines.

The Authority concluded that the original corridor options as proposed by SECWA in their CER had environmental impacts of concern to the Authority. Changes to the proposals arising from the Authority's interaction with the proponent,government agencies and the public have made the Great North Road and Margaret River options acceptable. The Manjimup to Beenup option in particular is environmentally acceptable provided Recommendation 5 is implemented in addition to the other recommendations and the Proponent's commitments.

The Authority's recommendations are outlined below.Recommendations 1,3,4,6, and 8 apply to the Great North Road and Margaret River corridor options.Recommendations 2,3,4,5,6,7 and 8 apply to the Manjimup option.

Recommendation 1

The Environmental Protection Authority concludes that the Great North Road and Margaret River options for power supply to the Beenup proposal as modified during the process of interaction between the proponent, the Environmental Protection Authority, the public and government agencies that were consulted, are environmentally acceptable provided the following recommendations are accepted(Recommendations 3, 4, 6, and 8).

The Environmental Protection Authority concludes that the environmental factors requiring detailed consideration have been addressed adequately by: the proponent substantially changing the proposal, environmental management commitments given by the proponent and the Environmental Protection Authority's recommendations in this Report.

Accordingly, the Environmental Protection Authority recommends that the proposal could proceed subject to:

- **the Environmental Protection Authority's recommendations in this assessment report;**
- **the proponent's commitments which appear in Appendix 1, which were drawn from the CER and the proponent's response to public submissions;**

Recommendation 2

The Environmental Protection Authority concludes that the Manjimup option for power supply to the Beenup proposal as modified during the process of interaction between the proponent, the Environmental Protection Authority, the public and government agencies that were consulted, is environmentally

acceptable provided the following recommendations are accepted (Recommendations 3 to 8).

Accordingly, the Environmental Protection Authority recommends that the proposal could only proceed subject to:

- **the Environmental Protection Authority's recommendations in this assessment report (especially Recommendation 5).**
- **the proponent's commitments which appear in Appendix 1, which were drawn from the CER and the proponent's response to public submissions**

Recommendation 3

The Environmental Protection Authority recommends that the reduced clearing profile and pole configuration proposed by SECWA and illustrated in Figure 2 apply to the entire length of the proposed corridors.

In making the above recommendation the Authority notes that structures other than poles may be needed to avoid impact on the proposed Blackwood River Conservation Park.

Recommendation 4

The Environmental Protection Authority recommends that on private land, the proponent should avoid where ever possible, areas of significant stands of native (included regenerated) bushland.

Recommendation 5

The Environmental Protection Authority recommends that the Manjimup option is acceptable only if the proponent does not clear forest of a high conservation value.In these areas, as indicated in Figure 3, the power line should be placed underground.Minor modifications to the areas indicated in Figure 3 should only be made to the satisfaction of the Environmental Protection Authority on advice of the Department of Conservation and Land Management.

Recommendation 6

The Environmental Protection Authority recommends that the integrity of the State Forest Estate be maintained by the proponent replacing the area and conservation value of forest cleared. A proposed plan for forest replacement should be prepared and implemented to the satisfaction of the Minister for the Environment on advise from the Department of Conservation and Land Management.

In making the above recommendation, it is intended that the replacement forest be reserved for conservation purposes and subsequently managed by the Department of Conservation and Land Management. The Authority suggests that the proponent could replace the vegetation lost by planting and/or the acquisition of forest on private land.

Recommendation 7

The Environmental Protection Authority recommends that no part of the Chester and Paget Nature Reserves be included in any easement for any power line or associated road access.

Recommendation 8

The Environmental Protection Authority recommends that a minimum distance be maintained from residences consistent with the guidelines laid down by the International Non Ionising Radiation Committee (INIRC) of the International Radiation Protection Authority (IRPA)

1. Introduction and background

The State Energy Commission of Western Australia (SECWA) has proposed to construct and operate a 132 kilovolt (kV) transmission line between either the Picton or Manjimup substations and Mineral Deposits Ltd (MDL) proposed mineral sands mine at Beenup, 17km east of Augusta.

The Beenup mineral sands deposit has a life expectancy in excess of 20 years. In its Environmental Review and Management Plan, Mineral Deposits Limited stated that the electric power supply to the operation would be provided from the state electrical grid by SECWA. It was indicated that this would involve either an extension of the 132kV line east of the project site or upgrading of the 66kV power line to Margaret River, and extension of the line to the project site.

In its assessment of the Beenup proposal, the Environmental Protection Authority noted that the project made provision for the connection of a SECWA power supply to the mine, plant site and construction accommodation facilities. It was indicated that the routing of the supply, possibly from the Manjimup area, would be determined by SECWA and subjected to environmental review with public input in its own right. The proposed commissioning date of the mine is July 1994.

In addition to providing power to the mine site, SECWA considers that the transmission line may provide a short term power supply for the Augusta and Scott River area and thus supplement power supplies derived from Margaret River. In the long term the proposed line would be capable of supplying other development power loads in the area and depending on the location of the development, will reinforce the existing power supply from Picton to Margaret River. At present the distribution of electricity is via 22kV lines originating from substations at Margaret River and Busselton.

Following referral of a proposal for a 132kV transmission line, Manjimup to the Beenup mine in August 1990, the Environmental Protection Authority considered that a formal assessment at a Consultative Environmental Review (CER) would be used to publicly examine and address environmental aspects of the proposal.

Following initial environmental studies and public consultation, the Environmental Protection Authority advised SECWA that an analysis of alternatives to the single corridor being proposed would have to be undertaken as an integral component of the CER. Specifically SECWA was requested to undertake a detailed comparison of the cost of each option and the environmental impacts associated with each option.

The Authority requested that SECWA re-advertise the CER in August 1991 because the proposal had extended to include power supply options from Manjimup, Picton via Margaret River, Picton via Sues Road and Picton via Great North Road.

2. Description of proposal

2.1 General

The proposal is to construct and operate a 132kV transmission line between either Picton or Manjimup substations and the proposed mineral sands mine at Beenup.

A Geographic Information System (GIS) was used to identify and eliminate a number of corridor options with environmental approval being sought for a 1km wide corridor. The actual easement required for the line is 40-60m wide.

Four corridor options were identified and are listed below:

- Manjimup to Beenup - transmission line operating at 132kV

- Picton to Beenup via Sues Road - transmission line operating at 132kV
- Picton to Beenup via Great North Road - transmission line operating at 132kV
- Picton to Beenup via Margaret River - transmission line operating at 132kV.

The original corridor options and the study area are shown in Figure 1.

The Sues Road option was eliminated by SECWA from further detailed investigation for the following reasons:

- the planned alignment of Sues Road contains bends which would be difficult to follow with the transmission line. It is estimated that of the 19km of Sues Road followed, only 12km of the route could take advantage of the existing clearing along Sues Road;
- the line route would impact on the Whicher Range Nature Reserve and the line route across the Whicher Scarp would be of greater visual impact than the alternative Great North Road option;
- SECWA was concerned with the potential impact of the transmission line on tourism if Sues Road becomes a major access to the region; and
- the option would require clearing of approximately 48ha of virgin (uncut) forest near the Blackwood River.

2.2 Description of options

The following describes the preferred route for each corridor as detailed in the CER.All corridors had sub-options which were not pursued following consultation undertaken by SECWA in the preparation of the CER.

(i) Picton-Margaret River-Beenup

Starting from Picton the proposed 1km wide corridor would parallel, at a separation of 20m, an existing 66kV line all the way to Margaret River via Capel and Busselton. The corridor up to Capel is generally clear of urban development, traverses some swamp areas, crosses the Bussell Highway south of Mangles Road intersection, passes near a private airstrip and north of the Capel township.

The route then generally parallels the existing 66kV line in a south-west direction to Margaret River, skirts the Ludlow Plantation, with a deviation required around the Busselton Golf Course. The corridor then passes through agricultural lands, skirts the Margaret Plantation and airfield, passing by the SECWA substation. The corridor then crosses private properties, Rosa Brook Road, the southern section of Bramley Forest block, Wallis Road and Witchcliff Forest block.The Blackwood River Reserve is crossed, continuing south following Great North Road to the mine site. The approximate route length is 131km.

(ii) Picton-Great North Road-Beenup

Starting from Picton, the corridor is identical to the previous option until it reaches Capel. It then remains the same until it deviates into the new corridor at Jamieson Road. The corridor passes through intensive agricultural lands, enters the Vasse Plantation and runs parallel with Rapids Road and the Great North Road. Deviations will be necessary to avoid conservation parks, nature reserves and scenic areas. The Blackwood River is crossed west of Great North Road and then follows the same route as the previous option. The approximate route length is 114km.

(iii) Manjimup-Beenup

Starting from Manjimup the proposed corridor follows the general alignment of two log haulage roads namely Palings Road and Waistcoat Road to Vasse Highway after having crossed agricultural land and entering the Channybearup forest block. Regrowth Karri forest is passed through with high quality Karri forest being avoided south of the corridor. The corridor then incorporates Waistcoat Road and is restricted by headwaters of major drainage lines. This section includes the Beavis East and Beavis West forest blocks, areas of which are nominated for listing with the Australian Heritage Commission. For areas nominated for listing with the Australian Heritage Commission, alternative options exist which would involve undergrounding or the construction of very tall structures.to clear the maximum tree height. The corridor passes down the Darling Scarp and the Scott Coastal Plain. After crossing the Vasse Highway, the corridor then enters the Storry forest block before crossing the Donnelly River and Barlee Brook. The remainder of the corridor traverses State Forest, some private cleared land, terminating at the minesite. Within the State Forest the edges of the corridor cross Paget and Chester Nature Reserves. Approximate route length of 90km.

2.3 Construction and operation

As originally detailed in the CER the line would be constructed using steel lattice towers approximately 20-30m in height with a typical span between the towers of 300-400m. The use of concrete poles is being considered. A substation would be constructed at the Beenup minesite.

Permanent access tracks to the tower bases would be constructed and maintained for line inspections and maintenance purposes in State Forest or crown land.

Construction of the line would be undertaken by contractors under SECWA supervision. Erection of the line would have three distinct stages, namely foundation construction, line structure erection and the stringing of conductors.

The specific design of the line and the towers/poles has been revised by SECWA especially for areas in the Manjimup to Beenup corridor. **The revised details are discussed in Section 6 of this assessment report.**

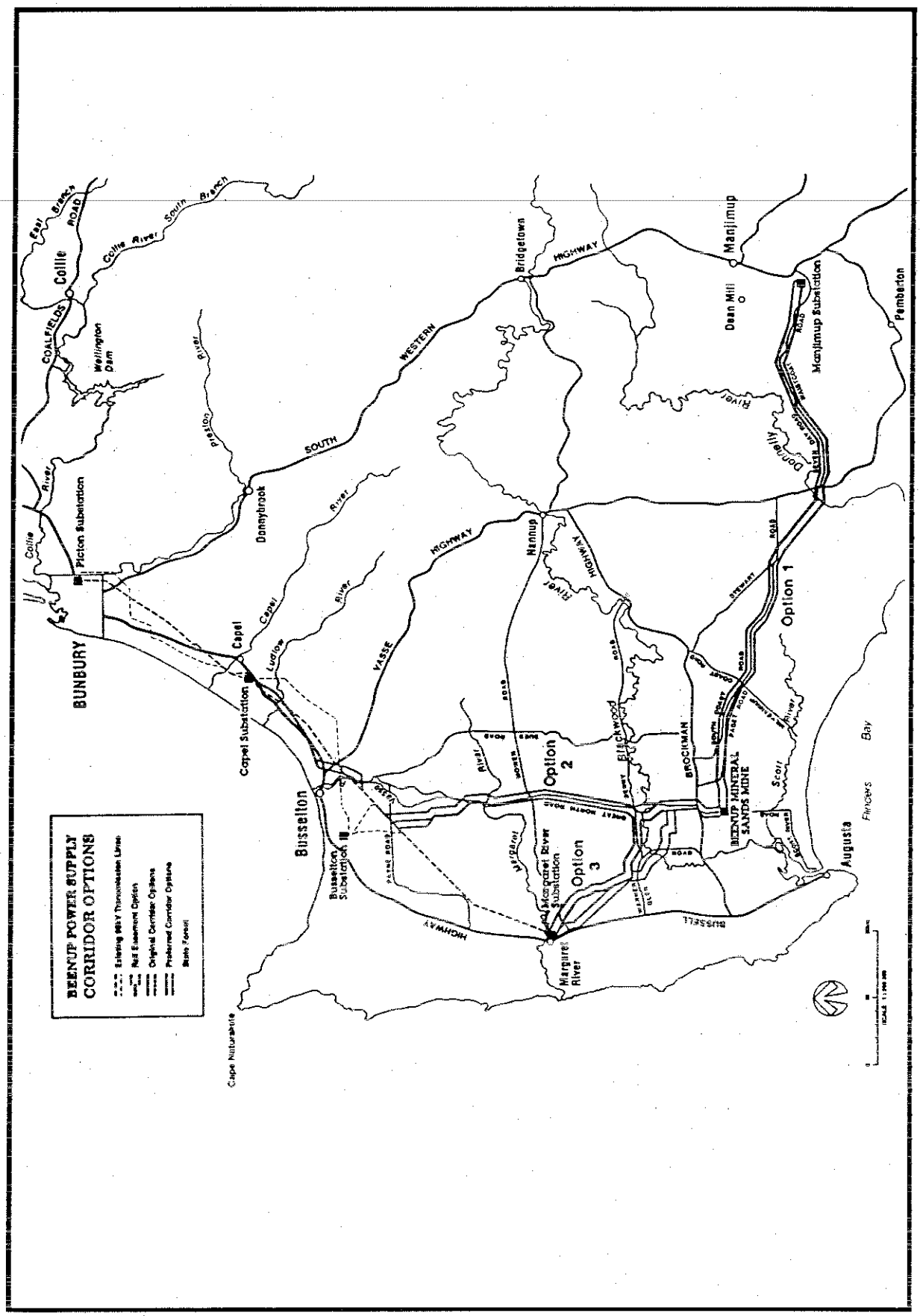

Figure 1. Study area and corridor options

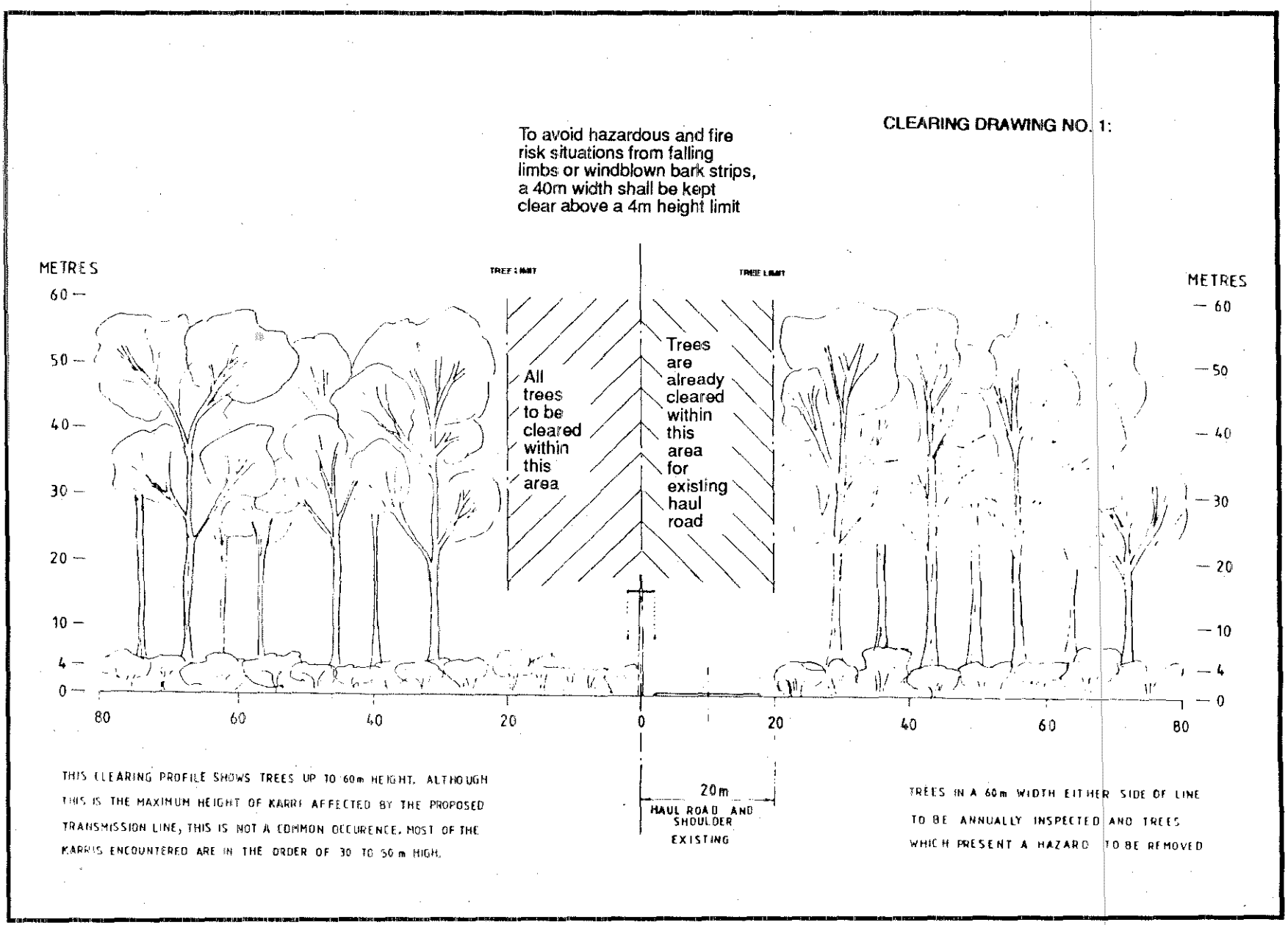

Figure 2: Clearing profile and pole configuration

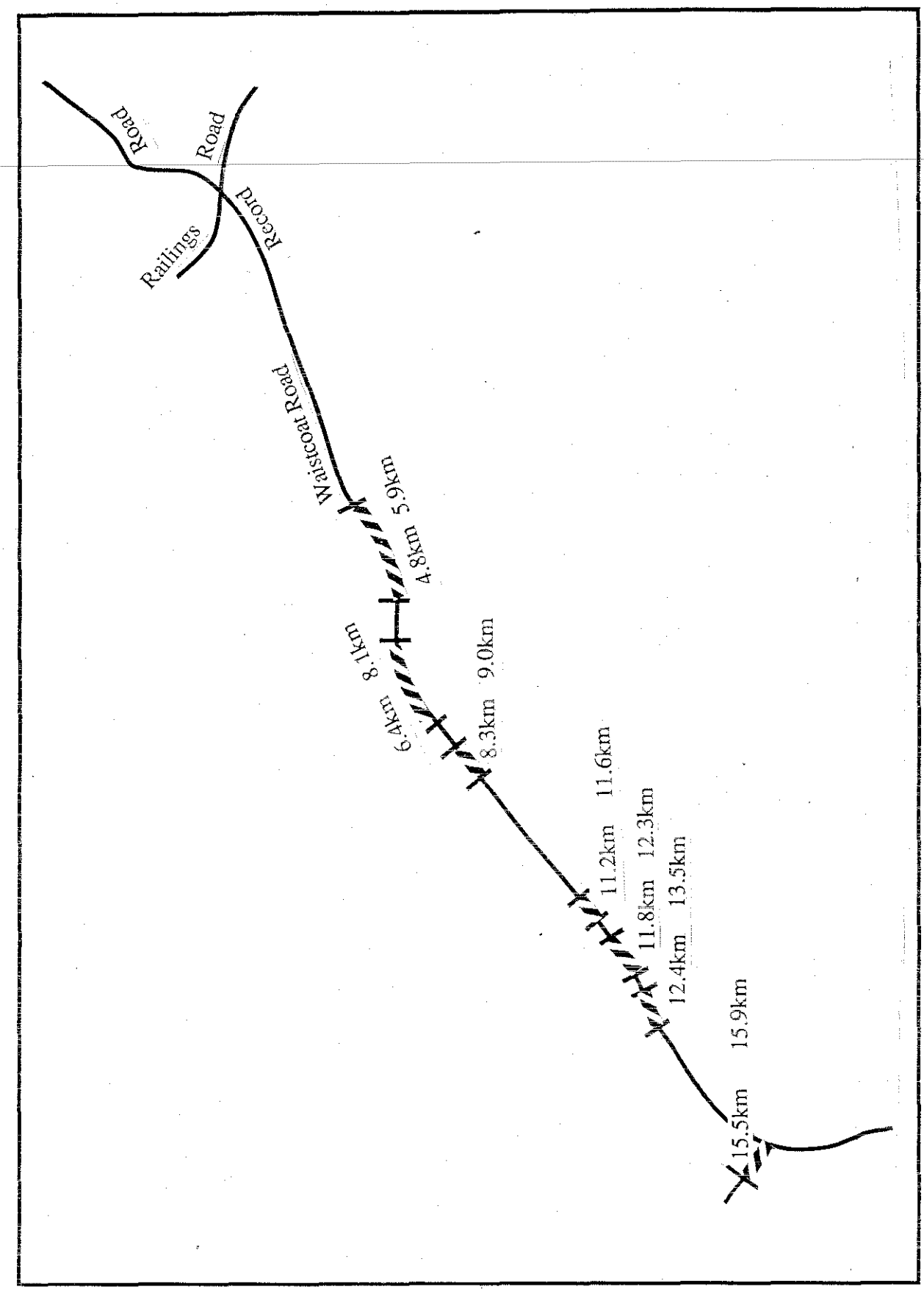

Figure 3: Areas recommended for line to be undergrounded

3. Alternatives

The proponent examined five general alternatives to the transmission line corridors in the CER. **Comment is provided by the Authority in Section 6 of this assessment report.**

(i) No action alternatives

Would involve no action by SECWA and would require Mineral Deposits Limited to reconsider on-site generation or deciding not to proceed with the mine.

(ii) Alternative technologies

The proposed Beenup mine is located in a portion of Western Australia with a substantial wind resource. Wind is variable in strength and direction and a back-up system possibly on-site diesel generation would be needed.In simple terms wind energy could not be used in the absence of an existing grid to cater for the times of low wind. **This issue is discussed further in Section 6.**

Underground cable has the benefit of reducing vegetation clearing and visual intrusion. The cost of undergrounding has generally been considered by power authorities around Australia to be prohibitive.**This issue is discussed further in Section 6.**

(iii) On-site generation

SECWA states in the CER that on-site generation alternatives were evaluated by Mineral Deposits Limited during mine-site feasibility studies. Solar and wind power technologies were considered to be not sufficiently advanced leaving gas or diesel generation. Gas was eliminated due to the region not being serviced and an economic and environmental analysis was undertaken by both Mineral Deposits Limited and SECWA in respect to diesel. **Further comment is provided in Section 6 of this assessment report.**

(iv) Alternative supply voltages

These involved 22kV, 33kV and 66kV options utilising existing distribution systems and/or building new lines. The options were considered economically and technically inferior to the 132kV corridor options.

Supply of 220kV or 330kV was considered unjustifiable in light of the load required by the Beenup mine.

(v) Direct Current transmission was not considered by SECWA due to costs associated with DC terminal installation.

4. Existing environment

The CER document describes the existing environment in general, but adequate terms. Because of the corridor selection system used, the environmental description provided describes the areas traversed by the proposed corridors on a regional and local basis.

Aspects of the environment particularly relevant to the environmental assessment of the project include:

- Vegetation units, specifically the Spearwood system (Tuart), Chapman system (Jarrah-Marri), Nornalup system (Karri).
- Heritage and conservation areas, specifically the Blackwood River Conservation Park, Milyeannup Nature Reserve, Rapids Conservation Park, Mowen Conservation Park, Chester Nature Reserve, Beavis (East and West) forest block and Giblett forest block.
- Rare and endangered flora, specifically within the Treeton forest block.
- Rare and endangered fauna.

- Social, specifically the number of properties traversed and land use including farming, residential, tourism and recreation.
- Visual resources, specifically landscape/scenic quality.

5. Public consultation

SECWA undertook an extensive programme of public consultation following the initial identification of three corridors.

Owners of potentially affected properties were contacted by SECWA personnel during the planning stages to inform them of the proposal and discuss issues of concern. Landowners were supplied with a copy or summary of the CER on its release. SECWA also arranged opportunities for public review through public meetings and half day information sessions. A number of interest groups were also addressed. Use of local media ensured adequate coverage of the proposal. The CER was widely available in the relevant communities.

As well as informing people, the thoroughness of the public consultation process has allowed detailed and accurate information to be collected and applied to the comparative evaluation of the corridors.

SECWA has committed to continue public consultation for the final siting of the power line.

The public review period drew 75 submissions. In addition, 14 submissions were received prior to the review period arising from the consultation undertaken in the preparation of the CER.

A number of submissions were very detailed and were representative of the issues raised in the majority of submissions. These submissions were forwarded to SECWA (with the submittors' permission) along with a summary of issues raised and specific questions arising from a number of submissions. The proponent's response to the issues, representative submissions and specific questions is published in full in Appendix 2.

Major issues raised in the public submissions included:

- Corridor selection methodology and assumptions
- Need for detailed information from on-site investigations
- On-site generation
- Excess capacity in 132kV line
- Impacts of coal based power generation
- Undergrounding of line
- Economics
- Alternative corridors
- Future power line upgradings
- Vegetation loss
- Rare flora and fauna
- Erosion
- Drainage
- Heritage impacts
- Plans to compensate for vegetation loss
- Dieback

- Visual and landscape assessment
- Maintenance details
- Weed infestation and chemical control
- Property values
- Disruption to farming and other activities, specifically viticulture, dairy farming, horticulture, airstrips, tourism, recreation areas, community centres
- Productivity of land and income generation ie. tourism, rental income, stagnation of farming lands
- Effects on future plans for subdivision, tourism, increased farm production
- Privacy
- Equity, specifically more than one power line on certain properties
- Visual amenity
- Television and radio reception
- Electromagnetic fields
- Regional overview
- Power supply should have been assessed with mine proposal

In addition to the issues raised, most submittors stated that they were opposed to a specific corridor option, but supported the alternative options.

6.Environmental Impacts and Management

As noted in the description of the proposal, the proponent has submitted three corridors for assessment and stated a preference for the Manjimup to Beenup option. During the ongoing interaction with the Authority, the proponent decided that detailed information was required for the forest impacts of the Manjimup option. In addition, the Authority decided further analysis was needed for alternative power generation options, for example, on-site generation utilising the wind resource in the Beenup area. The Authority undertook a full investigation into alternative supply which included briefings by technical experts.

6.1 Alternative power generation

In its CER document, the proponent concluded that alternative technologies were not sufficiently advanced technologically or were cost prohibitive.

Because the general area of the Beenup mine is remote and has real potential as a wind resource for power generation, the Authority requested a detailed response to issues relating to the feasibility of wind generation and other alternatives.

The Renewable Energy Advisory Council in their submission on the CER, advised that it has a policy of discouraging the expansion of the SECWA grid in Western Australia except where commercially viable,when full economic, social and environmental costs are taken into account. The Renewable Energy Advisory Council advised that it considered the location of the Beenup mine as remote, and with the developments in remote area power systems, further analysis should be undertaken for this proposal. The Renewable Energy Advisory Council supplied costings of the supply of power using wood, wind or gas.

During the Authority's interaction with the Renewable Energy Advisory Council, SECWA's Renewable Energy Branch and Mineral Deposits Limited, costings were revised leaving the question unresolved of whether alternatives to SECWA's grid competed economically and in

some cases (for example, construction of a gas pipeline, amount of wood required,location and size of wind farm), on environmental grounds. SECWA's response to the detailed questions put to it is included in Appendix 2.

After having sought expert advice, the Authority concluded that while alternative energy supplies were technologically advanced, their ability to provide an economically viable and reliable and continual source of power to meet Mineral Deposits Limited needs, could not be demonstrated at this time.This is due to the remote location of the mine site, its distance from the existing grid, and the amount of power required for Mineral Deposits Limited operations. The particular advantages of wind accrue when used in conjunction with the grid where a wind system can be backed up during windless weather, while actually providing extra energy to feed back into the grid when generating excess power on windy days.

The information compiled for the Authority's investigations, is considered to be important public information which summarises some key issues relating to alternative energy supply in Western Australia. For this reason the Authority draws attention to the Proponent's Response to issues in Appendix 2, (specifically pages 51, and 54-57).The Authority is pleased to note that SECWA and Mineral Deposits Limited will co-operate in continuing investigations into renewable energy sources.

It is also noted that BHP, the parent company of Mineral Deposits Limited, is one of Australia's producers of wind energy systems. The EPA encourages Mineral Deposits Limited to consider installing a wind system in addition to grid connection in order to off set the generation of greenhouse gas emissions caused by supplying power to the Beenup project.

6.2 Corridor assessment

Previous proposals by SECWA which have been assessed by the Authority have involved a single corridor option with specific sub-option alternatives. The proposal by SECWA involves three corridors traversing quite different landscapes in terms of vegetation type, conservation areas, farming lands (small lot to broad acre) and social factors. For these reasons, the Authority choose to assess each corridor option

The original three corridor options as outlined in the CER were considered to have impacts for which the Authority had concerns.The proposed Manjimup to Beenup corridor was particular problems because the proposal involved clearing large areas of forest, and affected specific stands of Karri and Jarrah with a high conservation value which cannot be readily replaced.

In its assessment, the Authority initially examined each corridor as outlined in the CER, to determine their environmental acceptability. The Authority asked itself if it was possible to rank the options to determine if any were acceptable and to indicate the degree of environmental impact associated with each. The Authority concluded that this was not possible because each corridor has associated environmental costs which are hard to compare. Further, the information required to do this was not available because all environmental costs were not reflected in the selection of the corridors. Ranking the corridors was also not appropriate because in the process used to select the corridors (which included the stated preferences of those consulted), trade offs between bio-physical impacts and social considerations would have occurred.This was particularly evident with the Manjimup option. The Authority is concerned that this should not happen until the point of decision making.

After determining that each corridor had significant environmental concerns, the Authority then turned its attention to seeking modifications to the original proposals. In response to the public submissions and following interaction with the Authority, the proposal, especially for the Manjimup corridor option,was significantly modified. The Authority has found that the Great North Road and Margaret River options could be made environmentally acceptable, subject to the proponent's changes, and commitments, and the Authority's recommendations in this report. However, the modified Manjimup option potentially affects forest of a high conservation value, and can only be made acceptable by undergrounding the line in specific locations as indicated in Figure 3.

In assessing each corridor option, the Authority was particularly aware of the stated preferences and positions of key government agencies, shire councils, various organisations, and individuals who made submissions.For example, a number of Government agencies stated their position as one of opposing the Manjimup option, while preferring the Margaret River option. In direct contrast, a number of shire councils, organisations and individuals stated their opposition to the Margaret River and Great North Road options, while stating a preference for the Manjimup option.

While the Authority appreciated being advised of the individual preferences, it still had a responsibility to examine the potential environmental impacts associated with each corridor.

6.2.1 Manjimup to Beenup

The Environmental Protection Authority identified the following environmental issues requiring detailed consideration:

- clearing profiles in forest areas in existing and proposed conservation areas
- loss of forest and reduction in forest value
- nature reserves
- dieback management
- social
- electromagnetic fields

The original proposal detailed in the CER involved the use of steel towers up to 30m in height, and clearing all trees with the potential to fall on the line. This would have resulted in a clearing profile in State forest of potentially up to and greater than 120m. In addition, over 60 hectares of forest considered to be of a high conservation value would have been lost. Overall, at least 320 hectares of vegetation would have been cleared The Authority in its assessment of the original proposal concluded that it would be environmentally unacceptable.

The Authority then considered the environmental impacts arising from the amended proposal put forward by SECWA following public review of the CER. This assessment relates to that amended proposal which includes:

- revised tree clearing profiles for the Karri region between Manjimup and the Donnelly River, west of the Vasse Highway
- the use of poles(wood or concrete) of a height up to 20 metres with a pole top configuration instead of steel towers in the Karri region
- the location of these poles on the shoulder of existing logging haul roads or forest tracks
- clearing of approximately 11ha of quality forest in existing and proposed conservation areas.

6.2.1.1 Clearing profiles

The Environmental Protection Authority has reviewed the forest condition report prepared by consultants to the proponent (see Appendix 4 of the Proponent's Response) and considers that the findings and recommendations of the report, which SECWA has incorporated in their revised clearing regimes and pole configuration (see Appendix 3 of the Proponent's Response), will minimise impact on the forest generally, and have less impact on the integrity of the State's Forest Estate.However the amended proposal would still affect areas of quality forest.which the Authority considers should not be disturbed at all.(See section 6.2.1.2)

Within existing and proposed conservation areas, SECWA proposes to locate the transmission line on the shoulder of the logging haul road such that half the 40m easement comprises the

road and its shoulder which would require no vegetation removal. The other 20m of the easement would require clearing of all vegetation over 4m in height.

The most significant aspect of SECWA's revised clearing profile is that in existing and proposed conservation areas, it will forgo its 'tall trees' practice where any tree which could impact upon the line, if it fell, would be removed. This would reduce the area to be cleared to approximately 20m. Under the revised profile, only trees which present a hazard to the line by virtue of age, disease, damage or disturbance would be removed (commitments 42, 47).

The pole configuration proposed for the Karri area is in the Authority's belief, a significant improvement on the use of steel towers. The poles by virtue of their reduced height should have significantly less impact in terms of visual intrusion than that of the steel towers originally proposed. It is noted in SECWA's response to issues raised (for example response to Issue 3, Submission 3) that it is expected that poles could show a cost advantage over steel towers. For this reason, the Authority considers that the pole configuration as shown in Figure 3 should be used for the entire route from Manjimup to Beenup. In addition, the clearing profile shown in Figure 3 (maximising the use of existing haul roads or forest tracks and not clearing outside of the easement), should also apply to the entire route so as to reduce the amount of vegetation which would have to be cleared.(**See EPA Recommendations 3 and 4.**)

6.2.1.2 Forest values

The proposed power line route cuts through Karri, Jarrah and Marri forest. Broadly divided into the Jarrah and Karri forests, data provided to SECWA by its consultants shows that the Karri region has been disturbed over the last 60 years by commercial logging and other activities.

For this reason, the Authority gave careful consideration to the values of the forest stands that the proposed line would affect. (see Proponent's Response for details of forest values.)The Authority also sought information from the Department of Conservation and Land Management (CALM) on its logging plans for this area.

The value of the forest areas which may be included in proposed conservation areas varies considerably in the Manjimup to Beenup corridor. The Authority was therefore concerned with identifying those areas of forest with a high conservation value and ensuring that these areas are protected.

SECWA's revised proposal would involve the loss of 11ha of quality (virgin) Karri, in that part of the proposed line leading up to the Vasse Highway. Details provided also show less than 1% of any particular forest block would be disturbed. In addition, forest on private land would also be affected.

As indicated in the previous section, the Authority considers that certain isolated stands of forest, mainly Karri and Jarrah along that part of the route examined in detail by SECWA's consultant, should not be disturbed at all. The Authority therefore considers SECWA's amended proposal which involved the clearing of approximately 11ha of this quality forest to be environmentally unacceptable.

In order to make the Manjimup option acceptable areas of quality forest should be avoided by undergrounding the power line in the areas indicated in Figure 3.(**See EPA Recommendation 5**).

In the course of the Authority's interaction with the public and the proponent, a proposal came forward whereby any loss to the State Forest Estate be compensated by an equal amount, either by planting and subsequent management or by purchase of forest on private land. The Authority considers this principle important.(**See EPA Recommendation 6**).

6.2.1.3 Nature reserves

The corridor option potentially impacts on the Chester and Paget Nature Reserves. However, it is possible to site the line so as to avoid the Reserves altogether. The proponent has committed

to minimising the impact of road construction on drainage flows into the Paget Reserve which the Authority duly notes. (**See EPA Recommendation 7 and SECWA's commitment 23**).

6.2.1.3 Silviculture

In its CER, the proponent outlined details of silviculture outside of the actual easement. A detailed plan would be developed in consultation with the Department of Conservation and Land Management to maintain the vegetation profile shown in Diagram 2, Appendix 3 of the Proponent's Response.

While the Authority acknowledges SECWA's intention of maintaining a vegetation profile outside of the 40m easement, it has concluded that the objectives behind the proposal do not relate to minimising environmental impact. The Authority's recommendations relating to no clearing outside of the 40m easement make the silviculture proposal no longer necessary.

6.2.1.4 Dieback

The spread of dieback disease caused by the Phytophthora species, is a major problem in areas of native vegetation. The proponent included management details in the CER document which will undertaken to the satisfaction of the Department of Conservation and Land Management. Safeguards to prevent or minimise the spread of dieback into dieback-free areas of native vegetation and crop lands during transmission line clearing have been established. These include restrictions on construction clearing following heavy rain, washdown of vehicles before coming from dieback to dieback free areas and a workforce awareness programme.

The Authority considers that the proponent's commitment (No.39) will ensure adequate control and management under the supervision of CALM.

6.2.1.5 Social

This option affects the least number of properties (18) and therefore people. It is one of the reasons that the proponent states a preference for this option.The proponent has been examining the corridor option for some time and has consulted with potentially affected landholders on a number of occasions.SECWA has made a number of commitments (for example, No's 16,30) which should ensure that potential social impact is minimised and managed in direct consultation with the individual landowner.A number of commitments focus on careful alignment and placement of structures to minimise disruption of activities and visual impact.Others cover the construction period (briefing of construction staff, complaints register).SECWA's undertaking to continue public consultation is particularly supported by the Authority.

6.2.1.6 Electromagnetic fields

Public concern was expressed about the possible effects from exposure to the electromagnetic field (EMF) from power lines. This issue was covered in the CER and reference was made to a review carried out in 1987 for the Environmental Protection Authority. This review concluded that although a link between electromagnetic fields and human health is inconclusive, field levels in Western Australia installations would not constitute a threat to public health. This conclusion was based upon the levels set by various international radiation protection organisations and comparisons with field measurements of SECWA installations which were well below the recommended levels set by these organisations.

In its CER, SECWA detailed 'Limits of Exposure' to electric and magnetic fields as recommended by the International Non Ionising Radiation Committee (INIRC) which was established by the International Radiation Protection Authority (IRPA) in conjunction with the World Health Organisation. SECWA stated that as part of its policy on EMF, it designs,

constructs and operates all its equipment and facilities in accordance with IRPA/INIRC guidelines (commitment 46). The Authority notes SECWA's concession that further research is required and the Authority will continue to monitor and upgrade relevant proposals through the environmental assessment process. Because the issue of EMF is unresolved and of particular public interest, SECWA should ensure that an effective minimum distance is maintained from residences.(**See EPA Recommendation 8**).

6.2.2 Picton - Great North Road - Beenup

The Environmental Protection Authority identified the following key environmental issues requiring detailed consideration:

- clearing profiles in forest areas and loss of forest;
- impact on or avoidance of conservation and heritage areas;
- rare flora and fauna;
- McCarley's Swamp - AMC wetland area;
- social;
- electromagnetic fields(EMF).

Other environmental issues were outlined in the CER. Adequate commitments were made by the proponent to ensure that these issues would be managed appropriately.See Appendix 1 for a consolidated list of commitments.

6.2.2.1 Clearing profiles in forest areas and loss of forest

The vegetation types found in the general area of the proposed corridor include tuart, jarrah, marri, peppermint, banksia and eucalypt. However, no tuart would be affected. The tree height rarely exceeds 17 metres, except in the Blackwood River Valley. The proponent estimated that 252ha of clearing would be required for the line.

In the CER, the proponent proposed a generic clearing profile to apply to forest areas affected by the Manjimup to Beenup option. As previously discussed, the proponent subsequently revised the clearing profile and pole configuration to apply to heritage areas and to areas of quality forest.

In its response to issues raised during the public review period, SECWA concluded that the Manjimup option was preferred for a number of reasons, including cost.

While it is not a factor that the Authority is required to assess,it was noted that the clearing profiles and pole configuration outlined in Appendix 3, of the Proponent's Response, did not increase the cost of the Manjimup option.

Therefore, the Authority is of the opinion that the principles inherit in the revised clearing profile for the Manjimup option should also apply to the Great North Road option.

In addition, the same pole configuration (as apposed to steel towers) should also apply to minimise visual impact. **Recommendations 3 and 4 apply.**

As was discussed previously,in the course of the Authority's interaction with the public and the proponent, a proposal came forward whereby any loss to the State Forest Estate be compensated by an equal amount, either by planting and subsequent management or by purchase of forest on private land. The Authority considers this principle important.**Recommendation 6 applies.**

6.2.2.2 Conservation and heritage areas

The proposed corridor potentially impacts on a number of conservation areas. These areas are the Rapids Conservation Park, Mowen Conservation Park, the proposed Blackwood River Conservation Park and the Augusta - Margaret River Heritage Trail.

The proponent has committed (commitment No.26) to avoiding the Rapids and Mowen Conservation Parks and to ensure adequate screening between the line and the park boundary to reduce visual impact.

The use of the proposed pole configuration should reduce visual impact further.

The proponent's plans to minimise impact on the Augusta - Margaret River Heritage Trail are considered adequate (commitment 29). The crossing of the of the proposed Blackwood River Conservation Park would require careful management by SECWA and CALM. While the proponent has committed to minimising impact (commitment 28), the Authority considers it important to further protect the areas landscape amenity by reducing the clearing profile required. The clearing profile recommended for the route(Figure 3) should help to minimise impact on the proposed park. In addition SECWA's plan to set back the poles (towers) as much as possible, should also reduce impact. **Recommendation 3 applies.**

6.2.2.3 McCarley's Swamp — AMC wetlands

The proposed route of the line to Capel/Busselton from Picton parallels the existing steel pole line. The existing line traverses an area of interdunal wetlands and swamps. Of particular importance is McCarley's Swamp, an important waterbird habitat. A number of public submissions were made on behalf, or in support of AMC's wetland site which is opposite McCarley's Swamp. Issues raised included visual impact and potential bird kills. Information sought from SECWA showed that the actual easement of any new line would run approximately twenty metres to the west of the existing line. This would ensure that McCarley's Swamp would not be directly impacted upon.

If SECWA pursues the use of the rail reserve, or the alignment of the proposed Ludlow road by-pass, then the AMC wetland area would be avoided. Either way, the proponent's commitments (25, 32, 37, 40) should ensure impacts are minimised and managed in consultation with the relevant land owners.

6.2.2.4 Rare flora and fauna

Rare flora is known to occur in the Treeton Forest block and this issue was addressed by the proponent in its CER (commitment 25). During the course of the public review period, the issue of rare flora and fauna on public and private land was raised by a number of organisations and individuals. SECWA's commitments to undertake flora and fauna surveys of the approved corridor prior to construction, and to site line structures so as to avoid sensitive areas or minimise impact, are considered by the Authority to be satisfactory.

6.2.2.5 Social

This option affects 126 private properties. Most of these properties(98) are already affected by the existing easements for power lines.As was discussed with the previous option,SECWA has made a number of commitments (16, 30)) which should ensure that potential social impact is minimised and managed in direct consultation with the individual landowner.A number of commitments focus on careful alignment and placement of structures to minimise disruption of activities and visual impact.While the actual easement location has been determined to a certain extent (paralleling the existing easement), SECWA's ability to minimise impact by careful siting of the line may be restricted.The commitment to continue public consultation is particularly supported by the Authority.

There are special considerations associated with this option.In the CER, SECWA highlighted the potential impact associated with siting the power line on the Abba fertile flats (an area of intensive agriculture) especially around Jamieson Road.Avoidance of the intensive farm lands was raised in a number of submissions.SECWA's commitment(24) should ensure that impacts are kept to a minimum and managed appropriately in direct consultation with the relevant land owners.

6.2.2.6 Electromagnetic fields

See comment in previous corridor discussion.(Section 6.2.1.6). **Recommendation 8 applies.**

6.2.3 Picton— Margaret River — Beenup

The proponent's third preference is identical to the previous corridor until it reaches Jamieson Road where it continues to parallel the existing 66kV line to Margaret River and then proceeds in a south easterly direction to meet the Great North Road option at the Blackwood River.

The Authority identified the following environmental issues which would require detailed consideration:

- clearing profile and vegetation loss;
- social;
- Bramley and Witchcliffe Forest blocks;
- Margaret River townsite;and
- electromagnetic fields.

Because this corridor option has a section in common with the Great North Road option , the Authority's previous comments on the McCarley's Swamp-AMC wetland area, rare flora and fauna, the Augusta - Margaret River Heritage Trail and the proposed Blackwood River Conservation Park also apply to the Margaret River option.

Other environmental issues were outlined in the CER. Adequate commitments were made by the proponent to ensure that these issues would be managed appropriately.See Appendix 1 for a consolidated list of commitments.

6.2.3.1 Clearing profile and vegetation loss

This corridor option involves clearing of approximately 190ha.SECWA has advised that the majority of the clearing would occur in the forest blocks affected by this option.Some clearing of remnant vegetation would occur on private land. A number of submissions expressed concern about the loss of natural vegetation (including regenerated bushland) on private property.The Authority therefore considers it appropriate for the clearing profile as shown in Figure 2 should also apply to this corridor option. **Recommendations 3 and 4 apply**.

In addition, the Authority considers that the use of poles and the associated pole top configuration, should help to reduce the visual impact of the line.

As was discussed previously,in the course of the Authority's interaction with the public and the proponent, a proposal came forward whereby any loss to the State Forest Estate be compensated by an equal amount, either by planting and subsequent management or by purchase of forest on private land. The Authority considers this principle important.**Recommendation 6 applies.**

6.2.3.2 Bramley and Witchcliffe Forest blocks

The proposed line would pass through sections of the Bramley and Witchcliffe Forest blocks.This issue was examined in the CER and a commitment(35) given to manage any impacts in direct consultation with CALM.In addition the Authority's recommendations relating to clearing profiles, use of poles instead of steel towers, and the replacement of vegetation lost should help to reduce the impact of the line through these two forest blocks.

6.2.3.3 Social

The Margaret River option affects the largest number of properties(179).Ninety eight(98) properties are common to the Picton - Jamieson Road section of the Great North Road option, and 15 are common to the Blackwood River - Beenup section. The remaining 66 properties are concentrated in the Jamieson Road to Margaret River section where the proposed line would generally be sited next to the existing easement. While SECWA did not provide an actual figure for the Margaret River - Blackwood River section, the Authority notes that SECWA's choice of the two options for this section was based in part on social issues.

As with the Great North Road option, the actual easement location has been determined to a certain extent (paralleling the existing easement to Margaret River). However, due to the smaller

size of individual properties, SECWA's ability to minimise impact by careful siting of the line may be restricted.As was discussed with the previous options, SECWA has made a number of commitments (16, 30)) which should ensure that potential social impact is minimised and managed in direct consultation with the individual landowner. SECWA's commitment to ongoing consultation is of particular importance with this option.

6.2.3.4 Margaret River Townsite

A number of submissions raised concern about the possible impact of the proposed line on the future development of Margaret River.This potential conflict was recognised by the proponent in its CER and its commitment (34) to maintain close liaison with the local community and relevant authorities should ensure that any impact is managed and minimised.

6.2.3.5 Electromagnetic fields

See comment in previous corridor discussion.(6.2.1.6).**Recommendation 8 applies.**

The following recommendations have been made after a review of the responses provided by the proponent and the issues raised in the public submissions. The recommendations are designed to ensure that if the proponent decides to pursue any option, then it should only do so in accordance with the Authority's recommendations.

Recommendation 1

The Environmental Protection Authority concludes that the Great North Road and Margaret River options for power supply to the Beenup proposal as modified during the process of interaction between the proponent, the Environmental Protection Authority, the public and government agencies that were consulted, are environmentally acceptable provided the following recommendations are accepted.

The Environmental Protection Authority concludes that the environmental factors requiring detailed consideration have been addressed adequately by: the proponent substantially changing the proposal; environmental management commitments given by the proponent and the Environmental Protection Authority's recommendations in this report.

Accordingly, the Environmental Protection Authority recommends that the proposal could proceed subject to:

- **the Environmental Protection Authority's recommendations in this assessment report;**
- **the proponent's commitments which appear in Appendix 1, which were drawn from the CER and the proponent's response to public submissions;**

Recommendation 2

The Environmental Protection Authority concludes that the Manjimup option for power supply to the Beenup proposal as modified during the process of interaction between the proponent, the Environmental Protection Authority, the public and government agencies that were consulted, is not environmentally acceptable.

Accordingly, the Environmental Protection Authority recommends that the proposal could only proceed subject to:

- **the Environmental Protection Authority's recommendations in this assessment report,especially Recommendation 5.**

- **the proponent's commitments which appear in Appendix 1, which were drawn from the CER and the proponent's response to public submissions**

Recommendation 3

The Environmental Protection Authority recommends that the reduced clearing profile and pole configuration proposed by SECWA and illustrated in Figure 2 apply to forest areas along the entire length of the proposed corridors.

In making the above recommendation the Authority notes that structures other than poles may be needed to avoid impact on the proposed Blackwood River Conservation Park.

Recommendation 4

The Environmental Protection Authority recommends that on private land, the proponent should avoid where ever possible, areas of significant stands of native (included regenerated) bushland.

Recommendation 5

The Environmental Protection Authority recommends that the Manjimup option is acceptable only if the proponent does not clear forest of a high conservation value.In these areas, as indicated in Figure 3, the power line should be placed underground.Minor modifications to the areas indicated in Figure 3 should only be made to the satisfaction of the Environmental Protection Authority on advice of the Department of Conservation and Land Management.

Recommendation 6

The Environmental Protection Authority recommends that the integrity of the State Forest Estate be maintained by the proponent replacing the area and conservation value of forest cleared. A comprehensive plan for forest replacement should be prepared and implemented to the satisfaction of the Minister for the Environment.

In making the above recommendation, it is intended that the replacement forest be reserved for conservation purposes and subsequently managed by the Department of Conservation and Land Management. The Authority suggests that the proponent could replace the vegetation lost by planting and/or the acquisition of forest on private land.

Recommendation 7

The Environmental Protection Authority recommends that no part of the Chester and Paget Nature Reserves be included in any easement for any power line or associated road access.

Recommendation 8

The Environmental Protection Authority recommends that a minimum distance be maintained from residences consistent with the guidelines laid down by the International Non Ionising Radiation Committee (INIRC) of the International Radiation Protection Authority (IRPA)

7. Conclusion

The amended proposal by SECWA for two transmission line corridors between Picton and Beenup is regarded as being environmentally acceptable subject to the proposal being carried out in accordance with the commitments by SECWA as set out in Appendix 1 of this report and the Environmental Protection Authority's recommendations.SECWA's amended proposal for a corridor between Manjimup and Beenup is regarded as being environmentally unacceptable. It could be made acceptable only if undergrounding of the power line occurs in specific areas identified in Figure 3 of this assessment report.

In its initial assessment of the proposed corridors as outlined in the CER, the Authority attempted to rank the options to determine if any were acceptable and to indicate the degree of environmental impact associated with each. The Authority found this difficult to do because each corridor has associated environmental costs which are hard to compare.

In assessing the original proposals and the amended proposals, the Authority has established a number of principles which have been developed to make the corridors more acceptable. These principles will be used to assess future proposals for transmission lines. The principles are:

- selection of corridors should include the review of all relevant impacts
- transmission lines and associated infrastructure should be sited on cleared land where-ever possible including being sited along existing roads and tracks in order to reduce clearing
- vegetation cleared should be replaced, both in quantity and value
- undergrounding of transmission lines should occur in areas having a high conservation value
- poles of a reduced height and foundation should be used instead of towers in environmentally sensitive areas
- dieback disease management should be stringent and strictly adhered to at all times in areas of risk

The recommendations contained in this report have been made following an assessment of the original proposal detailed in the Consultative Environmental Review,changes to that proposal, responses and additional information provided by the proponent, and issues raised in public submissions.

Finally,the Authority would like to acknowledge the extensive nature of SECWA's consultation process and the constructive involvement in that process by the various organisations, groups and individuals potentially affected by, or with an interest in, the proposal.

Appendix 1

State Energy Commission of Western Australia

Environmental Management Commitments

1. Areal limits of construction

The areal limits of construction activities will be predetermined by SECWA in consultation with landowners, with activity restricted to and confined within those limits. All construction vehicle movement outside the right-of-way will be restricted to predesignated roads.

2. Personnel Instruction

Prior to construction, all supervisory construction personnel will be instructed by SECWA and CALM officers on the protection of cultural and ecological resources and will be briefed on all agreed stipulations.

3. Complaints Register

A programme for handling and resolving complaints will be established by SECWA prior to commencement of construction and will be administered by a designated person in consultation with CALM, local shires and other relevant authorities.

4. Fire Suppression

SECWA shall instruct the contractor to do everything reasonably within their power to prevent and suppress fires on or near the lands to be occupied under the right-of-way, including making available such construction and maintenance forces as may be reasonably obtainable for the suppression of such fires. SECWA will also comply with Bushfire Board requirements.

5 Restoration

The contractor shall build and repair such roads, fences and trails as may be destroyed or damaged by construction work and shall build and maintain necessary and suitable crossings for all roads, trails and fences that intersect the works constructed, maintained or operated. This would be completed under SECWA supervision and in consultation with affected landowners.

6. Archaeology/ethnography survey

Prior to construction, SECWA will commission a survey made by an agency or contractor, of archaeological, paleontological, and historical sites within the area to be occupied by the line easement. The results of this survey will be provided to the WA Museum. SECWA, will relocate the proposed transmission line facilities in order to avoid destruction of archaeological, paleontological or historic values.

7. Rehabilitation

All construction and designated access roads, framing sites, and material storage sites will be restored to their natural state insofar as is practical. All construction roads will be completely obliterated (returned to the natural contour) and "put to bed" by harrowing or drilling and reseeding (if required) or simply where practical let it return to its natural state, as specified by the private landowner or CALM. The method of restoration will normally consist of returning disturbed areas back to their natural contour, cross drains installed for erosion control, placing drains back in the road and filling ditches.

*Regeneration of vegetation will be encouraged inside the easement, to a height of 4m and outside the easement in accordance with the clearing profile or silviculture arrangements.

8 Waste disposal

SECWA will instruct the contractor to remove or dispose of all waste caused by its activities in a manner satisfactory to the landowner. The term "waste" as used herein means all discarded matter, including but not limited to human waste, garbage, oil drums, petroleum products, ashes and equipment. Construction areas will be maintained in a sanitary condition at all times and garbage and refuse at these sites will be disposed of on a daily basis. Hazardous or toxic waste•generated or used on site will be disposed of in a manner consistent with health authority guidelines.

9. Vegetation removal

All litter and debris, including vegetative cover accumulated through land clearing, will be disposed of in accordance with the landowner requirements.

10. Access

No new access will be constructed where existing access is available. This will minimise ground disturbance and limit new or improved access ability.

*In areas where permanent access is not required tracks will be rehabilitated as per Commitment 7, once construction is complete.

11. New road alignments

The alignment of any new access roads will follow landform contours, provided that such alignment does not additionally impact resource values. This would minimise ground disturbance and/or reduce scarring.

12. Line structure locations

Structures will be placed so as to avoid sensitive features (eg rare flora, water courses, etc.) and/or to allow conductors to clearly span the features, within limits of standard line structure design. This would minimise the amount of sensitive features disturbed and reduce visual contrast.

13. Road crossings

At highway, road or trail crossings, line structures are to be placed at maximum feasible distance from the crossing.

14. Camp sites

Camp sites will be selected in consultation with relevant authorities to comply with the following requirements:

- no camp sites shall be located in vested reserves, eg National Parks and Flora and Fauna Reserves;
- camp sites shall not be located on the flood plains of major rivers or streams;
- wherever possible and practical, camp sites shall be located adjacent to stockpile site; and
- wherever possible and practical, camp sites shall be located adjacent to, or as close as possible to, existing access roads.

Every effort shall be made to establish camps in areas with the following characteristics:

- soil conditions are suitable for sewage effluent disposal;

- no excavation is required prior to camp establishment;
- some form of environmental degradation exists in the area; and
- minimal visual impact would result from the establishment of a camp site.

15. Erosion of soils

In areas where impacts to soils are expected to be high, the following commitments were developed by SECWA:

- wherever possible, no new access would be constructed;
- no widening or upgrading of existing access road;
- permanently close construction access roads not required for maintenance;
- new access roads will follow the landform contours;
- line would be re-routed to avoid sensitive features; and
- towers would be placed at maximum feasible distance from major drainage crossings.

16 Agricultural land

On agricultural land, the easement will be aligned with field boundaries to the greatest extent practicable and the line structures will be set near paddock boundaries, service roads etc., to reduce the impact to farm operations and agricultural production.

For areas where line structures are potentially visible to local residents, the structures will be located wherever possible, to take advantage of vegetation backdrops and terrain to reduce viewing the structures on the skyline.

17. Seven Day Road and Bibbulmum Track

Where the line crosses Seven Day Road and the Bibbulmum Track the alignment will be surveyed to minimise visual impact by crossing at right angles and using vegetation and/or topography to screen from view. Wherever possible screening vegetation will be planted to minimise visual impact. Clearing will be in accordance with Section 7.2.

18 Boundary of Beavis East Block

Strict adherence to all generic committed mitigation listed in Section 9.0 will be enforced along this section. Clearing will be carried out in accordance with Section 7.2 however no clearing will be undertaken north of Waistcoat Road (Beavis East Block).

19. Beavis East Block and Beavis West Block

The commitments for clearing through Beavis East and Beavis West Block include:

- clearing only those areas specified in Section 7.2 — prescription for clearing;
- tall trees able to fall on the line from outside the easement (up to 60m from the centre line) will be selectively felled in consultation with CALM and removed by CALM; and
- SECWA will monitor vegetation growth to identity and remove any vegetation high enough to cause flash-over or able to fall on the transmission line.

SECWA will prepare, to the satisfaction of CALM, a detailed construction and operation programme for Beavis East block and Beavis West block prior to the commencement of clearing. This programme will fully assess the underground cable option.

20. Darling Scarp

For the Darling Scarp, SECWA makes the commitment to use the following management techniques to minimise the potential erosion risk and the risk of dieback spread. These techniques include:

- wherever possible no new access will be constructed in areas of high slope;
- construction access roads not required for maintenance will be rehabilitated;
- new access/maintenance roads will be designed to follow the landscape contours;
- tower structures will be placed to avoid sensitive features, including outcrop and drainage lines; and
- towers will be placed the maximum feasible distance from drainage features.

21. Donnelly River

SECWA makes the following commitment for the crossing of the Donnelly River. The transmission line will cross the Donnelly River at right angles and line structures will be placed at the maximum feasible distance from the river bank. Where access roads are required, the road base will be designed so as not to impede surface drainage. Vegetation clearing will be similar to that shown on Figure 7.

22. Storry Forest Block

To minimise vegetation disturbance within the Storry Forest Block SECWA makes the commitment to adopt the following measures when locating line structures and access roads:

- avoidance of the wetland areas;
- spanning significant species sites (not erecting towers within them);
- locating the access track outside significant species sites;
- not digging, clearing or grading any part of significant species sites;
- restricting traffic across significant species sites to that required for laying out the conductor; and
- maintaining clearance levels at heights well above those of significant species.

23. Paget Nature Reserve

Approximately 7km of the Manjimup to Beenup Corridor passes within 500m of the Paget Nature Reserve. Public concern about the impact of road construction on drainage flows into the reserve has led SECWA to formulate the following commitment:

Within the catchment area for Paget Nature Reserve SECWA will construct access to the transmission line using the following guidelines, to the satisfaction of CALM:

- wherever possible SECWA will use local road base to provide colouring sympathetic to the area, and to reduce the possibility of introducing dieback;
- the access road will closely follow the existing ground profile to minimise cut and fill requirements, visual impact, erosion and disruption to surface water movement;
- the access road crown will encourage drainage to the edge of the track; and
- culverts will be installed where the gradient of the profile is locally too steep (creeks and drainages).

24. Intensive agriculture — Jamieson Road

SECWA will locate the line structures and access roads to follow or run parallel to existing road reserves and paddock boundaries or within the Jamieson Road reserve.

25. Rare flora survey

SECWA makes the commitment to undertake a comprehensive spring survey of vegetation within any of the corridors identified in this report, prior to the commencement of surveying and clearing. The survey of the vegetation will identity locations of rare flora and the line will be re-routed or mitigation measures formulated in consultation with CALM to avoid or minimise the potential impact on rare flora.

26. Rapids and Mowen Conservation Parks

Where the transmission line passes within one (1) km of the Rapids and Mowen Conservation Parks SECWA will:

- construct access roads and locate line structures so as not to impede the drainage patterns of the area;
- maintain a buffer of screening vegetation between the line and the Park boundary to reduce visual impact; and
- implement a construction supervision programme with officers from SECWA and CALM supervising construction activities to ensure no direct impact occurs to the Parks.

27 Margaret River Catchment Area

For the portion of the line route which crosses the Margaret River Catchment Area, SECWA is prepared to make the following commitment:

Within the Margaret River Catchment Area SECWA will:

- use wherever possible existing access tracks;
- undertake clearing so as to leave root stock intact; `and
- liaise with WAWA and CALM about clearing requirements and vegetation rehabilitation.

28. The Blackwood River Crossing

To ensure that the potential impacts associated with a line crossing the Blackwood River are minimised, SECWA proposes to undertake the following commitment:

- SECWA will prepare to the satisfaction of CALM a construction and management plan for the area impacted by the proposed crossing of the Blackwood River Conservation Park. This plan will be prepared prior to clearing and construction commencing. The plan will detail which vegetation (if any) will be removed in part or in full.

*Access along the easement will be restricted by the use of gates, screening vegetation and fencing where appropriate. Fencing will be constructed from local forest materials to maintain landscape value.

29. Augusta — Margaret River heritage trail

Where the line crosses the Heritage Trail line structures will be placed at the maximum possible distance from the track to reduce visual impact. Access from the Heritage Trail along the easement will be restricted using a combination of low vegetation screening and fencing. The fencing will be constructed from local forest materials to maintain landscape quality.

30. Compensation

SECWA makes the following commitments to any landowner affected by the final approved line route:

- compensation for the easement will be negotiated with the registered land proprietor based on valuations provided by the Valuer Generals Office;
- compensation will also be negotiated with landholders for any loss of production caused by the line construction and future operational activities; and
- owners will be offered seedlings to replace any trees removed from the property.

This commitment applies to all landholders potentially affected within the other corridor options identified.

31. Proximity to buildings

The line between Picton and Margaret River (parallel to the existing 66kV line) passes close to many existing buildings (<100m). To reduce the potential impact on local residents close to the line SECWA have made the following commitment:

- the line will be routed so that no existing buildings are located within the easement; and
- wherever possible, the closest residential building will be a minimum of 100m from the centreline.

32. Use of rail easements

The option to use the existing railway easement as shown on Map 1 would provide advantages by reducing vegetation clearing and avoiding homes located east of the Ludlow Forest. If any of the line options from Picton are approved, SECWA are prepared to make the following commitment:

- SECWA will fully investigate the potential for using the rail easement and commence detailed discussions with Westrail. If the option to use the rail reserve is feasible SECWA will prepare a report detailing the potential impacts and proposed mitigation for this section.

33. Busselton Golf Course/airstrip

SECWA will align the new line to minimise the impact on the Busselton golf course and minimise the intrusion into the airspace required for the proposed airstrip.

34. Margaret River Townsite

SECWA recognise the potential impact of the line on the future development of Margaret River townsite and are prepared to make the following commitment:

- If there is any potential impact of the line on the future development of Margaret River SECWA will liaise with the local community and relevant authorities to manage and minimise those impacts.

35. Bramley and Witchcliffe Forest blocks

SECWA makes the commitment to produce a report to the satisfaction of CALM and relevant authorities, which details a comprehensive construction and operation programme for Bramley and Witchcliffe Forest Blocks. This plan will include discussion on issues relevant to these areas and provide specific mitigation commitments aimed at reducing potential impacts.

36. Noxious weeds

SECWA will comply with the regulations and requirements of the Agricultural Protection Board (APB) at all times.

37. Fauna Survey

SECWA will complete a fauna survey for the approved corridor prior to the commencement of clearing and construction to identity habitats potentially affected by the line. Where possible, line structures will be placed to avoid sensitive habitats.

38. Silviculture outside of easement

A detailed silvicultural plan would be developed for the areas outside of the easement by SECWA in consultation with CALM, prior to the operation of the line commencing. The aim of the plan would be to maintain the vegetation profile shown on Figure 5b of the CER. It is envisaged that the plan would be implemented by CALM and consist of the following principle components:

- specification of maximum tree heights permitted within zones determined by distance from the easement;
- identification and removal of existing trees able to fall and impact on the line;
- development of a monitoring programme to monitor regrowth on a regular basis; and
- the subsequent felling and removal of trees identified during the monitoring programme as able to fall onto the line.
- *a strategy for harvesting and regenerating the silviculture blocks.

39. Dieback management

SECWA make the following commitments to control the spread of dieback:

- a dieback 7-way test will be conducted by CALM officers;
- SECWA would work to priorities agreed by CALM;

- mapping of dieback disease status in areas of native vegetation would be arranged by CALM prior to construction commencing;
- wherever possible the work sequence would be carried out by dieback disease classes. If this is not possible, washing down of vehicles and equipment moving between these classes would be required;
- nominated officers from CALM and SECWA would supervise all aspects of the line construction to ensure that the commitments and guidelines outlined in this report are followed; and
- if these commitments and guidelines are breached than all parties involved would be investigated, and where necessary, dismissed from site.

40. *McCarley's swamp

In the vicinity of McCarley's Swamp SECWA will:

- endeavour to minimise the height of line structures.
- rehabilitate and return to their natural state any construction access tracks in accordance with commitment 7;and
- monitor the operation of the line, in conjunction with local ornithologists, and take steps to resolve bird strike problems.

41. *Renewable energy

SECWA will continue to monitor and support the development of viable renewable energy technologies.

42. *Loss of vegetation

Clearing will be carried out in accordance with CALM's requirements and the revised clearing profiles contained in Appendix 3 of the response. The practices employed will be designed to minimise the initial loss of vegetation and facilitate regrowth.

43. *Screening vegetation

Screening vegetation will be planted wherever possible to reduce the visual impact of the line.

44. *Rare frog (Geocrinia, Alba and Vitellina)

The habitats of these frogs will be identified by the rare fauna survey which will be conducted prior to clearing and construction.

Disturbance to these areas will be avoided by careful siting of line structures and the diversion of construction access, where necessary.

45. *Line Construction

SECWA will explore the possibility of using concrete poles and other line hardware designed to reduce the visual impact of the line.

46. *Electric and magnetic fields

SECWA recognises that some members of the public are genuinely concerned about issues regarding electric and magnetic fields and health. SECWA is committed to the health, safety and welfare of the public.

SECWA designs and operates all its generation transmission and distribution systems prudently within current health guidelines as established by Australian health authorities. SECWA will continue to closely monitor and sponsor engineering, scientific and medical research regarding electric and magnetic fields and health.

47. *Clearing in the Karri Region

SECWA recognises the need to minimise the amount of clearing in the Karri Region between Manjimup and the Donnelly River, west of the Vasse Highway and is prepared to make the following commitments:

- Poles with a cruciform pole top configuration will be used instead of steel towers in the karri region.

- These poles will be located in the shoulder of existing logging haul roads or forest tracks wherever possible.

- Where the line traverses areas with significant stands of karri SECWA will relax its `tall trees' practice, that is removing trees outside the 40m easement which could impact upon the line if it fell. Only trees which present a hazard or disturbance will be felled and removed.

- Regeneration of shrubs and understorey to a 4m height will be encouraged in the 40m easement.

48. *Historic sites

The new line will avoid identified sites of historic or archeological significance.

49. *Capel airstrip

SECWA will align the new line to minimise the impact on the Capel airstrip and will design the line in accordance with the Department of Aviations regulations.

Appendix 2

Proponents Response

RESPONSE TO SUBMISSIONS

BEENUP POWER SUPPLY

CONSULTATIVE ENVIRONMENTAL REVIEW

TABLE OF CONTENTS

INTRODUCTION

This reports presents SECWA's response to the issues and queries raised by the Environmental Protection Authority (EPA) on the Beenup Power Supply project, subsequent to the release of the CER document for public comment.

As part of the response to the various issues raised in the submission SECWA has made a number of new commitments and has renewed, and amended where necessary, the commitments made in the CER documents.

Details of all commitments are contained in Appendix 2.

REVISED CLEARING PRESCRIPTION FOR THE KARRI REGION

The revised tree clearing requirements described below and illustrated in diagrams 1 and 2 are applicable to the Karri Region between Manjimup and the Donnelly River, west of the Vasse Highway, where vegetation can reach a height of 60m.

In all other areas where clearing is required this shall be done in accordance with the requirements specified in the CER document (see Appendix 3B).

Clearing Diagram No. 1

This clearing diagram provides detailed prescriptions for vegetation treatment along the line route affecting nominated significant stands of karri within areas to be registered on the National Estate.

The transmission line will be located in the shoulder of the logging haul road such that half the 40m easement comprises the road and its shoulders which requires no vegetation treatment. The other half of the easement, 20m wide, will require clearing of all vegetation over 4m in height. Shrub regeneration will be encouraged.

Outside the easement SECWA will relax its 'tall trees' practice, that is, to remove any tree which could impact upon the line if it, the tree, fell. SECWA now proposes only to remove trees which present a hazard to the line by virtue of age, disease, inclination, damage or disturbance. On this basis no clearing outside the easement is expected. Individual tree felling and removal will be required only as necessary and annual inspections will be arranged to monitor the area.

Clearing Diagram No. 2

This clearing diagram applies to areas other than those with significant stands of karri.

For considerable portions of the line route the 40m easement will include logging haul roads or forest tracks. Outside the 40m easement clearing will only occur where trees exceed the nominated safety profile. Where it can be applied, commercial regeneration will be implemented for subsequent harvesting as the trees again reach profile height. Where conditions are not suitable for commercial growing natural regeneration will be encouraged.

Regeneration of shrubs and understorey to a 4m height will be encouraged in the 40m easement.

The relaxation of the 'Tall tree' policy involves the acceptance of a considerable element of risk of line outage on the part of SECWA which could impact upon the reliability and performance of the line. However the portion of the line route involved is small and its reliability has little impact upon the security of the overall SECWA transmission system and on this basis would be acceptable to SECWA.

Specific design work for the proposed transmission line has also been done for the karri region. The design involves a commitment to using poles with a cruciform pole top configuration rather than steel towers. These poles will be located in the shoulder of existing logging haul roads such as Palings Road and Waistcoat Road for maximum distance.

The above measures will significantly reduce the clearing required in the Karri Region. As stated in the report in Appendix 4 only 5.5km of the preferred corridor traverses areas which can be categorised as significant stands of karri. The clearing required in these areas, as described in Diagram 1, will be limited to a 20m wide strip adjacent to an existing logging haul road. Thus the area of significant karri forest which is subject to clearing under the revised specifications is only 11ha.

KEY ISSUES

Note: a) The terms "CER" and "the document" should be understood to mean the Consultative Environmental Review document.

b) **"Document Reference"** will refer the reader to relevant sections of the CER.

Study methodology

Issue 1 *Specific data on impacts of powerlines on flora, fauna, private properties and public land not provided. Position of alignment not identified, therefore impact assessment not possible.*

Response It is not possible to decide upon the alignment until EPA approval is obtained; therefore localised impacts cannot be determined. Specific impacts, once assessed, will be managed in accordance with commitments given in the document and conditions set by the EPA.

Document Reference: Commitments SC10 and SC22.

Issue 2 *Information on assumptions and weightings used in GIS not provided.*

Response Information on the assumptions and weightings used in GIS are contained in the Supporting Documents. These documents are available upon request.

Issue 3 *Details of on-site investigations, specifically on flora and fauna, individual private properties and mining interests not provided.*

Response SECWA believes sufficient detail has been provided for the purposes of the CER. Additional detail will be available when SECWA have determined a final line route alignment and an environmental management plan is drawn up in accordance with EPA requirements.

Issue 4 *Survey analysis of people attending public meetings statistically not representative.*

Response The survey results are presented as they occurred. An analysis has not been attempted.

Document Reference: Page 18 Section 4.1 and Appendix C.

Issue 5 *Actual environmental investigations to be undertaken after approval. This approach does not allow for examination of impacts by the public prior to approval.*

Response Environmental investigations such as for flora, fauna, Aboriginal archeological and ethnographic sites cannot be undertaken until the line route alignment has been determined, which will occur after environmental approval of the corridor. Refer also to reply Issue 1 above.

Document Reference: Commitment SC10 and SC22.

Power supply alternatives

Issue 6 *On-site generation not adequately addressed. Not all options and/or combination of options examined.*

Response SECWA believes that on site generation was addressed in sufficient detail for the purposes of the CER.

Document Reference: Page 8 Section 3.3.

Issue 7 *DC transmission line environmental impacts not examined. Comparison with AC impacts needed.*

Response The impacts of DC transmission lines were not assessed because they are not technically nor economically viable for this project. As stated in the document there would be a very high cost associated with the plant required to convert the required power from AC to DC and back again at the beginning and end of the proposed line.

Also it should be recognised that the environmental impacts of a DC transmission line would be equivalent to those of the proposed AC line.

Document Reference: Page 12 "Direct Current"

Issue 8 *Justification for a 132kV line not adequate. Future users of the line not identified nor impacts predicted. Justification for excess capacity and relationship to existing grid not provided.*

Response Transmission at 66kV would involve installation of larger capacitor banks and incur heavy system losses compared with the 132kV option. Future users cannot be specifically identified. Page 5 of the CER document refers in general terms to future developments in the area.

Manjimup is supplied by a 132kV line from Muja and Picton is supplied at 132kV from both Muja and Bunbury. The excess capacity of the line occurs due to the combination of the required voltage and minimum size of conductor to avoid corona discharge.

Document Reference: Page 5 - third paragraph and Page 11 Section 3.4.

Issue 9 *Assessment of environmental impacts of coal-based power generation, specifically atmospheric emissions not undertaken. Comparison with emissions from on-site generation needed.*

Response The power load required by the Beenup proposal is in the range of 1% - 2% of the total output of Muja Power Station, which is 1040MW and hence there will be no significant impact on atmospheric emission.

Issue 14 *Statements made in relation to vegetation loss in Heritage Areas on Great North Road option, apply equally to Manjimup option.*

Response The Manjimup and Great North Road options have been considered individually and in detail. Specific mitigation statements have been made for each option to account for the different circumstances that arise.

Document Reference: Commitments SC3, SC4, SC8, SC11 and SC13

Issue 15 *Beedelup National Park not examined.*

Response The Beedelup National Park has not been examined because the proposed line corridor does not impact on this area.

Issue 16 *Justification for not utilising Sues Road apply equally to Manjimup and Great North Road corridors.*

Response The reasons for not using the Sues Road option, given in the CER, apply to specific circumstances occurring along Sues Road and are not applicable to the Manjimup and the Great North Road options.

Document Reference: Page 17 Section 3.5.4.

Vegetation

Issue 17 *Details of plans to compensate/replant vegetation on private and public lands not provided.*

Response SECWA will provide seedlings to replace trees on private properties. It is intended that they be planted by the land owners at their discretion. Replanting on public land will be at CALM's discretion.

Document Reference: Commitment SC15.

Issue 18 *Details of dieback surveys and management plan not provided.*

Response A dieback survey of the actual line route will be undertaken in conjunction with the centreline survey once environmental approval is obtained. The details of dieback management proposals are given in section 7.3 of the report and they are repeated in the Commitments Section. These management proposals conform to CALM requirements.

Document Reference: Page 53 Section 7.3 and Commitment SC24.

Issue 19 *Generalised vegetation types identified, e.g. karri on Manjimup corridor may not necessarily reflect actual dominant vegetation types.*

Response The information on identified vegetation types has come from CALM, who are the acknowledged experts on this matter.

Refer also to Appendix 4 of this report for specific information on the karri forest.

Document Reference: Page 28 Section 5.2.4.

Issue 20 *Details of landscape and visual assessment studies/plan not given.*

Response The details of landscape and visuals assessments are given in Supporting Documents 1 and 2.

Maintenance

Issue 21 *Management details of ongoing maintenance not provided.*

Response The line maintenance activities are given in section 6.4 of the CER and easement maintenance is covered in section 7.2.5.

Document Reference: Page 42 Section 6.4 and Page 52 Section 7.2.5.

Issue 22 *Gravel supply needed for maintenance of roads not addressed.*

Response SECWA anticipates that most of the existing line will be constructed alongside existing roads or tracks for the Manjimup option. Any requirements for gravel would be made from normal local supplies. For the Picton options permanent access will not be constructed across farmland and consequently the need for gravel on these options will be much restricted.

Issue 23 *Weed infestation and chemicals used to control not adequately discussed.*

Response SECWA is committed to comply with the rules, regulations and requirements of the Agriculture Protection Board at all times.

Document Reference: Commitment SC21.

Social

Issue 24 *Property values would be reduced because of the presence of the power line. Compensation is unlikely to make up for loss of value. It will be more difficult to sell property with a power line on it.*

Response Compensation for the line easement is based upon assessment of current land values and the lines impact on the current land use as determined by the Valuer General's Office and the Department of Agriculture.

SECWA believes that this method provides adequate compensation to the landowner as the sum paid is designed to compensate the owner for the actual presence of the easement and the restrictions it imposes, not any perceived affect it may have on the balance of the property.

Document Reference: Commitment SC15.

Issue 25 *Disruption to operations. The power line would disrupt activities on properties. Details and management of impacts on specific activities are required:-*

- *viticulture*
- *dairy farming*
- *horticulture*
- *airstrips*
- *tourism accommodation*
- *tourism activities*
- *golf club*
- *art gallery*

Response Power lines through farming areas are found to have only small impacts. The major restrictions are concerned with possible contact of live conductors with trees, structures, buildings and tall vehicles. Normal cropping and grazing activities underneath the line can continue.

Arrangements for power lines in proximity to airstrips or airports have to be made in accordance with the Department of Aviation requirements.

The power line affect upon the tourism, golf and art gallery activities listed will primarily be visual. Every effort will be made to reduce the aesthetic impacts of the line.

Refer to new Commitments NC4, NC6 and NC10 in Appendix 2 of this report.

Document Reference: Commitments GC12, SC1, SC2, SC9, SC14, SC18 and SC19.

Issue 26 *Income. The power line would affect income generation in relation to:*

- *productivity of land*
- *profitability of tourist operations*
- *rental income for properties*

Response SECWA believes that the power line would have insignificant affect upon income generation as power lines in other rural areas are found to have only minimal impacts on the cropping and grazing activities typical for this area. With regard to the profitability of tourist operations and rental income SECWA are committed to minimising the visual impact of the new line and so believe that the viability of tourism will be unaffected.

Document Reference: Commitment SC1 and SC9.

Issue 27 *Future plans for properties would be affected:-*

- *development of further production*
- *capacity for tourism*
- *future subdivision of land*

Response SECWA believes that power supplies are required for future development of the area. Based on advice from the Department of Agriculture SECWA believes that the presence of this power line will be compatible with the existing agricultural pursuits and practises of the area. Thus the line should have little or no impact on any extensions to current production.

Document Reference: Commitment SC1, SC9 and SC19.

Issue 28 *Privacy. Concerns were raised about privacy, the increased number of people on properties (for line construction and maintenance).*

Response Construction and maintenance personnel will be confined to the line route and access tracks. Landowners will be consulted and any necessary arrangements made prior to SECWA personnel or agents gaining access to the property.

Document Reference: Commitments GC1, GC2, GC3 and SC16.

Issue 29 *Equity. Some properties already have power lines on them. The power line offers no benefits to property owners. SECWA's established consultation processes are aimed at minimising the impact of the line on both public and private land uses.*

Response Power lines have got to be built throughout the State to benefit the whole community and it is unavoidable that they will be located on properties, both private and public.

Issue 30 *Health and safety. The effect on people and livestock of electromagnetic radiation.*

Response Electromagnetic Fields are covered in section 7.4 of the CER. As stated the electromagnetic fields surrounding SECWA's operating 132kV lines comply with the standards laid down by the World Health Organisation and the International Radiation Protection Authority.

Refer to new Commitment NC7 in Appendix 2 of this report.

Document Reference: Page 56 Section 7.4.

Issue 31 *Character of properties. People were concerned that the natural surroundings currently enjoyed would be affected by the presence and visibility of the line.*

Response SECWA believes that the natural surroundings of the region will be only marginally affected by the power line. Some disturbance is inevitable, however, SECWA will endeavour to minimise this by consulting the land owner regarding the siting of structures and the use of existing vegetation as either a screen or backdrop.

Refer to new Commitments NC4 and NC6 in Appendix 2 of this report.

Document Reference: Commitment GC12 and SC1.

Issue 32 *Visual amenity. Concerns were held about the visibility of the power line. This was referred for both residents of properties and other users (recreation, tourism, education, etc).*

Response SECWA believes that the aesthetic impact of the power line in a regional context will be minimal. Where the line traverses forest areas the natural screening effect of the vegetation will minimise the visibility of the line. In open farm land structures will be sited in consultation with the land owner, and in sympathy with the natural features of the land to minimise their visual impact.

Refer to new Commitment NC4 and NC6 in Appendix 2 of this report.

Document Reference: Commitment GC12, GC13 and SC1.

Issue 33 *Communications. The potential for interruption to television and radio reception was raised.*

Response There should be no interruption to television or radio reception from the power line. The components used to construct the line are designed in such a way that the problem would only occur in areas subject to high pollution.

Also, as the zone of influence of such problems does not extend beyond the easement boundaries, any minor interference which might occur would be extremely localised.

Other Issues

Issue 34 *Power supply to Beenup mine should have been examined along with mine assessment.*

Response It is not for SECWA to determine whether a development project such as this should be assessed in total or in its component parts.

Issue 35 *Regional overview of mineral sands industry not completed. Ad hoc response to one-off projects creating environmental and social problems.*

Response SECWA believes this would be a matter for the Department of State Development to review.

SPECIFIC QUESTIONS

Note: a) The terms "CER" and "the document" should be understood to mean the Consultative Environmental Review document.

b) **"Document Reference"** will refer the reader to relevant sections of the CER.

Q1 When will SECWA make a decision about using concrete poles? If used, will they be painted?

SECWA has a preference for concrete poles over lattice steel towers but a decision can only be made when tenders are received guaranteeing supply of concrete poles. Assuming approval for the line is given, tenders are scheduled to be called in early 1993. The concrete poles would be coloured Black Olive to minimise their visual impact in forest areas.

Refer to new Commitment NC6 in Appendix 2 of this report.

Q2 The CER states that between 12.5MW and 17.5MW is required for the Beenup mine. Why?
Why is SECWA proposing to construct a 132kV line?

This is the estimated load for the mining and preliminary ore process operations. SECWA is proposing to construct a 132kV line because it is the best technical and economic arrangement.

Document Reference: Page 2 Section 1.3.

Q3 Power requirements in the original ERMP for Beenup differ to those stated in the CER. Why?

The Beenup ERMP was released in early April 1990. In July 1990 SECWA was advised by MDL of their revised power requirements which are given in the CER document.

Document Reference: Page 2 Section 1.3.

Q4 Would the Manjimup option benefit users in Augusta, Margaret River to Picton? If so, how?

The Manjimup option would be of immediate benefit to users in Augusta by providing an alternative power supply to the existing supply from Margaret River. Beenup will initially be provided with a supply from the existing 22kV distribution system for construction purposes and this line will be used to feed power back into the existing system once a substation is established at the mine site and the 132kV supply is available.

Q5 What is the life of the proposed power line?

The life of the proposed power line is 80 to 100 years.

Q6 *The option of undergrounding was considered for Heritage Areas. Was this considered for areas on private land considered to be of high conservation/aesthetic value and/or commercial potential?*

SECWA has not considered the use of underground cable on private property because of its high cost, being approximately 7 to 15 times the cost of an equivalent length of overhead line, depending upon the line length and the need for compensation equipment.

Refer also to the response to Issue 6 of Submission 4 , in Section 5 of this report.

Document Reference: Page 7 Section 3.2 and Page 60 Section 7.5.1.

Q7 *If another corridor is selected, when will the Picton to Margaret River line be upgraded? To what capacity?*

The power supply system from Picton via Capel and Busselton to Margaret River on present load trends will require to be upgraded in 10 to 15 years time. The capacity characteristics will be as indicated in the response to Key Issue 8 in Section 3 of this report.

Q8 *Why was Manjimup excluded as a major population centre? Why was no climatic data provided for Manjimup?*

Manjimup is denoted as a major town on page 34 of the CER document. Population details are contained in Supporting Document 1 Page 10.

The climatic data in Section 5.2.1 should have comprised data from both Supporting Documents 1 and 2. Unfortunately the data from Supporting Document 1 was omitted.

Document Reference: Page 34 Section 5.3.2.

Q9 *If the rail reserve is used (McCarley's Swamp area,) how will SECWA protect wetland birds, especially those with large wingspans?*

SECWA will seek advice from ornithological experts.

Refer to new Commitment NC1 in Appendix 2 of this report.

Document Reference: Commitment SC22.

Q10 *Clearing of vegetation from the rail reserve may result in loss of shelter for fauna migration. How would this be managed?*

This matter will be included in the fauna survey that will follow environmental approval of a line corridor.

Refer to new Commitment NC1 in Appendix 2 of this report.

Document Reference: Commitment SC22.

Q11 The provision of a service road and other earthworks, could potentially affect drainage patterns and the hydrological balance of wetlands. How will this be managed?

This matter is covered by Commitments GC11 and SC8 of the CER document.

Document Reference: Commitment GC11 and SC8.

Q12 Construction and maintenance may introduce noxious weeds to private and public lands. How will SECWA manage this potential problem?

This matter is covered by commitment SC21 on page 79 of the CER document.

Document Reference: Commitment SC21

Q13 What are the actual clearing requirements for underground cable? Please provide profile.

Please refer to the response to Key Issue 10 in Section 3 of this report.

Q14 Has a dieback survey been undertaken for all the corridors? How will dieback be managed? Has a management plan been produced?

This matter is dealt with in detail in Section 7.3 of the document and is covered by commitment SC24 on page 80 of the CER.

Document Reference: Commitment SC24.

Q15 Has the issue of vegetation clearing and salinity been examined? e.g. the Vasse catchment. How will SECWA manage this problem?

SECWA believes that tree clearing on the narrow front required for a line easement will not affect local salinity. Vegetation removal will be kept to a minimum and regrowth will be allowed up to a height of 4m inside the easement.

Refer also to the response to Issue 12 of Submission 3 in Section 5 of this report.

Document Reference: Commitments GC7 and SC23.

Q16 Does the preferred corridor cross the Strickland block? Was this considered in the corridor selection?

Whilst the corridor encroaches into the Strickland Block there is no intention that the line itself will be located in the Block.

Q17 How will SECWA resolve any conflict which may arise between avoiding remnant bushland on private property, and maintaining a minimum distance from residences?

By consultation with the landowners.

Document Reference: Refer Commitments SC1, SC9 and SC16.

Q18 What is the absolute minimum distance which the line would be sited from residences?

The absolute minimum distance is half the easement width. SECWA cannot restrict any activity outside the line easement and therefore landowners are free to build as they see fit up to the edge of the easement.

Document Reference: Refer to Commitment SC16.

Q19 The CER refers to affected buildings within each corridor. How many residences are within each corridor? Is there an estimate of the number of people potentially affected by each corridor?

The types of building within the corridor have not been analysed and SECWA cannot estimate the number of people potentially affected. Thus the figures quoted represent a 'worst case' assessment. When siting the line SECWA will closely consult local residents.

Document Reference: Refer to Commitment SC16.

Q20 Will SECWA consult with each landowner? When? Please outline procedures already undertaken and those yet to be undertaken

SECWA has undertaken extensive public consultation on this project, thus far and intends to continue this practice as the project progresses.

Owners of each of the 210 properties affected by the various corridor options have been individually contacted by SECWA Field Officers. The nature of the project was explained, together with the implications of the corridor traversing their properties. Land owner brochures and project pamphlets were also distributed. These contained details of the project and information on property related matters. (See Appendix 1).

As each of the corridor proposals was developed and refined many land owners were revisited or recontacted. SECWA's Properties Branch alone has recorded 378 individual customer contacts.

During the course of public consultation on the various options a total of 6 (six) informal halfday information sessions were organised and 6 (six) formal public meeting held. Details of these meetings were provided directly to each affected land owner and all identified interest groups. The broader community were made aware of the meetings by the use of local media, community notice boards in Shire offices and other public places and by information on SECWA's public displays associated with the project.

Upon release of the CER document a further 5 public meetings were held.

A copy of the CER was mailed to each owner affected by SECWA's preferred option and all other affected landowners received a copy of the executive summary from the report.

Copies of the document were also provided for each of the affected Shires and put on public display in nominated libraries both in the local area and Perth.

Once SECWA receives Ministerial approval for a specific corridor all landowners will be officially informed of this decision.

SECWA will then commence detailed investigations to establish the final line route alignment in close consultation with the land owners.

Once the centreline survey is complete and easement sketches prepared SECWA will seek advice from the Valuer Generals Office and the Department of Agriculture regarding compensation.

Field Officers will then visit the individual landowners to present and discuss the draft easement document, sketch and valuation with the view to negotiating the easement agreement.

During line clearing and construction the SECWA Field Officer will maintain contact with the landowners and liaise with SECWA's contractor to resolve any problems.

At the conclusion of the project the Field Officer again contacts the landowners to reach agreement on any restoration required along the easement within their properties.

Document references: SC1, SC9 and Appendix C.

Q21 Will owners be compensated for any property damage during construction and maintenance? In what form would the compensation be?

SECWA is aware that owners do suffer a loss due to some land within the easement being made unproductive during line construction.

Restitution is paid by SECWA in those situations and is referred to as production loss compensation.

The procedure to determine the amount of compensation involves SECWA's Field Officer and a representative of the Department of Agriculture meeting with the landowner on the property to reach agreement on the amount or type of compensation required.

The form the compensation takes would be as arranged at that meeting.

It can be an amount in cash paid directly to the landowner, or it can, for example, be dry feed supplied and delivered to the property, with SECWA making payment directly to the supplier.

At the conclusion of line construction the Field Officer will again meet with the landowner to arrange restoration of the affected land.

Restoration will be at SECWA's expense.

Document Reference: Commitments GC5 and SC15.

Q22 Does SECWA indemnify landowners against devaluation in property due to power lines? Please explain.

SECWA indemnifies the land owner against property devaluation by providing compensation at the time the easement is acquired.

Based on the valuation provided by the Valuer General's Officer, SECWA makes a one off payment for the granting of an easement over private land.

For this project, the payment will be calculated after an officer of the Valuer General's Office has visited the area to examine the line route, determine land values and assesses the effect that the line will have on the individual properties.

In the case of most rural and broad acre farming properties the effects of the proposed line are expected to be minimal.

Q23 Is a caveat placed on easements through private properties? Could the easement be transferred to other parties for other uses? e.g. road, pipelines.

SECWA will be required to register an easement on the individual private land titles in order to protect all facilities associated with the Beenup project 132kV transmission line.

This agreement will be between the registered landowner and SECWA and will specify that it is granted for an electrical transmission line only.

Neither SECWA or the landowner has the right under the agreement to allow other parties to install other services within the easement.

In that event a separate easement would be required.

Any such easement agreement would be granted by the landowner and the consent of SECWA required where it affected SECWA's prior easement.

SECWA does not normally register a caveat on easements, but may choose to do so where there is a need to protect its interest when the registering of an easement is being delayed by other parties or processes.

Q24 How far away will powerlines be placed from dams?

Each situation will be considered on its merit, however, the crossing of dams is avoided where possible.

Q25 How will the private airstrip in the Shire of Capel be avoided?

SECWA intends that any line construction in the vicinity of the Capel airstrip will be in accordance with Department of Aviation regulations.

Refer to new Commitment NC10 in Appendix 2 of this report.

Q26 Will SECWA remove verge trees which are used for stock shelter and shade? Will fencing be provided to protect newly planted trees?

SECWA will remove verge trees if situations occur where the trees may come within the line easement or pose a threat to the line security.

Property owners will be provided with replacement seedlings which they may plant at their discretion.

SECWA does not provide fencing for the protection of seedlings, as it is the responsibility of the landowner to plant and protect them.

Document Reference: Commitment SC15.

Q27 Will SECWA avoid the historic East Witchcliffe School site?

SECWA will undertake to avoid the historic East Witchcliffe School site.

Refer to new Commitment NC9 in Appendix 2 of this report.

SUBMISSION 1

Rail Reserve

Issue 1 *The use of the rail easement as suggested would seriously affect the use of that section of rail as a future transport route.*

Response SECWA has had discussions with Westrail about using its rail reserve to accommodate the power line. Westrail has accepted in principle SECWA's proposal, which will not preclude Westrail from re-opening the rail line if the need arises.

If the use of the rail reserve is recommended or approved by the EPA, SECWA will then negotiate with Westrail on the precise siting of the powerline within the reserve.

Document Reference: Commitment SC17

McCarley's Swamp

Issue 2 *The new line will have an impact on birds of the McCarley's Swamp area as it will cross their flight path.*

Response The two route options in the vicinity of McCarley's Swamp would have minimal impact on the flight paths of the waterbirds. One option follows, in parallel, an existing powerline and the other takes the new line further from the swamp by being within the existing rail reserve.

Generally, bird strikes on powerlines are not considered a problem by SECWA.

SECWA will endeavour to minimise the height of structures in the vicinity of the Swamp and will monitor the operation of the line in conjunction with local ornithologists.

Refer to new Commitment NC1 in Appendix 2 of this report.

Issue 3 *The access track needed for the new line will disrupt the vegetation link between McCarley's Swamp and the AMC wetlands project.*

Response If SECWA builds its new line in parallel with its existing line the access may need to be upgraded during construction but it would then be returned to its existing condition. If the rail reserve was used permanent access tracks would not be constructed.

Document Reference: Commitments GC7 and GC10

Issue 4 *Impact of the line on the tourism potential of the AMC Wetlands Centre.*

Response The presence of the powerline should not have any effect on the tourism potential of the AMC Wetlands Centre as SECWA would site the line in consultation with the managers of the Centre, so that it would have a minimal effect on the aesthetics of the area.

Refer to new Commitments NC4 and NC6 in Appendix 2 of this report.

Document Reference: Commitment GC12

Underground Cable Option - Karri Forest AHC

Issue 5 *What clearing would be necessary for the underground cable option?*

Response Refer to Key Issue 10 in Section 3 of this report for details of trench and clearing requirements.

Issue 6 *Cost difference of $0.7M between the overhead and underground options through the karri forest.*

Response The underground cable cost mentioned in the CER only refers to undergrounding the section of the line running in the then known Australian Heritage listed areas (approximately 4km of the total route length). This option would cost $3.3M as opposed to approximately $600,000 for an equivalent length of standard overhead line. (These costs are indicative only).

The other option costing $2.6M refers to using tall structures 110m in height which would pass the line over the canopy of karris 60m in height. This overhead option whilst being considered as an option is not believed to be appropriate due to the large foundations (approxmately 20m x 20m) which would be required and the technical problems associated with the construction of a tower of this size.

Issue 7 *Why are the maintenance costs for underground lines greater than those of aerial lines?*

Response The statement regarding the maintenance cost of underground cable refers to the costs associated with repairing damage on the line. The costs incurred in locating and repairing an underground cable fault, and the time delays which can be involved, result in much higher maintenance or repair cost compared with a similar incident on an overhead line.

Conducting Surveys After Approval

Issue 8 *Philosophy of conducting flora, fauna and Archaeological surveys after route approval.*

Response Preliminary environmental studies were done during the identification of tentative line corridors. These have not indicated the presence of significant populations of rare flora, fauna or Aboriginal sites within any of the proposed corridors.

Once approval is obtained for a corridor SECWA will nominate a route centreline. Detailed surveys to identify significant flora, fauna and Aboriginal archaeological sites will then be conducted prior to surveying the precise centreline and determing the location of line structures. In this way sensitive areas can be identified and avoided.

Proposals for the management of any sensitive areas will then be incorporated into the Environmental Management Plan for the project, which will be drawn up in accordance with EPA requirements.

Document Reference: Commitments GC6, SC10 and SC22

Possible Alternatives To Avoid AMC/McCarleys Swamp

Issue 9 *Suggested use of the mineral sands haul route from Capel to Busselton.*

Response SECWA consider its route options in the vicinity of McCarley's swamp to be the most acceptable from a regional perspective.

SUBMISSION 2

Renewable Energy

Issue 1 *Research into alternative energy needs to be done so it is available for future projects.*

Response: There is considerable Government sponsored activity in the renewable energy field in Western Australia. The institutions involved are SECWA, the Minerals and Energy Research Institute of WA (MERIWA), the Murdoch University Energy Research Institute (MUERI) and the Renewable Energy Advisory Council (REAC).

All these institutions are continually involved in researching, developing and demonstrating new renewable energy products and applications.

Technologies that are currently being investigated, reviewed and developed are wind power, landfill gas, biomass, photo-voltaics, fuel cells, battery types, wave and tidal power.

Both SECWA and the Government are committed to supporting the development of viable renewable energy technologies. Their views are based on the premise that since renewables are still relatively expensive at this time it is strategically sensible, in the current economic climate, to focus support on research and development and apply the technology only to those projects where renewables have a chance to compete economically

Refer to new Commitment NC2 in Appendix 2 of this report.

On-Site Generation

Issue 2 *The possibility of on-site generation should not be dismissed.*

Response: MDL is continuing to evaluate the feasibility of on site generation; however at this point in time, a SECWA supply is considered the most viable alternative.

Refer also to the response to Issue 8 of Submission 3 in Section 5 of this report.

Fauna Considerations

Issue 3 *Placement of visibility enhancing devices (orange markers) on line conductors to avoid bird impact.*

Response: SECWA does not consider this proposition necessary or justifiable because:-

1. SECWA does not expect bird strike to be a problem, based on experience with existing overhead lines in the vicinity.

2. Overseas research shows that the use of visibility enhancing devices in locations where bird strike is most likely to occur, actually increases the incidents of bird strikes.

Issue 4 *Line impact on rare and endangered fauna.*

Response: SECWA is committed to carry out a detailed fauna survey prior to determining the precise location of the line within the approved line corridor. All known and identified habitats of rare fauna will be avoided by diverting the line if necessary.

Document Reference: Commitment SC22

SUBMISSION 3

General Comments

1 Costing

Issue 1 *Economic benefits of upgrading the existing Picton to Margaret River line now.*

Response: Predicted load growth indicates that the Picton to Margaret River system will be required to be reinforced in 10 - 15 years time and that will probably entail building a new line from Picton.

The existing lines cannot be upgraded.

Capital spent now for something which will be needed in 10 - 15 years time cannot be economically justified.

2. 66kV versus 132kV

Issue 2 *If a new 132kV line is built between Picton and Margaret River the resultant savings in energy losses should be included in calculations of the cost of this option.*

Response: If a new line was built from Picton via Margaret River to supply Beenup, it would be operated at 132kV but would not be connected into and out of the existing Capel, Busselton and Margaret River substations immediately.

The substations would have to be rebuilt from 66kV to 132kV which would cost approximately $3 million per substation and the work would not be required until sufficient load growth occurred in about 10 - 15 years time. Until then the existing 66kV system would remain operational and therefore the existing 66kV energy losses cannot be factored into any of the option estimates.

Specific comments referenced to sections of the document.

1.1 Background

Issue 3 *Compare the costs, span lengths and structure heights of concrete poles and lattice steel towers.*

Response: Concrete poles at the size envisaged for this line are not, at present, manufactured in WA; however SECWA will include concrete poles in its tender enquiries.

It is expected that concrete poles could show a cost advantage of about 10% over steel towers.

Concrete poles would range in height from 20 - 29 m above ground with spans ranging from 250-320m.

1.7 Scope and purpose of the Report

Issue 4 *Easement width is quoted as 40 - 60m, but the zone of influence may be up to 120m wide.*

Response: An easement is a statement of rights acquired by a person or body over another person or body's ground or property.

In the context of SECWA powerlines the rights are concerned with restrictions to the building of structures, planting of trees and access of overheight vehicles for safety purposes. The rights also ensure general access for SECWA personnel for maintenance purposes.

Under it's Act SECWA is required to treat any vegetation which may interfere with its powerlines. If the vegetation is 60m high this sphere of influence could be said to extend to 120m.

2.0 Need for the proposal.

Issue 5 *How will a new line to Beenup reinforce the existing Margaret River/Augusta system?*

Response: Refer to response to Specifc Question Q4, Section 4 of this report.

3.2 Alternative technologies

Issue 6 *Viability of wind generation.*

Response: Possible energy available from wind is too variable for the supply reliability required for the mining development.

There may be an opportunity to take wind derived power into the SECWA system should technology develop sufficiently in the future.

Refer also to Submission 9 in Section 5 of this report.

Document Reference: Page 7 Section 3.2.

Underground Cable

Issue 7 *Costs not quoted for an underground cable option. Did SECWA consider the use of underground cable particularly through the sensitive karri areas?*

Response: The CER states that the underground cable would cost in the range of 7 to 15 times the cost of an equivalent overhead line.

Undergrounding a section of the line through the Australian Heritage areas was considered, (Refer page 60) at an estimated cost of $3.3M.

Document Reference: Refer page 7 section 3.2 and Page 60 paragraph 4.

3.3 On site Generation

Issue 8 *Details of cost and information on available technologies has not been provided in the CER.*

Response: The CER document makes mention of wind, solar, gas fired and diesel generation.

To reliably fulfil an on site generation requirement seven diesel generators, any six running at once, would be required together with fuel, spares and shift working operators.

The associated costs would be far greater than and clearly uneconomic when compared to a SECWA system supply.

Refer also to Submission 9 in Section 5 and new Commitment NC2 in Appendix 2 of this report.

Document Reference: Refer Page 7 Section 3.2, Page 8 Section 3.3.

3.5.4 Picton to Beenup

Issue 9 *Was SECWA responding to public concern when it decided to investigate the Picton options after the public meeting at Manjimup on 14 May 1991?*

Response: At the time of the public meeting at Manjimup on 14 May 1991 SECWA were unaware of the issue of heritage listing of areas of the karri forest. Once we were informed a decision was made to investigate alternative routes.

4.1 Public Consultation

Issue 10 *Major issues identified at meetings reflect the interests of those who attended ie landowners.*

Response: The CER lists the interest groups who were told about the proposal and invited to attend the information sessions and public meetings. Only 25% responded in any way, and SECWA regrets that many community interest groups did not participate during the consultative phase.

Document Reference: Appendix C Section C5.

5.2.1 Climate

Issue 11 Climatic data for Manjimup not provided.

Response: The climatic data in Section 5.2.1 should have comprised data from both Support Documents 1 and 2. Unfortunately the data from Supporting Document 1 was omitted.

Document Reference: Section 4.1.1. of Supporting Document 1 and Section 3.1.1 of Supporting Document 2.

5.2.3 Surface Hydrology

Issue 12 Permanent removal of vegetation.

Response: The powerline will require a 40m easement width for safety reasons. Within that width shrub regrowth will be allowed up to a height of 4m. Outside the easement, except for the Heritage Areas, all the tall trees which may impact upon the line will be removed. Regrowth outside the easement will be limited only by the impact height. Therefore the only permanent clearing within the transmission line easement will be the access track. Regeneration will occur as it does in the harvested forest areas.

Refer to new Commitment NC3 in Appendix 2 of this report.

Document Reference: Commitments GC7 and SC23.

5.2.5 Fauna

Issue 13 Why only undertake a detailed fauna survey prior to clearing and construction?

Response: SECWA intends to undertake a fauna survey prior to clearing and construction in order to identify fauna which is specific to the line route. The line route cannot be identified prior to environmental approval. Consideration will be given to arrangements to avoid or minimise any particular problems once these areas are accurately identified and the issues understood.

Refer also to Key Issue 5 in Section 3 of this document.

Document Reference: Refer Page 28 Section 5.2.5 and Commitment SC22.

7.1.1.2 Earth Resources

Issue 14 Mining operations have been given preferential treatment.

Response: Although SECWA would, in principle have sought to avoid active mining operations, in this event there are no current mining operations co-incident with any of the considered options. The matter has therefore not arisen in practice.

7.2.1 Impact

Issue 15 "Selective felling" in single strata karri forest is not possible and would effectively result in total clearing.

Response: SECWA believes the selective felling proposals will be workable in these areas based on advice from both CALM and a forestry consultant.

Refer to Consultant's report in Appendix 4 of this report.

Issue 16 Total area of clearing in karri forest has been underestimated.

Response: SECWA firmly believes the area to be cleared has not been under-estimated. The figure of 60ha given in the document results from a "worse case" calculation. In reality only 11ha of quality karri forest in the Heritage listed areas will be cleared.

Refer also to Section 2 and Appendix 3 of this report for details of SECWA's revised clearing proposals and Appendix 4 for a report on the karri forest affected by this project.

7.5.1 Manjimup to Beenup Corridor

Issue 17 The document does not indicate much "give" in SECWA's approach to the handling of the Heritage listed areas.

Response: SECWA has been reconsidering, in conjunction with the Australian Heritage Commission, the impact of the line on significant stands of quality karri within the Heritage listed areas.

In order to reduce vegetation clearing to a minimum SECWA proposes to locate the line along the shoulder of the road such that only a 20m strip on the non-road side of the line will need to be cleared.

SECWA has further proposed to relax its tall trees practice in these areas, except for specific trees identified as hazardous.

On that basis about 11ha of quality karri will require clearing from the eastern extremity of Beavis block to the Donnelly River west of the Vasse Highway. Originally the amount of clearing required was estimated to be 60ha.

Refer also to Section 2 and Appendix 4 of this report for details of SECWA's revised clearing proposals and Appendix 4 for a report on the karri forest affected by this project.

SUBMISSION 4

Observations on the document

1.4 Timing

Issue: 1 *Submittor requests an amendment to the statement regarding the timing of clearing operations.*

Response: The statement regarding construction occurring during "dry summer periods" is intended to mean dry soil conditions between November to May.

Document Reference: Page 2 Section 1.4. Page 53 Section 7.3 and Commitment SC24.

1.7 Scope and Purpose

Issue: 2 *EPA guidelines and weightings used for the GIS model not available.*

Response: The EPA guidelines are contained in Appendix A of the CER document. The weightings for the GIS Model are contained in Supporting Documents 1 and 2 which were available upon request.

Document Reference: Appendix A, Section 6 of Supporting Document 1 and Section 5 of Supporting Document 2.

2.0 Need for the Proposal

Issue: 3 *Upgrade of Picton to Margaret River system is inevitable and therefore irrelevant for this project.*

Response: The demand for power in the Busselton/Margaret River areas can be expected to grow but reinforcement of the power supply system for these areas, on present load growth trends, will not be needed for 10 - 15 years. Investment now for that future load growth cannot be economically justified.

However some benefits to the local community will occur in the short term if the project proceeds, therefore, the issue is not irrelevant.

Refer also to response to Question 2 in Section 4 of this report.

3.5 Beenup Selection Study

Issue: 4 *SECWA has given an inordinate weighting to private property disruption.*

Response: The weightings given in Supporting Documents 1 and 2 do not represent an undue bias towards avoiding private property.

Document Reference: Section 6 of Supporting Document 1 and Section 5 of Supporting Document 2.

Issue: 5 *A powerline has no impact on grazing or cropping but will have a major impact on forest land uses.*

Response: In a regional context the impact of a power line on forest land is marginal considering the areas involved and therefore consideration should be given to this use of the land.

Document Reference: Page 47 Section 7.2.1

4.1 Public Consultation

Issue: 6 *Powerful weighting were given to concerns expressed via local community consultation during the corridor selection process.*

Response: SECWA believes that public consultation on power line projects is an important issue and the community should be given every opportunity to participate in the selection process.

Document Reference: Section 6 of Supporting Document 1 and Section 5 of Supporting Document 2.

Specific comments relating to the Manjimup option.

Issue: 7 *Issues relating to the upgrade of the Muja - Manjimup line should be included in the CER document as they are for the upgrade works required as part of the Picton options.*

Response: There will be no "upgrading" work required for either of the Picton options. It is therefore not correct to try to draw a comparison between the work required to upgrade the Muja to Manjimup line with any work required on the Picton options.

The upgrading of the Muja to Manjimup line will involve replacing or re-butting 30 - 50% of existing poles on the line. There will therefore be no additional impacts upon persons or private properties resulting from this work.

The costs associated with the work between Muja and Manjimup have been included in the estimates supplied in the document.

Issue: 8 *If the tolerance of 30% as quoted at Manjimup public meeting is applied to costs for each option, there is no significant difference between them.*

Response: The variable costs within each option estimate, are common to all estimates and therefore the options will retain their relativity despite any cost variation.

Issue: 9 *Is the cost of compensation to land owners included in the estimates provided?*

Response: Estimates of the cost of compensation payments to private landowners are included in the estimates given in the report.

Issue: 10 *Will SECWA provide compensation for lost forest area?*

Response: A Ministerial direction to CALM has precluded compensation payments for loss of productive forest areas.

Issue: 11 *Clearing an easement through forest will have a major aesthetic impact.*

Response: SECWA believes the aesthetic impacts can be minimised by the careful siting of structures within the existing land forms and by the natural screening effect of surrounding vegetation.

Refer to new Commitment NC4 in Appendix 2 of this report.

Document Reference: Commitments GC12, SC2 and SC23.

Issue: 12 *Detrimental effect of the creation of additional public access to natural vegetation - dieback spread.*

Response: SECWA does not intend to create any additional public access to natural vegetation. Existing track and forest roads will be used wherever possible. Established dieback hygiene techniques will be employed by all SECWA personnel and agents involved in the project.

Refer also to response to Issue 18 of this Submission.

Document Reference: Page 53 Section 7.3, and Commitments GC10 and SC24.

Issue: 13 *The figure quoted for clearing in the karri forest could be doubled from 60 to 120ha.*

Response: The quoted figure of 60ha refers specifically to the karri forest in the Heritage listed areas and is a worst case estimate of the clearing required.

The forest areas currently under consideration for heritage listing cover approximately 15.5km of the route length. Within this distance approximately 11ha of quality karri will require clearing.

Refer to Section 2 of this report for details of SECWA's revised clearing requirements in quality karri areas. Also refer to Appendix 4 for information on the forest in karri region.

Issue: 14 *SECWA's silviculture proposal equates to ongoing loss of production and forest values.*

Response: The silviculture proposals included in the document for areas of productive forest, came about as a result of discussions with CALM and so should be commercially viable.

Document Reference: Commitment SC23.

Issue: 15 *The suggestion that dieback hygiene training, supervision and monitoring should be done by CALM is not an equitable arrangement from a financial view point.*

Response: SECWA acknowledges CALM's expertise and responsibility in this matter. The CER describes the standard arrangements made with CALM for control of personnel, plant and vehicles in dieback affected areas. It does not seek to address the issue of financial responsibility.

Specific comments relating to Great North Road Option.

Issue: 16 *Erosion risk in the Margaret River Catchment.*

Response: SECWA has placed significant emphasis on avoiding soil erosion and has made specific mention of the Margaret River Catchment in Commitment SC12.

Document Reference: Page 44 Section 7.1.12, Page 64 Section 7.5.2 and Commitments GC15 and SC12.

Issue: 17 *Crossing the Blackwood River south of the Warner Glen Bridge is a better option.*

Response: The proposed crossing place of the Blackwood River is the optimal crossing point for the Great North Road option, whereas a crossing west of Warner Glen Bridge would be inappropriate, due to the increase in the route length and clearing which would be required.

Document Reference: Page 64 Section 7.5.2 and Commitment SC13.

Issue: 18 *Riverside degradation due to increased public access because of easement.*

Response: SECWA will discourage public use of any new access tracks by the use of gates. This method is currently employed by CALM in many sensitive forest areas.
Refer to revised Commitment SC13 in Appendix 2 of this report.

Document Reference: Commitments GC10 and SC13.

Specific comments relating to the Margaret River Option.

Issue: 19 *The crossing of the Blackwood River Conservation Park is unacceptable.*

Response: SECWA believes that a crossing of the Blackwood through the Conservation Park/Heritage Area can be acceptably managed for either the Great North Road option or the Margaret River option.

Document Reference: Page 64 Section 7.5.2 and Commitment SC13.

Issue: 20 *The environmental impact of the southern Margaret River option is less than that of the northern route.*

Response: SECWA does not agree that the environmental impacts are greater on the northern rather than the southern Margaret River corridor, when all aspects are considered.

Issue: 21 *Upgrading of Picton to Margaret River line.*

Response: The Margaret River and Great north Road options do not involve the "upgrading" of existing 66kV lines from Picton.

Refer to response to Issue 6 of Submission 5 in Section 5 of this report.

SUBMISSION 5

1.4 Timing

Issue 1 — *Survey and clearing could be carried out from December '91 to May '92 resulting in construction being bought forward to begin in November 1992.*

Response: By the present project timetable, environmental approval can not be expected before end January 1992 and agreement on the conditions attached to that approval, from past experience could take several months. Survey and clearing together therefore can not possibly be done between December 1991 and May 1992.

Document Reference: Page 2 Section 1.4.

1.7 Scope and Purpose

Issue 2 — *Easement width required in karri areas is 120m not 40-60m as stated in the CER.*

Response: Refer to response to Issue 4 of Submission 3 in Section 5 of this report.

2.0 Need for the Proposal

Issue 3 — *Will the Margaret River system benefit from the use of the Manjimup to Beenup route?*

Response: Refer to response to specifc Question 4 in Section 4 of this report.

3.0 Evaluation of Alternatives

Issue 4 — *The use of underground cable in significant areas e.g. mature karri; is the only environmental option.*

Response: SECWA feels that the submittor should not assume authority for environmental approval, since the EPA is the body which decides what is or is not environmentally acceptable.

SECWA expects that the circumstances of significant areas will be considered on their merits by the evaluating officers of EPA. Mature karri in itself should not necessarily be considered environmentally inviolate. CALM and its agents clear fell many hectares of mature karri annually.

3.5.3 Manjimup to Beenup

Issue 5 *The preliminary corridor selection study originally undertaken only considered routes between Manjimup and Beenup.*

Response: Initial considerations for the Beenup power supply were focused upon the existing 66kV system from Picton to Margaret River. Engineering studies were performed followed by economic appraisals which showed that there was a large problem associated with energy losses.

Consideration then moved to providing a power supply at 132kV. There are two possible 132kV sources, Picton or Manjimup and roughly speaking, the distances involved are 130km or 90km. On a first approximation, the difference in cost between the two because of the distance alone, would be about $3M.

There was therefore a compelling economic argument in favour of the Manjimup option.

3.5.4 Picton to Beenup

Issue 6 *Property statistics for the upgrade of the existing Muja to Manjimup line have not been included in the document whereas the properties affected by the upgrade between Picton and Sabina River/Margaret River have been taken into account.*

Response: The existing 66kV lines from Picton via Capel and Busselton to Margaret River do not form part of the intended Picton to Beenup 132kV supply. Therefore there is no "upgrade" work to be done for this project on the existing lines. A totally new 132kV line from Picton will be built to provide the supply to Beenup.

For the Manjimup to Beenup option it will be necessary to upgrade the existing Muja to Manjimup 132kV line by raising between 30-50% of the existing poles and replacing some others. There will not be any change to the properties affected by the existing line.

Thus the number of properties affected by the proposed new line are as described in section 5.3.2 of the CER.

Issue 7 *Elimination of the Sues Road option on the grounds of its impact on the Whicher Range Nature Reserve and the amount of clearing of virgin forest is not acceptable when the three remaining options involve similar impacts.*

Response: In rejecting the Sue's Road option, SECWA explained in the CER that concern about the Whicher Range Nature Reserve was coupled with concern about visual impact in crossing the Whicher Scarp. Clearing of virgin/significant vegetation near the Blackwood River is much larger for the Sues Road option than the other Picton options, 48ha compared to about 2ha.

4.1 Public Consultation

Issue 8 *A much larger population (eg the population of the South West, including the Perth metropolitan area) rather than just the "local" community should have been consulted when the corridors were still under review. (ie prior to CER being finalised).*

Response: SECWA actively and earnestly sought consultation with all elements of the general community in the areas to be affected between Bunbury, Manjimup and Augusta. During the consultative phases, prior to completion of the CER, no one in the area with access to local newspapers, TV or radio would have been unaware that the powerline and its effects were open for discussion at numerous venues and that written comments were welcome.

All identified interest groups, including major environmental/ conservation groups were also contacted by letter and phone and invited to participate in the consultative process. Thus SECWA feels it has consulted the wider community.

Document Reference: Appendix C.

4.2 Description of Options

Issue 9 *Estimates given for the total distances involved with each option are misleading as they exclude the upgrade work between Muja and Manjimup.*

Response: The distances quoted in the CER take into account the total length of new line associated with each option. The works required to upgrade the Muja-Manjimup line cannot be equated with the work to construct a new line. Thus the line distances given in this section of the CER are correct.

4.2.1 Picton - Capel - Margaret River - Beenup

Capel to Margaret River Link

Issue 10 *The results of negotiations between SECWA and Westrail regarding the use of the abandoned railway reserve are not discussed in the document.*

Response: The CER refers to the possible use of rail easements on pages 20 and 67. Detailed negotiations have not been started with Westrail. The extent of the easement has been ascertained however and SECWA understands that Westrail has no immediate plans for use of the easements.

Document Reference: Page 20 Section 4.2.1, Page 67 Section 7.5.3 and Commitment SC17.

Margaret River to Beenup Link

Issue 11 *The reasons for the use of the Denny Road forest route should be more thoroughly justified.*

Response: As stated in the CER the eastern and northern corridor sections have been chosen "to avoid conflict with property owners, subdivisions, existing dwellings and farming facilities". Specifically, the preferred corridor "avoids the extensive dairy farming facilities located at both the Brooks Road and the Warner Glen Bridge areas".

Document Reference: Page 21 Section 4.2.1.

Issue 12 *The southern route for the link from Margaret River to Beenup is the best option since it (i) involves crossing the Blackwood to a point which avoids impact on the habitat of the rare geocrinia frog species and (ii) it has a lower impact on the vegetation in the Witchcliffe forest block.*

Response (i) SECWA has undertaken to develop a management plan, to the satisfaction of CALM, for the nominated crossing of the Blackwood River.

SECWA have already recognised the presence of the geocrinia frog and are confident that the highly restricted habitat of this amphibian can be avoided.

(ii) The Witchcliffe forest block is not listed for conservation in CALM's current Regional Management Plan.

The corridor of the southern Margaret River option runs adjacent to the western boundary of the Witchcliffe Block and traverses two areas where the Geocrinia species of frog has been identified, whereas the northern option avoids these areas.

SECWA believe that the proposed Margaret River Beenup route is the most appropriate.

Refer to new Commitment NC5 in Appendix 2 of this report.

Document Reference: Page 64 of Section 7.5.2 and Commitment SC13.

4.2.3 Manjimup to Beenup

Issue 13 *The clearing rather than the line itself will have a high visual impact in forest areas. SECWA says it will avoid karri forest where possible and yet they also say they will follow Waistcoat road which makes this impossible.*

Response: (a) General clearing.

The visual impact of clearing for the line route will appear as no worse than a normal clearfelling operation in the forest. Regeneration of shrubs and understorey to a 4m height will be encouraged in the 40m easement. For considerable portions of the route the 40m easement will include adjacent haul road or forest tracks. Outside the easement, clearing will only occur where trees exceed the nominated safety profile. Where it can be applied, commercial regeneration will be implemented, for subsequent harvesting as the trees again reach profile height. Where conditions are not suitable for commercial growing natural regeneration will be encouraged.

(b) Clearing requirements for areas of significant karri

The significant stands of trees along the haul road in the Heritage Areas have been identified. The line will be located in the shoulder of the haul road such that half the 40m easement comprises the road and its shoulders, which require no vegetation treatment. The other half of the easement, 20m wide, will require clearing and shrub regeneration to 4m high will be encouraged.

Outside the easement in areas with significant stands of karri, SECWA will relax its practice of removing any tree which could impact upon the line if it, the tree, fell. However there would have to be annual inspection and removal of any tree which presents a hazard by virtue of age, disease, inclination, damage or disturbance. On this basis, no clearing outside the easement is expected, individual tree felling and removal will be required only as necessary.

Refer to Section 2 of this Report and New Commitment NC3 in Appendix 2.

5.2.5 Fauna

Issue 14 *Specific field studies for fauna have not been undertaken for the project.*

Response: SECWA expects that environmental approval, when given to one of the options, will be subject to a fauna survey being conducted along the intended line alignment. Satisfactory arrangements will have to be made, before the start of clearing and construction, for any significant fauna found to be present.

SECWA generally has sought environmental approval to place the powerline anywhere within a nominal corridor 1km wide, subject to such conditions as the Minister for the Environment sees fit. The approval and its conditions need to be determined before an alignment can be nominated within the approved corridor. From this point, the fauna survey can be conducted and the subsequent arrangements made which may, if necessary entail some adjustment of the intended alignment prior to its final survey.

Document Reference: Commitment SC22.

5.3.2 Human Populations Affected

Issue 15 *The figure given for the number of properties affected by the Manjimup proposal is misleading as it does not include properties affected by upgrade work on the Muja to Manjimup line.*

Response: The statistics and issues here are related to the number of properties which will be directly affected by the new transmission line, not merely properties affected by lines.

5.3.11 Conservation

Issue 16 *The statement relating to the compatibility of transmission lines and National Parks (pg 39 of the document) should be extended to include Nature Reserves, Conservation Parks or areas designated in the Register of National Estate.*

Response: SECWA now believes that the statement quoted from the CER ie. "The construction maintenance and operation of a transmission line is not compatible with the objectives of areas classified as National Parks" is too simplistic and therefore is not strictly correct. There are circumstances where roads and railways are located in National Parks. Therefore it is conceivable also then that a powerline could be located in a National Park.

The circumstances and conditions relating to the powerline would need careful consideration but the issue should be decided upon merit rather than subjective policy.

This approach should apply to any conservation area. The criteria for conservation should be objectively compared with the construction and existence of the powerline. If it can be seen that the line would have only a small effect upon the particular conservation value embodied in the area, then the line should be allowed to proceed.

7.2.4 Clearing in Forest > 20m high (outside of easement)

Issue 17 *The requirement to clear all tall trees at risk of falling on the line from outside the easement has the potential to result on an effective easement width of 120m in areas where the karri is 60m high.*

Response: SECWA has reduced this requirement, for significant stands of mature karri in Heritage listed areas.

Refer to Issue 12 above and Section 2 of this report.

7.5.1 Manjimup to Beenup Corridor

Beavis East Block and Beavis West Block

Issue 18 *It would be difficult for SECWA to formulate a detailed construction and operation programme "to the satisfaction of CALM", for the Heritage listed Beavis Blocks as stated in Commitment SC4 of the document, since it is believed that CALM will find the clearing necessary, environmentally unacceptable.*

Response: SECWA is in consultation with the Australian Heritage Commission about the possibility of routing the powerline through the Heritage areas. The clearing prescriptions are as described in the response to Issue 12 above and Section 2 of this report. If the Commission agrees to the SECWA's proposals, SECWA expects that CALM will raise no further objection.

Document Reference: Page 59 Section 7.5.1 and Commitment SC4.

Storry Forest Block

Issue 19 *The route through Storry Block has no ameliorating features.*

Response: SECWA understood from discussions with CALM, that the Storry Block is a mixture of woodland, scrub and swamp, and the woodland is low quality non commercial forest. The concern about the Storry Block rested on the possibility of there being rare and endangered flora species present. Unfortunately CALM did not have any specific information available regarding the flora on the Block at the time of these discussions.

Since then, SECWA has commissioned an Autumn flora survey of the Block which revealed nothing of significance. A Spring flora survey will be conducted and the line route will be arranged to avoid or to minimise any effect upon any significant species. SECWA believes passage through the Storry Block will be manageable.

Document Reference: Page 61 Section 7.5.1 and Commitments SC7 and SC10.

7.5.2 Great North Road Option

Treeton Forest Block

Issue 20 *No impact is acceptable on declared rare flora.*

Response: SECWA will commission flora surveys along the intended alignment and arrangements will be made to avoid or minimise any affect upon any significant flora species.

Document Reference: Commitment SC10.

Blackwood River Crossing

Issue 21 *Clearing required within Blackwood Conservation park which has been nominated for inclusion in the National Estate.*

Response: SECWA has acknowledged that some clearing will be necessary in this Heritage Area and has included a proposal for its management, in the CER.

SECWA believes that the clearing will have very little impact on the area and should therefore be acceptable.

Document Reference: Page 64 "Blackwood River Crossing" and Commitment SC13.

7.5.3 Margaret River Options

Compensation

Issue 22 *Payment of compensation for easement and production loss sets a precedent.*

Response: Paying compensation for an easement and also for loss of production for this 132kV line will not in any way set a precedent. It has been SECWA practice to obtain and pay for easements for all new transmission lines since 1984.

Issue 23 *Costs given on page 69 of the document are misleading as SECWA have included an amount for the compensation of private land owners but none for compensation to CALM.*

Response: SECWA has accounted for tangible costs in its cost estimates. Hence the figures quoted for easement costs reflect the areas of private property to be affected for the three options e.g. $100,000 - 18 properties Manjimup; $700,000 - 126 properties Great North Road; $1,100,000 - 179 properties Margaret River.

CALM have been instructed that no charge is to be made for loss of future production in forest areas affected by the line, neither is there to be any charge for the use of public land from one government department to another. Accordingly, no compensation is to be paid to CALM and therefore there is no tangible cost there.

The costing argument put forward in the submission is hypothetical. The costs of the options, as given at p69 of the CER, are the best summary of costs that can be put forward at this early stage of a project. They are subject to the detailed definition of route alignment and local circumstance all of which can only be settled after environmental approval, and they are also subject to possibly large variances in tender prices for the line work. This is why the CER describes the costs as indicative costs.

Issue 24 *If a tolerance of 20 to 30% is applied to the indicative costs given for each option, there is effectively no difference between them.*

Response: Refer to response to Issue 8 of Submission 4 in Section 5 of this report.

22. 8.0 Conclusions

SECWA can not agree with the Submittor's statement regarding perceived inaccuracies or inconsistencies in the CER document.

The following summary addresses the issues highlighted in the Submittors conclusion, all of which have been covered in the body of the submission.

(i) The Picton to Margaret River lines will not be upgraded nor altered in any way by this project.

The Muja to Manjimup line will be upgraded if the Manjimup option is used. That work will affect existing structures but will not alter structure locations. The properties affected now by the line will not change and they will not be further affected. Therefore this project will not have a disturbing or valuation effect on any property along the Muja to Manjimup line.

The three options each entail the construction of a new additional powerline. The lengths of line involved are 90km, 114km and 130km respectively and the private properties affected are correspondingly 18, 126 and 179.

(ii) The CER is correct in stating that all three options involve crossing Heritage Areas and the CER describes the crossing proposals in detail. The Blackwood crossing would be about 0.4km and the Manjimup route crossing about 4.0km, according to the information available at the time of preparation of the CER.

(iii) The cost estimates that SECWA has given are based upon tangible costs.

Payment of compensation for easements on private property for new transmission lines has been SECWA practice since 1984. SECWA has not introduced the practice for this project in order to bias the economics in favour of the Manjimup option, as suggested.

CALM has been instructed that there is to be no charge for loss of future production nor for the use of public land for this project. The Submittor is aware of this fact and so SECWA is surprised that the Submittor has chosen to use this fact as grounds for an accusation that we have been inaccurate and inconsistent.

(iv) On present load growth trends the 66kV power system from Picton to Margaret River will need reinforcing in 10 to 15 years time.

If the Beenup powerline were to be routed from Picton to Margaret River just to cater for this future need, SECWA would have to contribute the difference in cost between this option and the least cost option i.e. $4.5M. SECWA would be investing $4.5M with no return for 10 to 15 years when it could be investing the capital elsewhere in the power system for a return of 18-20%. At a time when SECWA is committed to reducing the cost of electricity to the community by 25%, this proposition is not considered viable.

Hence the Submittor's preference for the Margaret River Route would not allow SECWA to meet its economic objectives.

(v) CALM and its agents clearfell large areas of mature karri on a continuous basis, and that is environmentally acceptable. Therefore, to be consistent, clearing for a powerline in these areas should also be environmentally acceptable.

For significant stands of karri in Heritage Areas, SECWA has refined its proposals such that only a 20m wide strip along the haul road will require clearing. SECWA expects that proposal to be acceptable to the Australian Heritage Commission. (See Section 2 of this report for more information).

SUBMISSION 6

Issue 1 Sterilisation of known mineral resources.

Response: SECWA recognises the importance of mineral resources and seeks to avoid them. In this instance, however, the study established that SECWA's existing lines and substation already occupied an area where mineral resources have subsequently been identified.

Every attempt will be made to minimise the effect on the resources by consultation with the affected parties, by keeping the new line as close as possible to one of the existing lines south of the substation and by pursuit of the option to utilise the rail reserve.

Document Reference: Commitment SC17.

SUBMISSION 7

General Discussion

Issue 1 *SECWA should not be obliged to provide a power supply to a public or private company when that supply will be for the sole benefit of that company.*

Response: Under its Act SECWA is required to provide power to the community in the most effective and economic manner possible having due regard for environmental effects.

Document Reference: Page 2 Section 1.3.

Issue 2 *The Picton options should make use of Government owned or controlled land such as rail and road reserves, instead of private properties.*

Response: As stated in the CER, SECWA is considering using the presently disused rail reserve between Capel and Busselton as an alternative to shadowing its existing line across private properties.

SECWA usually seeks to avoid the use of road reserves due to public perceptions regarding the visual impact of the line.

Document Reference: Top of Page 67 and Commitment SC17.

Issue 3 *An option not considered by SECWA is the upgrading of the existing 66kV lines between Picton and Margaret River to achieve the increased supply needed. This could be done by:*

(i) adding an extra conductor to each phase or,

(ii) replacing the existing conductor with one which could carry a heavier current.

Response: (i) Adding another conductor to each phase would not be physically possible as the existing line configuration cannot accommodate this arrangement.

(ii) The existing line configuration would also not be able to accommodate a heavier line conductor.

Although these proposals would, if they could be implemented, alleviate the problem of the high electrical losses associated with supplying the mine from the 66kV system, the investment required would not justify the benefit achieved. The best method of supplying the project is via the 132kV system as planned.

Document Reference: Page 11 Section 3.4.

Environmental Aspects

Issue 8 *Considertion should be given to reducing the visual impact of the line by:*

(i) painting lattice steel towers
(ii) colouring concrete poles and
(iii) anodising the aluminium line conductors

Response: (i) If steel towers are used they will be left with the normal galvanised finish which from experience SECWA considers quite adequate.

(ii) If concrete poles are used SECWA intends to have them painted Black Olive.

(iii) The phase conductors used will be of the galvanised steel cored aluminium type which SECWA considers environmentally acceptable.

SECWA is commited to minimising the visual impact of the line, see new Commitments NC4 and NC6 in Appendix 2 of this report.

Document Reference: Commitments GC12, GC13, SC1 and SC2.

Social Impact

Issue 9 *EMF- The presentation on electromagnetic fields lacks detailed information on potential health effects. More research is required.*

Response: This issue was covered in the CER as well as in several public pamphlets which were made available to all interested members of the community. (See Appendix 1).

SECWA will continue to monitor research sponsor research and review its EMF policy in the light of the most up to date research findings on power frequency electric and magnetic fields.

Refer to new Commitment N7 in Appendix 2 of this report.

Document Reference: Page 56 Section 7.4

Issue 10 *Impact on private properties should be minimised, especially when properties are already affected by power lines.*

Response: Under its Act SECWA is required to provide power to the community in the most economic and efficient manner having due regard to the environmental effect and social impact.

SECWA will optimise the siting of the line to minimise its impact upon private properties.

Document Reference: Commitments GC12, SC1 and SC16.

SUBMISSION 8

1.0 Introduction

Issue 1 *Supporting documents not made available during the review period.*

Response: Due to the bulk of the CER document copies of the Supporting Documents were not sent out as part of the general issue of the document but they were available to any party upon request.

2.0 Need for the Proposal

Issue 2 *Confusion over project power requirements.*

Response: Refer to response to Question 2 in Section 4 of this report.

3.2 Alternative technologies

Issue 3 *There will be an increase in Greenhouse gas emissions due to the use of coal based power generation and the clearing of vegetation for this project.*

Response: The ultimate power requirements at Beenup is only 1 - 2% of the total output of Muja Power Station; therefore it represents a minimal impact on atmospheric emissions.

The impact associated with the clearing for the transmission line is no worse than the harvesting of forest by CALM. It should be noted that regeneration will be encouraged in cleared areas once construction work on the line is completed.

Refer to Section 2 and new Commitment NC3 in Appendix 2 of this report.

Document Reference: Commitment GC7.

Wind Generation

Issue 4 *Wind generation acknowledged as capable of meeting some of Beenup's power requirements but no details were supplied.*

Response: Investigations are currently underway to assess the potential of wind energy at the site.

The feasibility of Wind Generation being used to supplement the supply to the mine from the main grid will be known once adequate data is collected. The result of this investigation would have no impact on SECWA's choice of supply voltage or the design capacity of the line due to the unreliable nature of this energy source.

Refer to new Commitment NC2 in Appendix 2 of this report.

Document Reference: Page 7 Section 3.2.

Underground Cable

Issue 5 *What are the environmental advantages of the use of underground cable as opposed to above ground transmission lines.*

Response: Refer to Key Issue 10 in Section 3 of this report.

Document Reference: Top of page 8 Section 3.2.

3.3 On site Generation

Issue 6 *The possible contributions of these technologies cannot be assessed as details of the feasibility studies conducted by MDL have not been included in the document - see attached.*

Response: The most reliable and economically viable source of supply for the Beenup mine is connection into SECWA's 132kV grid system.

SECWA understands that MDL is continuing their investigation into the use of alternative energy systems but the technology associated with these systems is not yet capable of providing a reliable and sustainable source of electricity for a project of this size.

Refer also the response to Submission 9 in Section 5 of this report.

Issue 7 *The issue of gas generation is not adequately addressed in the CER.*

Response: SECWA's existing gas lateral currently finishes at the Masters Dairy works at Boyanup. The size of the pipe used on this lateral is not big enough to accommodate gas generation at Beenup. It would be necessary to extend the gas mains from Wagerup over a distance of approximately 200km to Beenup. It is estimated that it would cost about $71.5M just to make gas available at Beenup for generation.

Therefore SECWA does not consider this to be a viable option.

Document Reference: Page 8 Section 3.3.1.

Issue 8 *Possibility of supplying power to the mine via a combination of alternative technologies ie. solar, wind, gas, diesel and 66kV from Margaret River.*

Response: SECWA is currently investigating the viability of combining various sources of alternative energy for application in remote areas, however, these systems are quite expensive and nowhere near the scale required for a mining operation of this nature.

Refer comments on RAPS in Submission 9 in Section 5 of this report.

3.5 Beenup Corridor Selection Studies

Issue 9 *If "construction, maintenance and operation of a transmission line is not compatible with the objectives of areas classified as National Parks" then it would also be incompatible with the objectives of a listed Heritage Area.*

Response: Refer to response to Submission 5 - Issue 15 in Section 5 of this report.

3.5.4 Picton to Beenup

Issue 10 *One of the reasons for dismissing the use of Sues Road was its potential as a tourist route, yet SECWA's preferred route will impact on Seven Day Road which has even greater tourist potential.*

Response: The only impact the Manjimup to Beenup route is likely to have on Seven Day Road is where the line crosses Seven Day Road at its intersection with Palings Road and then again at Waistcoat Road. The impact on Sues Road would be much more severe as the proposed line would follow the road alignment not just cross it.

Document Reference: Page 17 Section 3.5.4.

Issue 11 *How was the figure of 48ha of clearing adjacent to the Blackwood River calculated.*

Response: This figure was based on the need to clear a 40m wide easement through approximately 12km of previously uncut (virgin) or untracked forest near the Blackwood ie 12km x 40m = 48ha.

Document Reference: Page 17 Section 3.5.4.

4.0 Determination of Preferred Option

Issue 12 *SECWA have ignored the impact of the line on the Strickland forest block which is Registered as part of the National Estate.*

Response: Whilst the 1km wide corridor may encroach upon the Strickland block it is not SECWA's intention to locate the line within the block.

5.0 Affected Environment

Issue 13 *Field surveys for rare and endangered flora and fauna were not conducted prior to preparation of CER, therefore, the impact cannot be assessed.*

Response: Refer to response to Submission 1 Issue 8 and Submission 4 Issue 13 in Section 5 of this report.

Document Reference: Commitments GC12, SC7, SC10 and SC22.

7.2 Vegetation Clearing

Issue 14 The greatest environmental impact of the project is the clearing necessary.

Response: SECWA has revised the clearing requirements for this project. Refer to Submission 5 Issue 12 and Section 2 of this report.

A revised estimate of the clearing required for the Manjimup option in the karri forest of the Australian Heritage areas is 11ha. This represents less than 0.1% of the total area of karri forest in the proposed Heritage zone of Strickland, Beavis, Giblett, Solai and Lindsay Blocks.

Appendix C - Public Consultation Programme

Issue 15 Survey results not representative of the general community's view, since they were heavily biased by the interests of the affected landowners who were the major participants.

Response: Refer Submission 4 Issue 6 and Submission 5 Issue 8 in Section 5 of this report.

Other points of concern

Issue 16 Possible wind damage to remaining trees due to easement clearing.

Response: This matter was discussed with CALM and was not considered a major problem.

Issue 17 No commitment to avoid, rather than treat weed infestation.

Response: SECWA is committed to comply with the rules, regulations and requirements of the Agriculture Protection Board at all times.

Document Reference: Commitment SC21.

Issue 18 The possibility of relocating the Margaret River Substation, as mentioned in the Beenup ERMP, was not addressed in the CER.

Response: MDL discussed the viability of relocating the existing Margaret River substation with SECWA. The former agreed that the proposal is economically unjustifiable.

SUBMISSION 9

Method and level of assessment

Issue 1 *Level of assessment should have been higher than a CER.*

Response: The EPA is the body responsible for setting the level of assessment for a project.

Issue 2 *The Beenup project should have been assessed as a whole and not reduced to its component parts.*

Response: It is not for SECWA to determine whether a development project such as this should be assessed in total or in its component parts.

SECWA's preferred Option

Issue 3 *The power line easement will be a permanent long term scar in the forest areas.*

Response: SECWA believe that the visual impact of the line easement will be minimal especially where the line runs along existing forest tracks/haul roads and elsewhere its impact will be extremely localised due to the screening effect of the vegetation present.

Regrowth of vegetation to a height of 4m will be allowed within the easement and silviculture will be practised outside the easement wherever possible. This will also result in a decreased visual impact.

Refer to new Commitments NC4 and NC6 in Appendix 2 of this report.

Document Reference: Commitments GC7, SC2 and SC23.

Issue 4 *The line corridor will act as an avenue for the spread of:*

(i) feral animals
(ii) weeds and
(iii) disease.

Response: (i) SECWA does not believe the presence of the line will facilitate the spread of feral animals into the forest areas.

(ii) SECWA is committed to comply with the regulations and requirements of the Agriculture Protection Board.

(iii) SECWA will, wherever possible, utilise existing access tracks for construction and maintenance purposes.

The dieback management proposals contained in the CER document have been developed in conjunction with CALM.

Document Reference: Page 53 Section 7.3 and Commitments SC21 and SC24.

Issue 5 *The presence of a powerline decreased an area's conservation importance.*

Response: SECWA cannot agree with this statement. The presence of a power line would have only a minimal effect on the conservation values of an area.

Refer also to Issue 14 of Submission 5, in Section 5 of this report.

The SECWA Grid

Issue 6 *With the rapid technical advancement and price reductions of renewable power supplies, especially Remote Area Power Systems (RAPS), the future economic viability of the proposed line must be questioned.*

Response: RAPS are not cost effective with renewables alone and still require a significant fossil energy input by diesel, petrol or gas. These systems have been developed for loads up to 100kW but are not available for MW (1MW = 1000kW) sized developments such as the Beenup mine which will have a load of 12.5 to 17.5MW.

SECWA have just completed a cost analysis for a 30kW RAPS in the South West. The system requires a capital contribution in the order of $20,000 and the energy cost is in the range of 80¢-$1.00/kWh which, at best, is over 6 times the current domestic energy tariff.

On this basis the economic viability of the line is secure.

SECWA's treatment of non-powerline options.

Issue 7 *Wind would be a viable electricity source if sufficient generating capacity, and storage for calm conditions were provided.*

Response: The Beenup project will be a 24 hour operation and require a minimum supply of 12.5MW. The suggestion that sufficient storage can be supplied to 'firm up' the wind energy option is a very simplistic statement. The only viable means of providing energy storage sufficient to cover the mine for a period of 7 days without generation, due to light wind conditions, would be pumped storage.

This involves the construction of a dam and installation of water turbine generators sufficient to cover the plants load, of 12.5MW minimum. The water is pumped into the dam during periods of light load to take advantage of any excess wind generation. Thus the energy is 'stored'.

If a suitable site exists in the area for such a storage facility its environmental impact could be more severe than the transmission line.

The capacity of a storage facility designed to meet the requirements of the mine for a period of 7 days would have to be in the order of 2100MWhrs.

The largest battery bank in the world is the Chino bank in California, rated at 40MW hrs. The cost is about $325/kWhr. Storage capacity for 2100MWhr would cost in the order of $650M.

Wind generators are commercially available up to 500kW. A minimum of 75 units would be required to supply the energy for a continuous load of 12.5MW, allowing for maintenance outages and inefficient operation at lower than optimum wind speeds. These units would occupy an area of 1450ha.

In an isolated system wind as the major energy source is not technically nor economically justifiable.

Refer to new Commitment NC2 in Appendix 2 of this report.

Suggested Options

Wood

Issue 8 *Use of waste wood as a viable energy source for the project.*

Response: SECWA is aware that a US company visited BHP and was to do a feasibility study for them on wood fired plant. Reliability of a single boiler system would be a major concern. The company has not yet provided any information regarding the results of this study.

The cost and sourcing of wood needs considerable assessment to determine the economics.

Wind

Issue 9 *The Beenup project is ideally sited to tap into some of the best wind resource in WA.*

Response: SECWA experts have visited the mine site and believe it is not good wind farming country. Monitoring equipment is currently being installed at the site to gather data for analysis.

Instruments are also being installed in nearby coastal areas but if a wind farm were sited there a transmission line would still be required to supply power to the mine; as the submittor rightly points out. This, of course, would have its own environmental problems.

Refer to new Commitment NC2 in Appendix 2 of this report.

Issue 10 The cost of storing energy is currently 3c/kWh.

Response: In the case of a mine requiring 24 hour operation the storage facility must be sized to cover for extended periods where generation is not available, as previously explained.

The full storage capacity will rarely be used and this will result in storage costs many times the 3¢/kWh quoted.

GAS

Issue: 11 Consideration should be given to establishing a small CNG plant at Bunbury and constructing a special tanker to transport fuel to the mine site.

Response: The capital cost of establishing the compressor station, transport infrastructure and on-site storage and generation facilities necessary for this option will far exceed the capital contribution required for the transmission line. It is likely that the cost of the generation plant alone will match the cost of the line.

Transport of the CNG will require a fleet of tankers operating between the compressor site and the mine, not merely a single vehicle as implied. The social impact of this aspect of the proposal would require assessment; as mentioned earlier in the submission.

Assuming, however, that the capital cost to implement this proposal is equivalent to the cost of the transmission line, the energy costs must then be considered. Based on a fuel cost of approximately $9/GJ the price of energy derived from a gas turbine installation would be in the order of 11¢/kWhr. This does not compare favourable with SECWA's energy costs.

Connection to the 132kV grid system is still the most viable option.

CONCLUSION

The principal issues involved in this project are:

(i) cost

(ii) effect upon local community/residents, and

(iii) environmental impacts.

(i) Cost

The indicative costs, in December 1990 dollars, for the three corridor options are:

-	Manjimup option	$12.5M
-	Picton via Great North Road	$15.0M
-	Picton via Margaret River Option	$17.0M

These figures include the cost of line construction and easement acquisition. In the case of the Manjimup option the costs also include upgrading the existing Muja-Manjimup 132kV line.

(ii) Effect Upon People in the Area

The number of private properties affected by each corridor option are:

-	Manjimup Option	18
-	Picton via Great North Road Option	126
-	Picton via Margaret River Option	179

The Manjimup line would be seen by fewer people than either of the other options; it will have least visibility.

(iii) Environmental Impact

The major environmental impact associated with this project is forest clearing particularly in the Karri Region between Manjimup and the Donnelly River. All the other local issues arising on the three options can be satisfactorily managed by the measures described in the commitments contained in the CER and in this report.

SECWA has taken actions in the following directions to find solutions to the karri forest clearing problems:

(a) SECWA has optmised the transmission line route alignment within its preferred line corridor between its substation in Manjimup and the Donnelly River. To minimise the impact on the karri forest SECWA has fully utilised the clearing along existing logging haul roads such as Palings Road and Waistcoat Road in the siting of the line.

(b) SECWA has re-assessed its line design and clearing needs. Refer to Section 2 of this report.

(c) The Australian Heritage Commission has undertaken to make a detailed appraisal of the proposed line route and clearing impacts.

(d) SECWA engaged forestry consultant, McArthur and Associates to report on forest quality, disturbance and impacts along the line route in the karri forest between Manjimup and the Donnelly River, west of the Vasse Highway. Refer to Appendix 4 for details of this report.

The sailent points from the McArthur report are:-

"... the karri forest is not endangered". (p11).

"... all the forest adjacent to the reviewed route has been subjected to a number of man-associated disturbances". (p14).

"It is not believed that the recommended transmission line route passes through any specific area or site which is unique..... The construction of a carefully routed powerline will ...(not).... significantly lower the uniqueness of the Karri Region, any particular Forest Block, any particular Reserve or Estate concept, nor the general appearance of recognised public usage areas. The powerline establishment will have no additional effect upon the flora genetic pool of any area, not the movement of fauna". (pp 18-19).

"Impacts on Quality Karri".

Forest Block	Beavis East	Beavis West	Carey	Total
Distances thru quality karri (km of line)	3.50	0.75	1.25	5.50
Disturbed area of quality karri (hectares impacted)	7.00	1.50	2.50	11.00
% of quality karri impacted for each Forest Block	0.18%		0.05%	

"... The types and extent of disturbance (from the line) will have negligible impact on the integrity of the National Estate areas. The significance of the National Estate areas will remain and the values associated with these areas will not be altered". (p31).

The criteria upon which SECWA's preference for the Manjimup Option are based can therefore be summarised as follows:-

. the option has the least dollar cost to the community.

. the option has the least adverse effect upon people living in the area.

. the option is environmentally manageable.

APPENDIX 1

Information Pamphlets and Brochures

(i)	Project pamphlet 1	-	Manjimup to Beenup (Issued March 1991.)
(ii)	Project pamphlet 2	-	Picton to Beenup (Issued July 1991).
(iii)	Project pamphlet 3	-	Power Supply to Beenup (Issued September 1991).
(iv)	Electromagnetic Fields pamphlet	-	(Available throughout the public consultation process).
(v)	Land owner brochure	-	Manjimup to Beenup (Issued March 1991).
(vi)	Land owner brochure	-	Picton to Beenup (Issued July 1991).

APPENDIX 1 (i)

Approvals process

SECWA is committed to providing power to both new and existing customers throughout the state in the most energy and cost efficient way possible.
In order to meet this customers requirement for a supply of electricity by May 1993, SECWA must have environmental approval for the line corridor by November 1991.
The EPA require SECWA to prepare a Consultative Environmental Review (CER) document for this project. Prior to its preparation, during May/June 1991, SECWA will undertake an extensive programme of public consultation in order to finalise the corridor proposal. A formal consultation period of four weeks is required during the CER approval process.

Further details

Enquiries relating to the proposed corridor and the transmission line should be directed to SECWA's Transmission Facilities Co-ordination Engineer, Mr Rudy Teh, on telephone number (09) 326 4897

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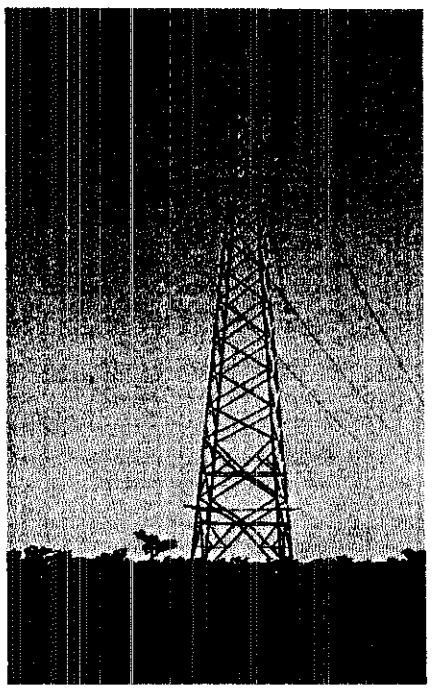


Proposed 132 kV Transmission Line Corridor Manjimup to Beenup

Introduction

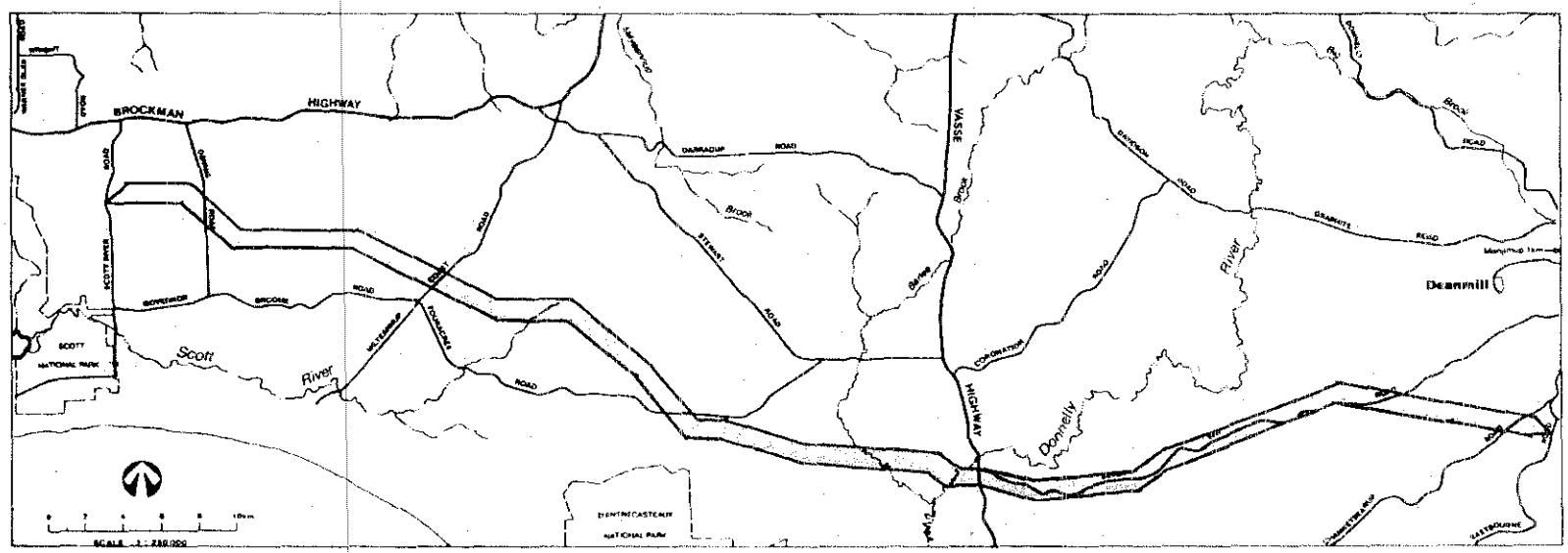
The Beenup mineral sands deposit, situated on farmland 17km north east of Augusta, is one of the world's major ilmenite discoveries. It is estimated that a project to mine this material, and the other heavy minerals present in the deposit, will have a life expectancy in excess of 20 years.
Developing this resource will require a substantial amount of power for both the mining and preliminary ore-processing operations.
The existing electricity supply close to the site is inadequate to meet the demands of this development. The most viable method of supplying the power required is to extend the 132 kilovolt (kV) grid system.
In preparation for the public consultation necessary for this new powerline, SECWA commissioned an environmental study to identify a tentative corridor for the proposed line. The results of this preliminary study are available to the community at display stands and meetings, arranged in conjunction with local government authorities.
All interested individuals and groups are invited to review the study results and take part in refining the route of the corridor before SECWA seeks environmental approval for the proposal.

Investigation

Identification of a 1km wide provisional corridor involved the consideration of many environmental, social and technical factors. Some of the most important requirements were that the area identified have minimal impact on homes, private property, recreation reserves and the general visual amenity of the area.
A width of 1km was adopted for the corridor to retain flexibility in the final siting of the line, after environmental approval has been received.
The corridor, shown on the map of the study area overleaf, extends west from SECWA' s existing substation near Manjimup, through state forest, private property, and vacant Crown land to the mine site at Beenup, a distance of about 85km.
It is impossible to estimate, at this time, the amount of private property which will be occupied by the final line route, since farm land abutts state forest over much of the corridor, however, in its current form, approximately 36% of the area covered is private land.

Flora and Fauna

SECWA will take care to ensure that the route chosen for the line will not impact on the habitat of any rare or endangered species, or any Aboriginal sites. The intrinsic value of the area is well appreciated.
Once the corridor has been finalised by community consultation and environmental approval subsequently received, a detailed survey of the flora and fauna of the area will be undertaken in conjunction with the centreline survey. Archaeological and ethnographic studies will also be conducted at this time. If any areas of significance are found the line route will be adjusted accordingly.



Line easement

Although a 1 km wide corridor has been identified for the line, the actual easement required is only 40m wide. Once the final line route has been determined SECWA will relinquish all interest in the balance of the corridor.

Easement agreements will be required where the line traverses private property. Most agricultural pursuits are compatible with the operation of transmission lines therefore minimal dusruption is expected to normal farming activities.

Clearing of vegetation

Construction and operation of the power line will require the clearing of vegetation from the line easement and, in some cases, from the surrounding area.

Clearing will be kept to an absolute minimum and the top layer of soil shall, as far as possible, be left undisturbed.

Compensation

SECWA will provide monetary compensation to land owners for the line easement and any loss of production caused by the construction of the line and its operations.

Compensation, in the form of seedlings, will also be offered for any trees removed during the construction phase. It is intended that these trees be established in an area remote from the line easement.

Electric and magnetic fields

An energised transmission line creates electric and magnetic fields around the line conductors that diminish rapidly with distance from the line.

The World Health Organisation (WHO) has published documents containing recommended limits for both electric and magnetic fields. Comparison of these limits with field measurements made near to operating 132 kV transmission lines in Western Australia show the field strengths inside and outside the easement needed for this new power line will be below the WHO standards under normal operating conditions and will remain below these standards even under emergency load conditions.

Project specifications

Details of the transmission line are likely to be as follows:

Line distance (approx) — 85km.
Tower construction — 4 leg steel lattice type.
Tower height (range) — 20-30m.
Tower base (approx) — 4m x 4m.
Minimum ground clearance — 6.7m.
Typical span between towers — 300-400m.

APPENDIX 1 (ii)

Approvals process

SECWA is committed to providing power to both new and existing customers throughout the state in the most energy and cost efficient way possible.
In order to meet this customers requirement for a supply of electricity by May 1994, SECWA must have environmental approval for the line corridor by December 1991.
The EPA require SECWA to prepare a Consultative Environmental Review (CER) document for this project. Prior to its preparation, during August 1991, SECWA will undertake an extensive programme of public consultation in order to finalise a preferred corridor from Picton. A further consultation period of four weeks is required during the CER approval process.
The CER document will contain information on all the options for providing power to the development, including on site generation and line corridors from Manjimup.

Further details

Enquiries relating to the proposed corridors and the transmission line should be directed to SECWA's Transmission Facilities Co-ordination Engineer, Mr Rudy Teh, on telephone number (09) 326 4897.

SECWA

State Energy Commission of Western Australia
363 365 Wellington Street
Perth Western Australia 6000

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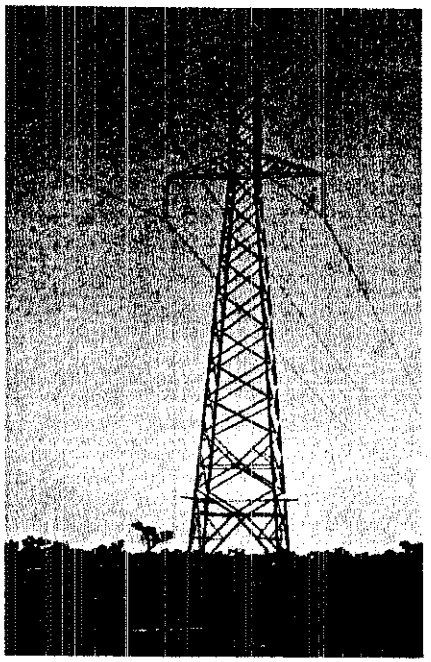


Proposed 132 kV Transmission Line Corridors Picton to Beenup Mineral Sands Mine

Introduction

The Beenup mineral sands deposit, situated on farmland 17km north east of Augusta, is one of the worlds major ilmenite discoveries. It is estimated that a project to mine this material, and the other heavy minerals present in the deposit, will have a life expectancy in excess of 20 years.
Developing this resource will require a substantial amount of power for both the mining and preliminary ore-processing operations.
The existing electricity supply close to the site is inadequate to meet the demands of this development. One viable method of supplying the power required is to extend the 132 kilovolt (kV) grid system from SECWA's existing substation at Picton.
In preparation for the public consultation necessary for this new powerline, SECWA commissioned studies to identify tentative corridors for the proposed line. The results of these preliminary studies are available to the community at displays and meetings, arranged in conjunction with local government authorities.
All interested individuals and groups are invited to review the study results and take part in refining a prefered corridor before SECWA makes its submission to the EPA.

Investigation

Preliminary studies involving environmental, social economic and technical considerations have identified two tentative line corridors. Both involve the new line running in parallel, at a 20m separation, with existing 66 kV lines south from Picton.

Option 1: The Margaret River Option.

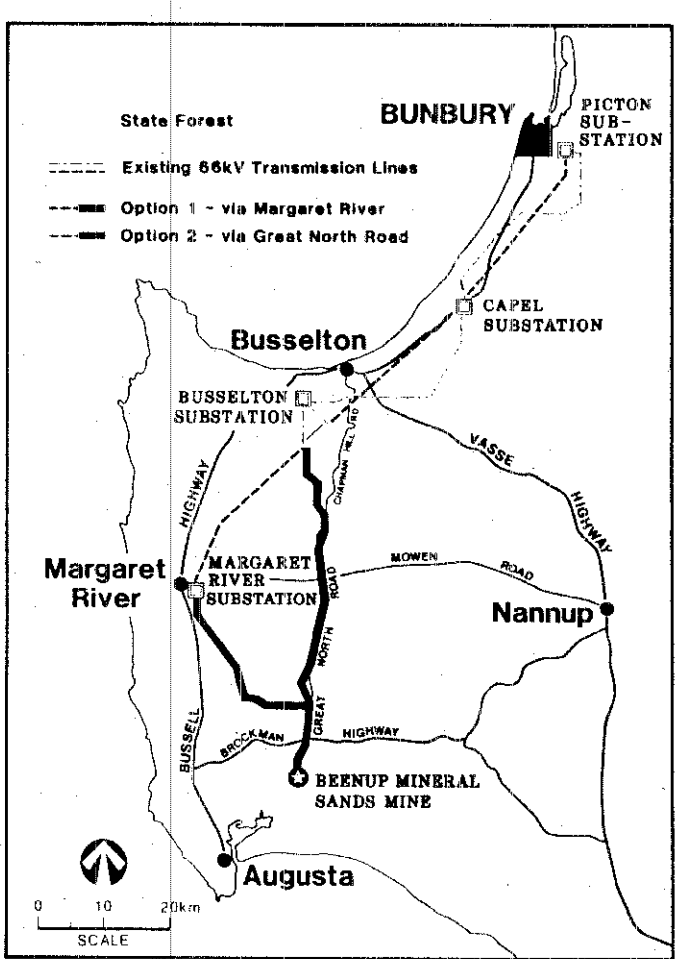
Starting from Picton the new line will parallel existing 66 kV lines all the way to Margaret River via Capel and Busselton. A 1km wide corridor will then extend from Margaret River in a south-easterly direction to Beenup.

Option 2: The Great North Road Option.

Starting from Picton the new line will parallel existing 66 kV lines to Busselton via Capel. A 1km wide corridor will then extend south, generally following Great North Road to Beenup.
The corridor concept has been used to retain flexibility in the final siting of the line, after environmental approval has been received.

Flora and Fauna

SECWA will take care to ensure that the route chosen for the line will not impact on the habitat of any rare or endangered species, or any Aboriginal sites. The intrinsic value of the area is well appreciated.
Once a corridor has been finalised by community consultation and environmental approval subsequently received, a detailed survey of the flora and fauna of the area will be undertaken in conjunction with the centreline survey. Archaeological and ethnographic studies will also be conducted at this time. If any areas of significance are found the line route will be adjusted accordingly.



Line easement

SECWA will negotiate with land owners to acuire easements for the new line. The width of the easement required will vary from 40-60m. Once the final route has been determined SECWA will relinquish all interest in the corridor outside the easement.

Most agricultural pursuits are compatible with the operation of transmission lines, resulting in minimal disruption to normal farming activities.

Clearing of vegetation

Construction and operation of the power line will require the clearing of vegetation from the line easement and, in some cases, from the surrounding area.

Clearing will be kept to an absolute minimum and the top layer of soil shall, as far as possible, be left undisturbed.

Compensation

SECWA will provide monetary compensation to land owners for the line easement and any loss of production caused by the construction of the line and its operation.

Compensation, in the form of seedlings, will also be offered for any trees removed during the construction phase. It is intended that these trees be established in an area remote from the line easement.

Electric and magnetic fields

An energised transmission line creates electric and magnetic fields around the line conductors that diminish rapidly with distance from the line.

The International Radiation Protection Authority in conjunction with the World Health Organisation has published documents containing recommended limits for both electric and magnetic fields. Comparison of these limits with field measurements made near operating 132 kV transmission lines in Western Australia show the field strengths inside and outside the easement needed for this power line will be below the standards set by these organisations under normal operating conditions and will remain below these standards even under emergency load conditions.

Project specifications

Details of the transmission line are likely to be as follows:

Line distance (approx) — Option 1 133km.
Option 2 121km.
Tower construction — 4 leg steel lattice type.
Tower height (range) — 20-30m.
Tower base (approx) — 4m x 4m.
Minimum ground clearance — 6.7m.
Typical span between towers — 300-400m.

APPENDIX 1 (ii-

Flora and Fauna

Once environmental approval has been received, a detailed survey of the flora and fauna of the area will be undertaken in conjunction with the centreline survey. Archaeological and ethnographic studies will also be conducted at this time. If any areas of significance are found the line route will be adjusted accordingly.

SECWA will take care to ensure that the actual route chosen for the line will not impact on the habitat of any rare or endangered species, or any Aboriginal sites. The intrinsic value of the area is well appreciated.

Project specifications

Details of the transmission line are likely to be as follows:

Line distance (approx) — Option 1 90km,
Option 2 114km,
Option 3 131km.

Tower construction — 4 leg steel lattice type.
Tower height (range) — 20-30m.
Tower base (approx) — 4m x 4m.
Minimum ground clearance — 6.7m.
Typical span between towers — 300-400m.

Further details

Enquiries relating to the proposed corridors and the transmission line should be directed to SECWA's Transmission Facilities Co-ordination Engineer, Mr Rudy Teh, on telephone number (09) 326 4897.

SECWA

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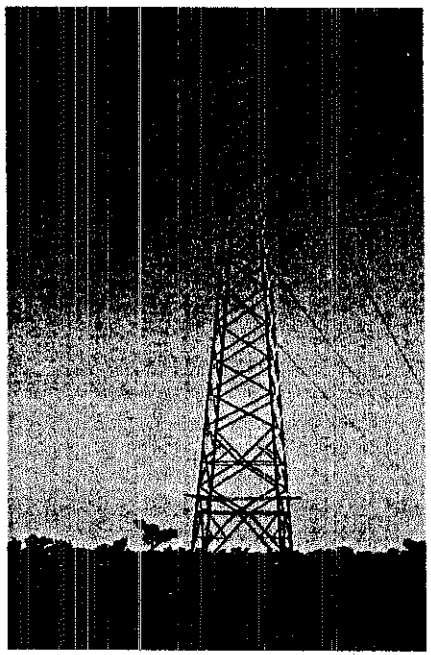


Proposed 132 kV Power Supply to Beenup Mineral Sands Mine

Introduction

The Beenup mineral sands deposit, situated on farmland 17km north east of Augusta, is one of the worlds major ilmenite discoveries. It is estimated that a project to mine this material, and the other heavy minerals present in the deposit, will have a life expectancy in excess of 20 years.

Developing this resource will require a substantial amount of power for both the mining and preliminary ore-processing operations.

The existing electricity supply close to the site is inadequate to meet the demands of this development. The most viable method of supplying the power required is to extend the 132 kilovolt (kV) grid system from SECWA's existing substation at Manjimup or Picton.

SECWA commissioned a number of studies to identify tentative line corridors to Beenup from both Manjimup and Picton. A wide range of issues were taken into account during these studies including environmental, social, economic and technical considerations.

The tentative corridors were reviewed and refined throughout SECWA's preliminary public consultation programme. The final corridor options are shown on the map overleaf.

The corridor from Manjimup to Beenup is SECWA's preferred option.

The corridor options

A corridor concept has been used for this project to retain flexibility in the final siting of the line, after environmental approval has been received.

Option 1: The Manjimup Option.

Starting from Manjimup the proposed 1km wide line corridor follows the general alignment of two log haulage roads, namely Palings Road and Waistcoat Road, to the Vasse Highway. The corridor then takes a north-westerly direction to pick up and then follow the alignment of South Coast Road and Pagets Road to Beenup. The approximate route length is 90km.

Option 2: The Great North Road Option.

Starting from Picton the proposed line will parallel, at a separation of 20m, an existing 66kV line to Busselton via Capel. A 1km wide corridor will then extend south, generally following Great North Road to Beenup. The approximate route length is 114km.

Option 3: The Margaret River Option.

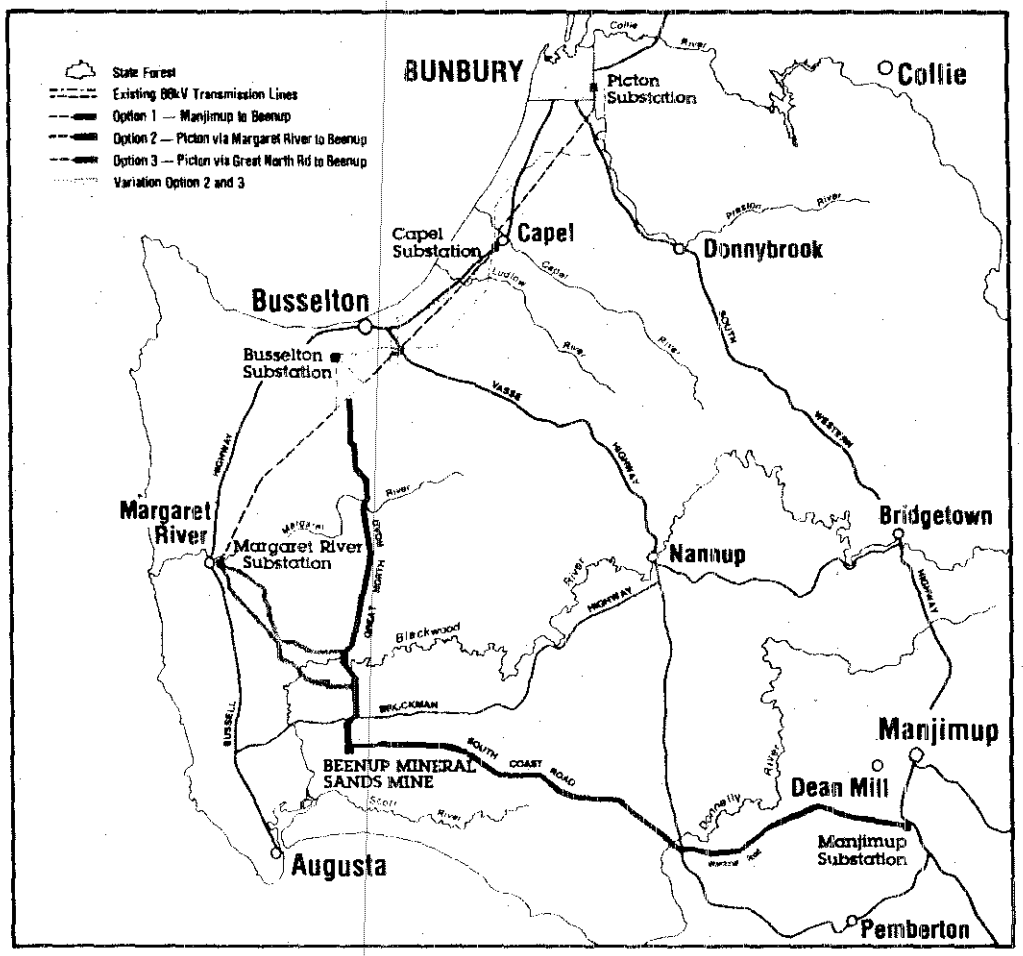
Starting from Picton the proposed line will parallel, at a separation of 20m, an existing 66kV line all the way to Margaret River via Capel and Busselton. A 1km wide corridor will then extend from Margaret River in a south-easterly direction to Beenup. The approximate route length is 131km.

A possible variation on Options 2 and 3 is the use of part of the rail reserve south of Capel.

Approvals process

SECWA is committed to providing power to both new and existing customers throughout the state in the most energy and cost efficient way possible.

In order to meet this customers requirement for a supply of electricity by May 1994, SECWA must have environmental approval for the line corridor by December 1991.



The environmental aspects of this project are now being assessed by the Environmental Protection Authority (EPA). As part of the environmental impact assessment SECWA has prepared a Consultative Environmental Review (CER) which describes all the supply alternatives for Beenup.

The CER is presently available for public comment. The closing date for the submission of comments on the document is Monday, 30 September 1991. All interested individuals and groups are invited to comment about the environmental impacts of the project and the proposals for their management. Submissions should be addressed to:

The Chairman
Environmental Protection Authority
1 Mount Street
Perth WA 6000

SECWA has arranged a series of public meetings during this review period to discuss the CER; details are available at all public display locations and SECWA offices.

Clearing of vegetation

Construction and operation of the power line will require the clearing of vegetation from the line easement and, in some cases, from the surrounding area.

Clearing will be kept to an absolute minimum with as much vegetation as possible being retained within the easement boundaries.

Line construction and easement

SECWA will negotiate with land owners regarding access arrangements and easements for the line.

The width of the easement required will vary from 40-60m. Once the final route has been determined SECWA will relinquish all interest in the corridor outside the easement.

Most agricultural pursuits are compatible with the operation of transmission lines resulting in minimal disruption to normal farming activities.

Compensation

SECWA will provide monetary compensation to land owners for the line easement and any loss of production caused by the construction of the line and its operation.

Compensation, in the form of seedlings, will also be offered for any trees removed during the construction phase. It is intended that these trees be established in an area remote from the line easement.

Electric and magnetic fields

An energised transmission line creates electric and magnetic fields around the line conductors that diminish rapidly with distance from the line.

The International Radiation Protection Authority in conjunction with the World Health Organisation has published documents containing recommended limits for both electric and magnetic fields. Comparison of these limits with field measurements made near operating 132 kV transmission lines in Western Australia show the field strengths inside and outside the easement needed for this power line will be below the standards set by these organisations under normal operating conditions and will remain below these standards even under emergency load conditions.

Note:

If further information is required please contact SECWA's Transmission Projects Engineer, Tel. No. (09) 326 4911.

Published by Transmission Branch in association with Public Affairs Branch

SECWA

State Energy Commission of Western Australia
363-365 Wellington Street
Perth Western Australia 6000

5/90

Power Frequency Electromagnetic Fields

Introduction

The electric power used in our homes, factories, farms and offices uses AC, or alternating current. This is in contrast to DC, or direct current, as produced by batteries. An AC current does not flow steadily in one direction, it alternates back and forth 50 times a second. This is referred to by engineers and scientists as 50 Hertz (Hz) or "power frequency".

There are electromagnetic fields associated with 50Hz power

What causes 50Hz Electromagnetic Fields?

Electromagnetic fields at 50Hz are produced by all types of power frequency electrical equipment. This includes overhead power lines, underground cables, house wiring and electrical appliances within the home.

Field strengths reduce quickly with increasing distance from the source. At ground level below many overhead lines the field strengths are similar to those produced by domestic electrical appliances.

Electromagnetic Fields and Health Effect

In recent years considerable research has been undertaken worldwide into the possibility that electromagnetic fields could affect health. This ha been monitored by the World Health Organizatio (WHO) and the International Radiation Protection Association (IRPA).

Research is continuing, but IRPA considers there is a need for interim electromagnetic field exposure limits based on research data currently available. IRPA has recommended limits and these have been approved by the Australian National Health and Medical Research Council. The limits applicable to areas with public access are shown in Table 1 over the page.

Table 1 International Radiation Protection Association recommended limits for exposure to 50Hz electric and magnetic fields in areas with public access.

	Electric field	Magnetic flux density	
	kV/m	milli-tesla	milli-gauss
Up to 24 hours per day	5	0.1	1,000
Few hours per day	10	1	10,000

The international standard is that fields be measured at a height of one metre above ground level.

SECWA Policy

SECWA recognises the 50Hz field exposure limits recommended by IRPA.

SECWA installations are designed so that members of the public will not be exposed to 50Hz fields in excess of the recommended limits.

Electromagnetic Field Strengths

☐ Overhead lines

SECWA takes care to design its power lines to ensure electromagnetic fields are minimised. The 50Hz field strengths near to ground level below SECWA lines are less than the applicable IRPA limits. Major transmission lines are run in easements and the field strengths at the edge of easements are very much less than the IRPA limits.

Buildings are precluded from easements, principally to ensure adequate safety clearances to the live conductors, but this restriction also serves to minimize exposure to electromagnetic fields. Where there are no easements SECWA regularly inspects lines to ensure no encroachments occur.

Field strengths are different for different types of line. Please contact SECWA if you would like to know the field strengths below a particular line.

☐ Underground cables

Underground cables produce virtually no electric fields. Magnetic fields vary with the type of cable but are of similar or slightly greater strength than a comparable overhead line. In all cases the magnetic field strength at ground level above a cable is less than the IRPA limit.

☐ Substations

Large substations are within fenced enclosures or dedicated buildings. Smaller distribution substations are often located in the basements of commercial buildings. In areas with public access near substations electric and magnetic fields are within the IRPA limits.

☐ Transformers

These are used to change the voltage of the power supply system. Large transformers are located in power stations and major substations. Smaller distribution transformers can be seen near the top of some power poles. In areas with underground power supplies they are located at ground level in metal enclosures.

Power transformers used by SECWA are enclosed in steel tanks. Electric fields are totally contained by the tank. High magnetic fields occur inside transformers but virtually none escapes through the tank. Fields near transformers are produced almost entirely by the overhead lines or underground cables connected to the transformer. The strengths of these fields are within the IRPA limits.

☐ House wiring

Most house wiring cable has an "active", a "neutral" and an "earth" conductor. Under normal circumstances the current flows in opposite directions in the active and neutral conductors. The magnetic fields produced tend to cancel each other and the resulting field is very small. Because the conductors are close together the electric field outside the cable is also very small. The strength of both types of field are much less than the IRPA limits.

☐ Domestic appliances

Some types of domestic appliance produce significant magnetic fields. The highest fields occur close to equipment with small electric motors such as power drills, shavers, hairdryers etc. These fields can exceed the limit for up to 24 hours per day but are less than the limit for a few hours per day. Appliances of this type would normally only be used for short periods so exposure is unlikely to exceed the "few hours per day" limit recommended by IRPA.

Proposed 132kV Transmission Line Corridor Manjimup to Beenup

SECWA

Proposed 132kV Transmission Line Corridor Manjimup to Beenup

Introduction

The Beenup mineral sands deposit, situated on farmland 17km north east of Augusta, is one of the worlds major ilmenite discoveries. It is estimated that a project to mine this material, and the other heavy minerals present in the deposit, will have a life expectancy in excess of 20 years.

Developing this resource will require a substantial amount of power for both the mining and preliminary ore-processing operations.

The existing electricity supply close to the site is inadequate to meet the demands of this development. Several supply options were evaluated. The most viable alternative for providing the amount of power required being to extend the 132 kilovolt (kV) grid system.

In preparation for the public consultation necessary for this project SECWA commissioned an environmental study to identify a tentative corridor for the proposed line. Prior to seeking environmental approval for the corridor SECWA wish to consult and involve the community. Results of this preliminary study will be made available to the public. Displays and meetings will be arranged, in conjunction with local government authorities, to discuss the proposal.

All interested individuals and groups will be invited to review the study results and take part in refining the route of the corridor.

The purpose of this brochure is to provide general information to all affected land holders about the proposed corridor and the transmission line which will be built in it.

Investigation

The 1km wide corridor was identified using a computer based data management system which combined and analysed all relevant environmental, social, economic and technical data to determine an initial location for the corridor. Some of the most important requirements were that the area identified have minimal impact on homes, private property, recreation reserves and the general visual amenity of the area.

A width of 1km was adopted for the corridor to retain flexibility in the final siting of the line. No attempt has been made to pre-arrange where the line will go. EPA approval for the line corridor must come first and any conditions laid down by EPA in giving approval must be observed.

The provisional corridor extends west from SECWA's existing substation near Manjimup, through mainly state forest and private property, to the mine site at Beenup, a distance of approximately 85km.

Notices of Entry

A 'Notice of Entry' for the purposes of investigation and survey will be issued by the end of March to all registered land proprietors whose properties are affected by the proposed transmission line corridor.

A copy of a plan showing the approximate location of the line corridor relative to each property is included with the 'Notice of Entry'.

Before any line construction commences a second 'Notice of Entry' for the purpose of construction will be issued for just those properties that the line will cross.

Transmission Line Route

Following the corridor approval process, the exact line route will be determined in consultation with the land holder

Towers will, where possible, be located close to the edges of wooded areas and rows of trees in order to minimise the visual intrusion of structures located on cleared land.

The route centreline will be surveyed and identified on site by white 50mm x 50mm survey pegs. Alongside these pegs will be unpainted 900mm long marked stakes.

Land holders should ensure that these pegs are undisturbed. If a peg is accidentally disturbed please notify SECWA.

Proposed 132kV Transmission Line Corridor Picton to Beenup Mineral Sand Mine

SECWA

Proposed 132kV Transmission Line Corridor Picton to Beenup Mineral Sand Mine

Introduction

The Beenup mineral sands deposit, situated on farmland 17km north east of Augusta, is one of the worlds major ilmenite discoveries. It is estimated that a project to mine this material, and the other heavy minerals present in the deposit, will have a life expectancy in excess of 20 years.

Developing this resource will require a substantial amount of power for both the mining and preliminary ore-processing operations.

The existing electricity supply close to the site is inadequate to meet the demands of this development. Several supply options were evaluated. The most viable alternative for providing the amount of power required being to extend the 132 kilovolt (kV) grid system.

In preparation for the public consultation necessary for this project SECWA commissioned an environmental study to identify a number of tentative corridors for the proposed line. Prior to seeking environmental approval for a corridor SECWA wish to consult and involve the community. Results of this preliminary study will be made available to the public at displays and meetings arranged in conjunction with local government authorities.

All interested individuals and groups will be invited to review the study results and take part in refining a preferred corridor.

The purpose of this brochure is to provide general information to all affected land holders about the proposed corridor options and the transmission line.

Investigation

Several 1km wide corridors were identified using a computer based data management system which combined and analysed all relevant environmental, social, economic and technical data to determine suitable corridor alignments. Some of the most important requirements were that the areas identified have minimal impact on homes, private property, recreation reserves and the general visual amenity of the area.

A width of 1km was adopted for each corridor option to retain flexibility in the final siting of the line. No attempt has been made to pre-arrange where the line will go. EPA approval for a line corridor must come first and any conditions laid down by EPA in giving approval must be observed.

The most viable corridors extend southwest from SECWA's existing substation near Picton, shadowing the route of one of the existing 66kV lines to the vicinity of our Busselton substation. Option 1 then continues to shadow the alignment of the existing 66kV line to Margaret River before heading southeast towards the mine site. Option 2 however turns south from the existing line alignment and follows the Great North Road almost all the way to Beenup.

Notices of Entry

A 'Notice of Entry' for the purposes of investigation and survey will be issued to all registered land proprietors whose properties are affected by the proposed transmission line corridor.

A copy of a plan showing the approximate location of the line corridor relative to each property is included with the 'Notice of Entry'.

Before any line construction commences a second 'Notice of Entry' for the purpose of construction will be issued for just those properties affected by the transmission line.

Transmission Line Route

Following the corridor approval process, the exact line route will be determined in consultation with the land holder.

Line structures will, where possible, be located close to the edges of wooded areas and rows of trees in order to minimise visual intrusion.

The route centreline will be surveyed and identified on site by white 50mm x 50mm survey pegs. Alongside these pegs will be unpainted 900mm long marked stakes.

Land holders should ensure that these pegs are undisturbed. If a peg is accidentally disturbed please notify SECWA.

Line Easement

Although approval will be sought for a 1km wide corridor, the actual easement required for the line is only 40-60m wide. Once the final line route has been determined SECWA will relinquish all interest in the balance of the corridor.

An easement in general terms means the granting of certain rights to SECWA including the right of entry to survey, clear, construct and maintain the line. SECWA does not obtain title to the land and ownership always remains with the registered land proprietor.

Once the line is constructed and put into service the land within the easement usually resumes its previous role, provided this is compatible with the operational requirements of the line. Understandably some restrictions must be imposed on certain activities within the easement to ensure public safety and line security.

These will be described and detailed in the Easement Agreement document.

Compensation

Compensation for the easement will be negotiated with the registered land proprietor. This will be based on valuations provided by the Valuer General's Office.

Compensation will also be negotiated with land holders for any loss of production caused by the line construction and future operational activities.

Owners will also be offered seedlings to replace any trees removed from the property. These trees should be established in a new area remote from the easement.

Clearing of Vegetation

Construction and operation of the power line will require the clearing of vegetation from the line easement and, in some cases, from the surrounding area. Included in the line easement will be a 4m wide vehicle access track which will be cleared to ground level, during the construction phase.

Clearing will be kept to an absolute minimum and the top layer of soil shall, as far as possible, be left undisturbed.

Maintenance Clearing

SECWA will maintain the cleared areas within the transmission line easement. Easement maintenance will be aimed at maintaining vegetation which will not impinge on the clearance limits of the line.

Flora and Fauna

Once the corridor has been fixed by consultation with land holders, and EPA approval subsequently obtained, a detailed survey of the flora and fauna of the area will be undertaken in conjunction with the centreline survey. Should any areas of significance be identified the line route will be adjusted accordingly.

Gates

Single or double metal gates, properly hung, will be erected in fences along the route of the easement where permanent access is necessary. Gates on boundary fences will be kept locked, if required, during the construction of the transmission line and SECWA will install its own padlock alongside the property owners' padlock where access is required from an adjacent road.

Fences

Fences may be opened and restored where necessary, although access is normally made along the easement via the gates mentioned above. In difficult terrain, permission to use the owners' gates and tracks may be negotiated.

Access Tracks

Access tracks are sometimes necessary off the easement to reach the transmission lines construction sites. Under such circumstances appropriate arrangements shall be negotiated with the property owners concerned.

Electric and Magnetic Fields

An operating transmission line creates electric and magnetic fields around the line conductors. These fields diminish rapidly with distance from the line.

The International Radiation Protection Authority, in conjunction with the World Health Organisation (WHO), has published documents containing recommended limits for both electric and magnetic fields. Comparison of these limits with field measurements made near operating 132 kV transmission lines in Western Australia show the field strengths inside and outside the new power line easement will be below the WHO standards under normal operating conditions and will remain below these standards even under emergency load conditions.

Approvals Process

SECWA is committed to providing power to both new and existing customers throughout the State in the most energy and cost efficient way possible.

In order to meet this customer's requirement for a supply of electricity by May 1994, SECWA must have environmental approval for the line corridor by December 1991.

The EPA require SECWA to prepare a Consultative Environmental Review (CER) document for this project.

The proposed programme is as follows:

- Contact Land Holders
  8 July - 12 July 1991
- Public Consultation
  8 July - 16 August 1991
- Finalise CER Document
  19 August - 23 August 1991
- CER Issued for Public Comment by EPA
  2 September - 27 September 1991
- EPA Assessment and Ministerial Approval
  30 September - 13 December 1991
- Line and Flora Survey, Easements Negotiated, Clearing and Construction
  1 January 1992 - 30 April 1994

Project Specifications

Details of the transmission line are likely to be as follows:

Line distance: (Approx)	Option 1:	133km
	Option 2:	121km
Tower Construction:	4 leg steel lattice type	
Tower height: (range)	20-30m	
Tower base: (approx)	4m x 4m	
Minimum ground clearance:	6.7m	
Typical span between towers:	300 - 400m	

Further Details

Enquiries relating to the proposed corridors and the transmission line should be directed to SECWA's Transmission Facilities Co-ordination Engineer, Mr Rudy Teh, on telephone number (09) 326 4897.

Issued by
Transmission Branch
Telephone 326 4897

SECWA

State Energy Commission
of Western Australia
363-365 Wellington Street
Perth Western Australia 6000

APPENDIX 2

Generic and Specific Commitments

(i) LIST OF COMMITMENTS FROM THE CER DOCUMENT.

(ii) EXTENSIONS TO EXISTING COMMITMENTS.

(iii) NEW COMMITMENTS.

APPENDIX 2

(i) List of commitments from the CER document.

Note: Commitments marked with an asterisk * have been extended. Refer to Appendix 2 (ii).

GENERIC COMMITMENTS

The following commitments have been developed by SECWA to reduce the potential impact of transmission line construction and maintenance within Western Australia. They apply to all corridors and would be implemented at the appropriate time and to the satisfaction of the landowner and/or relevant authority.

GC1 - Areal Limits of Construction

The areal limits of construction activities will be predetermined by SECWA in consultation with landowners, with activity restricted to and confined within those limits. All construction vehicle movement outside the right-of-way will be restricted to predesignated roads.

GC2 - Personnel Instruction

Prior to construction, all supervisory construction personnel will be instructed by SECWA and CALM officers on the protection of cultural and ecological resources and will be briefed on all agreed stipulations.

GC3 - Complaints Register

A programme for handling and resolving complaints will be established by SECWA prior to commencement of construction and will be administered by a designated person in consultation with CALM, Local Shires and other relevant authorities.

GC4 - Fire Suppression

SECWA shall instruct the contractor to do everything reasonably within their power to prevent and suppress fires on or near the lands to be occupied under the right-of-way, including making available such construction and maintenance forces as may be reasonably obtainable for the suppression of such fires. SECWA will also comply with Bushfire Board requirements.

GC5 - Restoration

The contractor shall build and repair such roads, fences and trails as may be destroyed or damaged by construction work and shall build and maintain necessary and suitable crossings for all roads, trails and fences that intersect the works constructed, maintained or operated. This would be completed under SECWA supervision and in consultation with affected landowners.

GC6 - Archaeology/Ethnography Survey

Prior to construction, SECWA will commission a survey made by an agency or contractor, of archaeological, paleontological, and historical sites within the area to be occupied by the line easement. The results of this survey will be provided to the WA Museum. SECWA, will relocate the proposed transmission line facilities in order avoid destruction of archaeological, paleontological or historic values.

GC7 - Rehabilitation

All construction and designated access roads, framing sites, and material storage sites will be restored to their natural state insofar as is practical. All construction roads will be completely obliterated (returned to the natural contour) and "put to bed" by harrowing or drilling and reseeding (if required) or simply where practical let it return to its natural state, as specified by the private landowner or CALM. The method of restoration will normally consist of returning disturbed areas back to their natural contour, cross drains installed for erosion control, placing drains back in the road and filling ditches.

GC8 - Waste Disposal

SECWA will instruct the contractor to remove or dispose of all waste caused by its activities in a manner satisfactory to the landowner. The term "waste" as used herein means all discarded matter, including but not limited to human waste, garbage, oil drums, petroleum products, ashes and equipment. Construction areas will be maintained in a sanitary condition at all times and garbage and refuse at these sites will be disposed of on a daily basis. Hazardous or toxic waste-generated or used on site will be disposed of in a manner consistent with health authority guidelines.

GC9 - Vegetation Removal

All litter and debris, including vegetative cover accumulated through land clearing, will be disposed of in accordance with the landowner requirements.

GC10 - Access

No new access will be constructed where existing access is available. This will minimise ground disturbance and limit new or improved access ability.

GC11 - New Road Alignments

The alignment of any new access roads will follow landform contours, provided that such alignment does not additionally impact resource values. This would minimise ground disturbance and/or reduce scarring.

GC12 - Line Structure Locations

Structures will be placed so as to avoid sensitive features (e.g. rare flora, water courses, etc.) and/or to allow conductors to clearly span the features, within limits of standard line structure design. This would minimise the amount of sensitive features disturbed and/or reduce visual contrast.

GC13 - Road Crossings

At highway, road or trail crossings, line structures are to be placed at maximum feasible distance from the crossing.

GC14 - Camp Sites

Camp sites will be selected in consultation with relevant authorities to comply with the following requirements:

- no camp sites shall be located in vested reserves, e.g. National Parks and Flora and Fauna Reserves;
- camp sites shall not be located on the flood-plains of major rivers or streams;
- wherever possible and practical, camp sites shall be located adjacent to stockpile site; and
- wherever possible and practical, camp sites shall be located adjacent to, or as close as possible to, existing access roads.

Every effort shall be made to establish camps in areas with the following characteristics:

- soil conditions are suitable for sewage effluent disposal;
- no excavation is required prior to camp establishment;
- some form of environmental degradation exists in the area; and
- minimal visual impact would result from the establishment of a camp site.

GC15 - Erosion of Soils

In areas where impacts to soils are expected to be high, the following commitments were developed by SECWA:

- o wherever possible, no new access would be constructed;
- o no widening or upgrading of existing access road;
- o permanently close construction access roads not required for maintenance;
- o new access roads will follow the landform contours;
- o line would be re-routed to avoid sensitive features; and
- o towers would be placed at maximum feasible distance from major drainage crossings.

SPECIFIC COMMITMENTS

SC1 - Agricultural Land

On agricultural land, the easement will be aligned with field boundaries to the greatest extent practicable and the line structures will be set near paddock boundaries, service roads etc., to reduce the impact to farm operations and agricultural production.

For areas where line structures are potentially visible to local residents, the structures will be located wherever possible, to take advantage of vegetation backdrops and terrain to reduce viewing the structures on the skyline.

SC2 - Seven Day Road and Bibbulmum Track

Where the line crosses Seven Day Road and the Bibbulmum Track the alignment will be surveyed to minimise visual impact by crossing at right angles and using vegetation and/or topography to screen from view. Wherever possible screening vegetation will be planted to minimise visual impact. Clearing will be in accordance with Section 7.2.

SC3 - Boundary of Beavis East Block

Strict adherence to all generic committed mitigation listed in Section 9.0 will be enforced along this section. Clearing will be carried out in accordance with Section 7.2 however no clearing will be undertaken north of Waistcoat Road (Beavis East Block).

SC4 - Beavis East Block and Beavis West Block

The commitments for clearing through Beavis East and Beavis West Block include:

- clearing only those areas specified in Section 7.2 - prescription for clearing;
- tall trees able to fall on the line from outside the easement (up to 60m from the centre line) will be selectively felled in consultation with CALM and removed by CALM; and
- SECWA will monitor vegetation growth to identify and remove any vegetation high enough to cause flash-over or able to fall on the transmission line.

SECWA will prepare, to the satisfaction of CALM, a detailed construction and operation programme for Beavis East block and Beavis West block prior to the commencement of clearing. This programme will fully assess the underground cable option.

SC5 - Darling Scarp

For the Darling Scarp, SECWA makes the commitment to use the following management techniques to minimise the potential erosion risk and the risk of dieback spread. These techniques include:

- wherever possible no new access will be constructed in areas of high slope;
- construction access roads not required for maintenance will be rehabilitated;
- new access/maintenance roads will be designed to follow the landscape contours;
- tower structures will be placed to avoid sensitive features, including outcrop and drainage lines; and
- towers will be placed the maximum feasible distance from drainage features.

SC6 - Donnelly River

SECWA makes the following commitment for the crossing of the Donnelly River. The transmission line will cross the Donnelly River at right angles and line structures will be placed at the maximum feasible distance from the river bank. Where access roads are required, the road base will be designed so as not to impede surface drainage. Vegetation clearing will be similar to that shown on Figure 7.

SC7 - Storry Forest Block

To minimise vegetation disturbance within the Storry Forest Block SECWA makes the commitment to adopt the following measures when locating line structures and access roads:

- avoidance of the wetland areas;
- spanning significant species sites (not erecting towers within them);
- locating the access track outside significant species sites;
- not digging, clearing or grading any part of significant species sites;
- restricting traffic across significant species sites to that required for laying out the conductor; and
- maintaining clearance levels at heights well above those of significant species.

SC8 - Paget Nature Reserve

Approximately 7km of the Manjimup to Beenup Corridor passes within 500m of the Paget Nature Reserve (Map 3). Public concern about the impact of road construction on drainage flows into the reserve has led SECWA to formulate the following commitment:

Within the catchment area for Paget Nature Reserve SECWA will construct access to the transmission line using the following guidelines, to the satisfaction of CALM:

- wherever possible SECWA will use local road base to provide colouring sympathetic to the area, and to reduce the possibility of introducing dieback;
- the access road will closely follow the existing ground profile to minimise cut and fill requirements, visual impact, erosion and disruption to surface water movement;
- the access road crown will encourage drainage to the edge of the track; and
- culverts will be installed where the gradient of the profile is locally too steep (creeks and drainages).

SC9 - Intensive Agriculture - Jamieson Road

SECWA will locate the line structures and access roads to follow or run parallel to existing road reserves and paddock boundaries or within the Jamieson Road reserve.

SC10 - Rare Flora Survey

SECWA makes the commitment to undertake a comprehensive spring survey of vegetation within any of the corridors identified in this report, prior to the commencement of surveying and clearing. The survey of the vegetation will identify locations of rare flora and the line will be re-routed or mitigation measures formulated in consultation with CALM to avoid or minimise the potential impact on rare flora.

SC11 - Rapids and Mowen Conservation Parks

Where the transmission line passes within one (1)km of the Rapids and Mowen Conservation Parks SECWA will:

- o construct access roads and locate line structures so as not to impeded the drainage patterns of the area;
- o maintain a buffer of screening vegetation between the line and the Park boundary to reduce visual impact; and
- o implement a construction supervision programme with officers from SECWA and CALM supervising construction activities to ensure no direct impact occurs to the Parks.

SC12 - Margaret River Catchment Area

For the portion of the line route which crosses the Margaret River Catchment Area, SECWA is prepared to make the following commitment:

- o within the Margaret River Catchment Area SECWA will:
  - use wherever possible existing access tracks;
  - undertake clearing so as to leave root stock intact; and
  - liaise with WAWA and CALM about clearing requirements and vegetation rehabilitation.

SC13 - The Blackwood River Crossing

To ensure that the potential impacts associated with a line crossing the Blackwood River are minimised, SECWA proposes to undertake the following commitment:

- o SECWA will prepare to the satisfaction of CALM a construction and management plan for the area impacted by the proposed crossing of the Blackwood River Conservation Park. This plan will be prepared prior to clearing and construction commencing. The plan will detail which vegetation (if any) will be removed in part or in full.

- SECWA will fully investigate the potential for using the rail easement and commence detailed discussions with Westrail. If the option to use the rail reserve is feasible SECWA will prepare a report detailing the potential impacts and proposed mitigation for this section.

SC18 - Busselton Golf Course/Airstrip

SECWA will align the new line to minimise the impact on the Busselton golf course and minimise the intrusion into the airspace required for the proposed airstrip.

SC19 - Margaret River Townsite

SECWA recognise the potential impact of the line on the future development of Margaret River townsite and are prepared to make the following commitment:

- If there is any potential impact of the line on the future development of Margaret River SECWA will liaise with the local community and relevant authorities to manage and minimise those impacts.

SC20 - Bramley and Witchcliffe Forest Blocks

SECWA makes the commitment to produce a report to the satisfaction of CALM and relevant authorities, which details a comprehensive construction and operation programme for Bramley and Witchcliffe Forest Blocks. This plan will include discussion on issues relevant to these areas and provide specific mitigation commitments aimed at reducing potential impacts.

SC21 - Noxious Weeds

SECWA will comply with the regulations and requirements of the Agricultural Protection Board (APB) at all times.

SC22 - Fauna Survey

SECWA will complete a fauna survey for the approved corridor prior to the commencement of clearing and construction to identify habitats potentially affected by the line. Where possible, line structures will be placed to avoid sensitive habitats.

SC23 - Silviculture Outside of Easement

A detailed silvicultural plan would be developed for the areas outside of the easement by SECWA in consultation with CALM, prior to the operation of the line commencing. The aim of the plan would be to maintain the vegetation profile shown on Figure 5b. It is envisaged that the plan would be implemented by CALM and consist of the following principle components:

- specification of maximum tree heights permitted within zones determined by distance from the easement;
- identification and removal of existing trees able to fall and impact on the line;
- development of a monitoring programme to monitor regrowth on a regular basis; and
- the subsequent felling and removal of trees identified during the monitoring programme as able to fall onto the line.
- *a strategy for harvesting and regenerating the silviculture blocks.*

APPENDIX 2 – (iii) NEW COMMITMENTS

NC1 – McCarley's Swamp

In the vicinity of McCarley's Swamp SECWA will:

- endeavour to minimise the height of line structures.
- rehabilitate and return to their natural state any construction access tracks in accordance with Commitment GC7 and,
- monitor the operation of the line, in conjunction with local ornithologists, and take steps to resolve bird strike problems.

NC2 – Renewable Energy

SECWA will continue to monitor and support the development of viable renewable energy technologies.

NC3 – Loss of Vegetation

Clearing will be carried out in accordance with CALM's requirements and the revised clearing profiles contained in Appendix 3 of this report. The practices employed will be designed to minimise the initial loss of vegetation and facilitate regrowth.

NC4– Screening Vegetation

Screening vegetation will be planted wherever possible to reduce the visual impact of the line.

NC5 – Rare frog (Geocrinia, Alba and Vitellina)

The habitats of these frogs will be identified by the rare fauna survey which will be conducted prior to clearing and construction.

Disturbance to these areas will be avoided by careful siting of line structures and the diversion of construction access, where necessary.

NC6 – Line Construction

SECWA will explore the possibility of using concrete poles and other line hardware designed to reduce the visual impact of the line.

NC7 – Electric and Magnetic Fields

SECWA recognises that some members of the public are genuinely concerned about issues regarding electric and magnetic fields and health. SECWA is committed to the health, safety and welfare of the public.

SECWA designs and operates all its generation, transmission and distribution systems prudently within current health guidelines as established by Australian health authorities. SECWA will continue to closely monitor and sponsor engineering, scientific and medical research regarding electric and magnetic fields and health.

NC8 – Clearing in the Karri Region

SECWA recognises the need to minimise the amount of clearing in the Karri Region between Manjimup and the Donnelly River, west of the Vasse Highway and is prepared to make the following commitments:-

- Poles with a cruciform pole top configuration will be used instead of steel towers in the karri region.
- These poles will be located in the shoulder of existing logging haul roads or forest tracks wherever possible.
- Where the line traverses areas with significant stands of karri SECWA will relax its 'tall trees' practice, that is, removing any tree outside the 40m easement which could impact upon the line if it fell. Only trees which present a hazard or disturbance will be felled and removed.
- Regeneration of shrubs and understorey to a 4m height will be encouraged in the 40m easement.

NC9 – Historic Sites

The new line will avoid identified sites of historic or archeological significance.

NC10 – Capel Airstrip

SECWA will align the new line to minimise the impact on the Capel airstrip and will design the line in accordance with the Department of Aviations regulations.

APPENDIX 3

Tree Clearing Diagrams

(i) CLEARING DIAGRAMS 1 AND 2 - Applicable to karri region only.

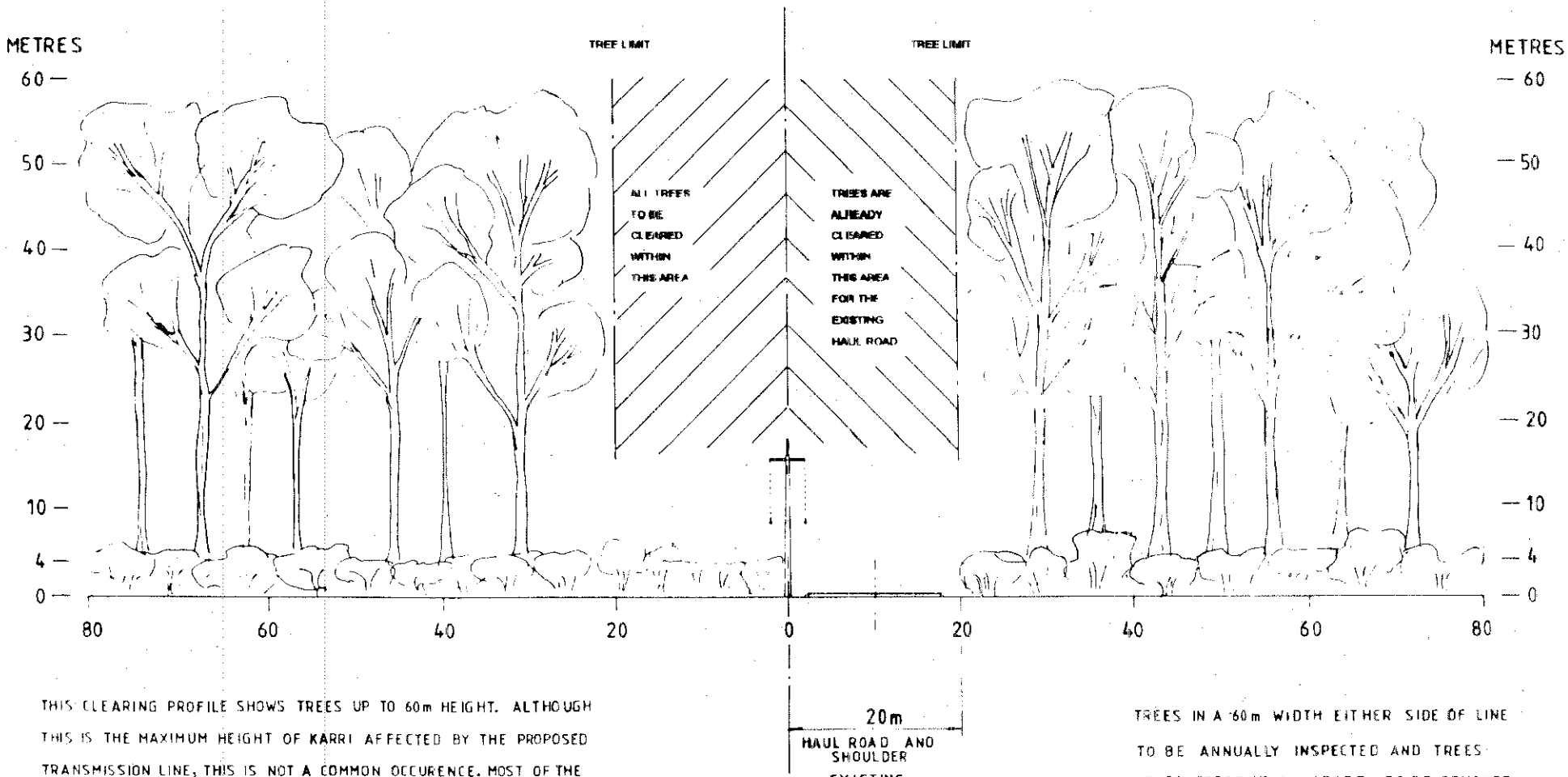
(ii) CLEARING DIAGRAMS CONTAINED IN THE CER DOCUMENT.

APPENDIX 3 (i)

CLEARING DRAWING NO. 1:

PROPOSED CLEARING REGIME FOR NOMINATED STANDS OF SIGNIFICANT KARRI WITHIN AREAS TO BE REGISTERED ON THE NATIONAL ESTATE

TO AVOID HAZARDOUS AND FIRE RISK SITUATIONS FROM FALLING LIMBS OR WINDBLOWN BARK STRIPS, A 40m WIDTH SHALL BE KEPT CLEAR ABOVE A 4M HEIGHT LIMIT



THIS CLEARING PROFILE SHOWS TREES UP TO 60m HEIGHT. ALTHOUGH THIS IS THE MAXIMUM HEIGHT OF KARRI AFFECTED BY THE PROPOSED TRANSMISSION LINE, THIS IS NOT A COMMON OCCURENCE. MOST OF THE KARRIS ENCOUNTERED ARE IN THE ORDER OF 30 TO 50 m HIGH.

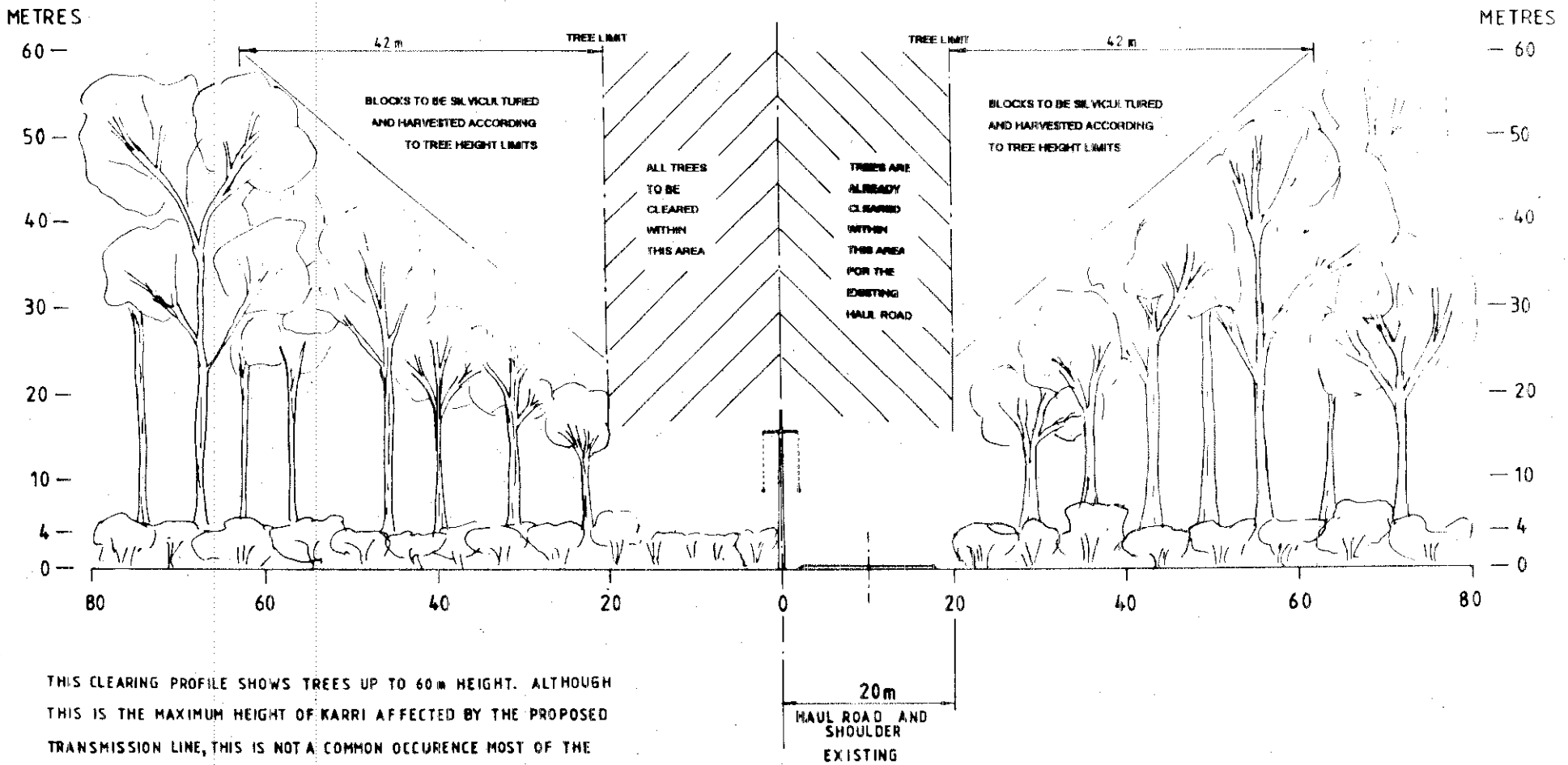
TREES IN A 60m WIDTH EITHER SIDE OF LINE TO BE ANNUALLY INSPECTED AND TREES WHICH PRESENT A HAZARD TO BE REMOVED

APPENDIX 3 (i)

CLEARING DRAWING NO. 2:

PROPOSED CLEARING REGIME IN FOREST AREAS BETWEEN MANJIMUP AND THE VASSE HIGHWAY REFER TO CLEARING DRAWING NO 1 FOR CLEARING DETAILS OF AREAS TO BE REGISTERED ON THE NATIONAL ESTATE WITH NOMINATED STANDS OF SIGNIFICANT KARRI

TO AVOID HAZARDOUS AND FIRE RISK SITUATIONS FROM FALLING LIMBS OR WINDBLOWN BARK STRIPS, A 40m WIDTH SHALL BE KEPT CLEAR ABOVE A 4m HEIGHT LIMIT



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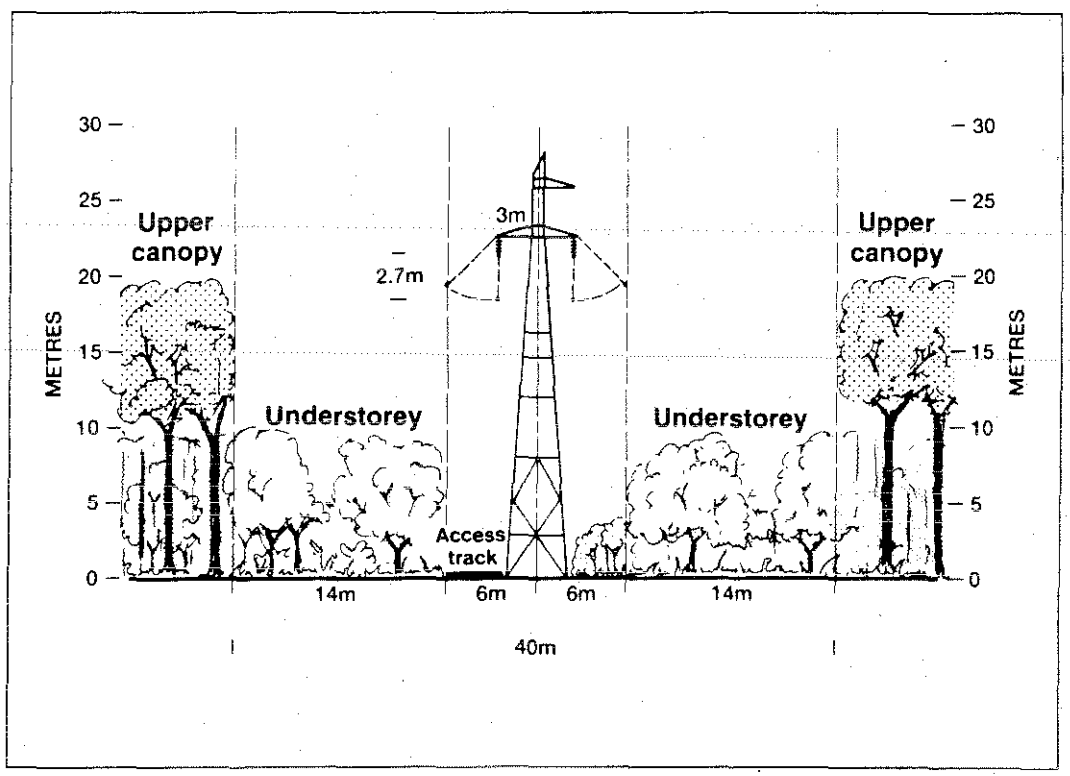
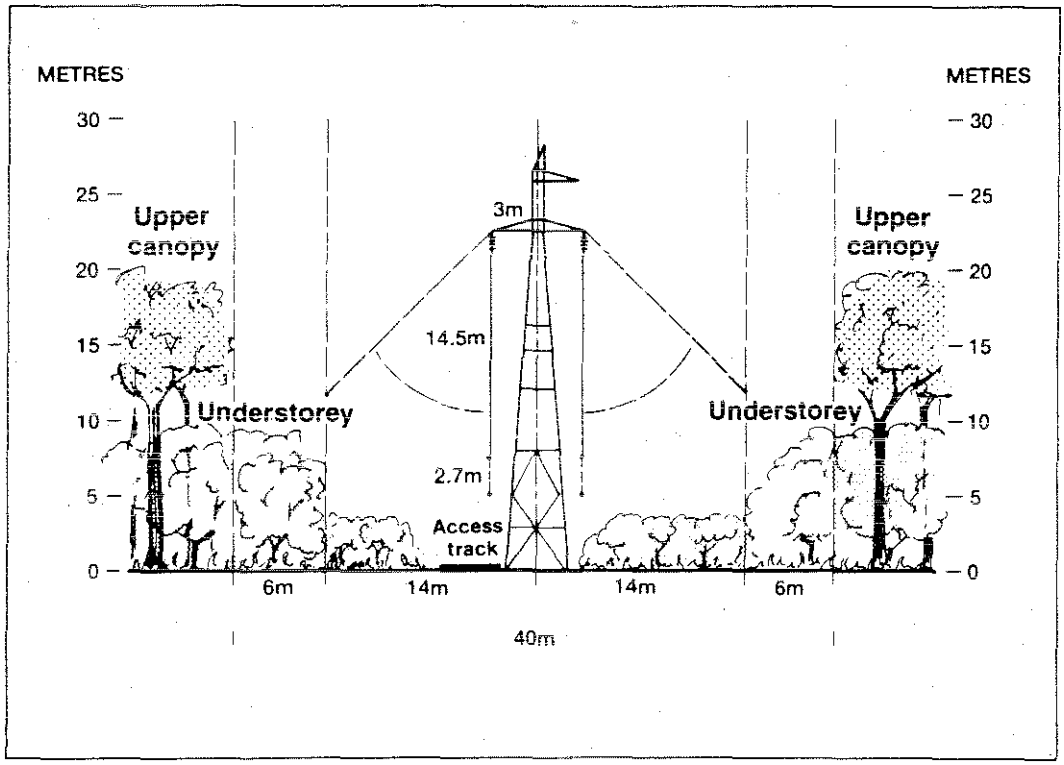
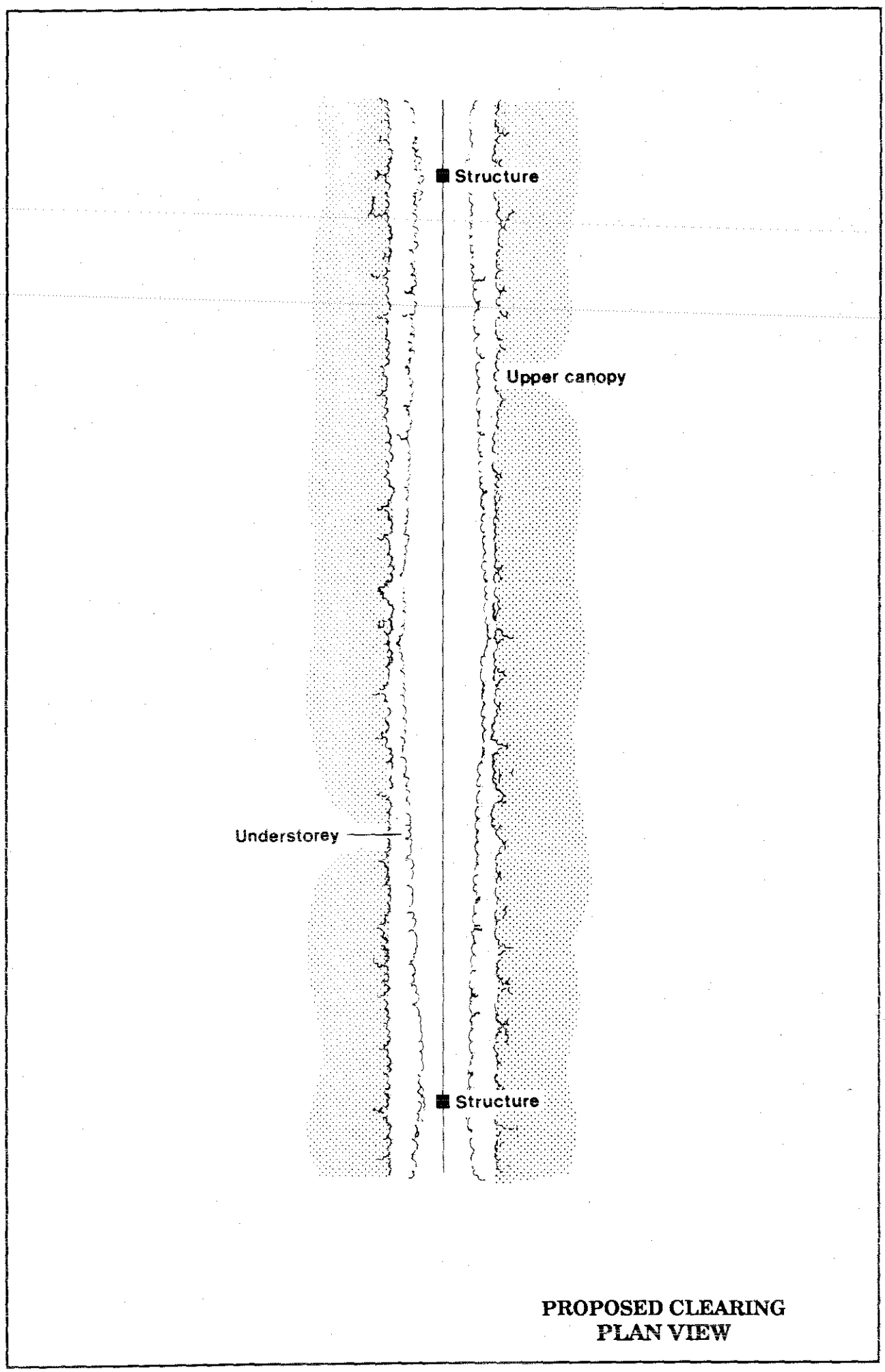


TOWER LOCATION



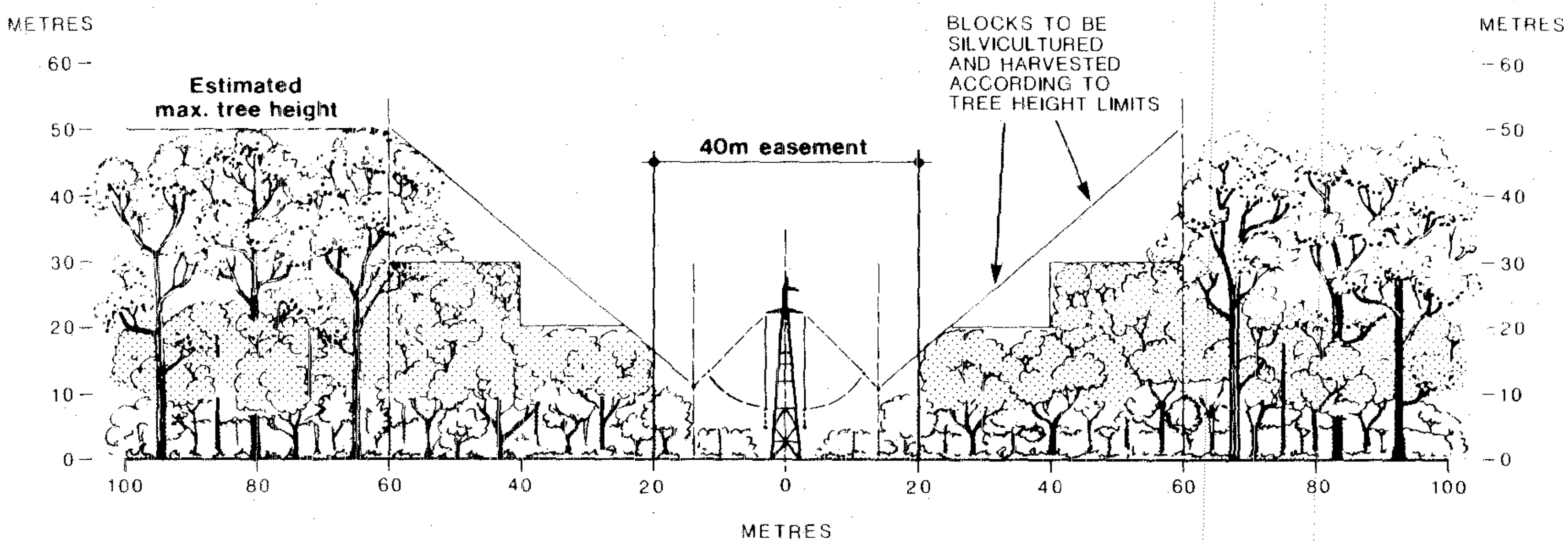
MID SPAN LOCATION

PROPOSED CLEARING PROFILE
132kV SINGLE CIRCUIT TRANSMISSION LINE



PROPOSED CLEARING
PLAN VIEW

PROPOSED CLEARING PROFILE OUTSIDE OF 40m EASEMENT



APPENDIX 4

McArthur and Associates Report

Manjimup - Beenup Power Supply

Forest Condition along Proposed Transmission Line Corridor

A Review Report for the State Energy Commission of WA

Prepared by McArthur & Associates

October 1991

McArthur & Associates

Environmental, Landuse & Forestry Consultants

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ADDENDUM to REPORT

Manjimup - Beenup Power Supply

Forest Condition along Proposed Transmission Line Corridor

Report dated : October 1991

The following amendments are to be made to the above report :

1. page 18, second-last para,
   alter "Table 2" **to** "Table 1",

2. page 20, Table 3(d), line under header,
   alter "from Table ---(b) above" **to** "from Tables 1 and 3(c)"

3. page 21, first para, first sentence,
   add word to end of sentence "...along the recommended route."

4. page 25, Table 4,
   alter "(Impact Levels - see text above)" **to** "(Impact Levels - see page 13)"

5. page 25, Table 5,
   alter as below :

Forest Type		Adjacent Rd	Through Forest	Private Land
	(Km of line on preferred side of Log Haul Road)			
Young Regeneration	(J/K)	5.00		
Recent cut-over forest	(J/K)	1.00		
Selection cut forests	(J/K)	14.60}	2.40	
Old regeneration	(K)	}		
Virgin karri		3.50		
Virgin jarrah		4.25		
Private land				4.50
Total Distance 35.25 km		28.35	2.40	4.50

6. page 27, para 1, second sentence,
   alter "In four sections totaling 2.5 Km .." **to** "In three sections totaling 2.4 km ...".

G.M.McArthur

13th November 1991

Manjimup - Beenup Power Supply

Forest Condition along Proposed Transmission Line Corridor

Contents

List of Tables

List of Figures

(Found at rear of document)

Acknowledgements

The content standard of this report would not have been possible without the cooperation of the Department of Conservation and Land Management and its officers. Of particular importance, the availability of accurate forest management data was possible through the Department's Forest Management & Information System.

Manjimup - Beenup Power Supply

Forest Condition along Proposed Transmission Line Corridor

1.0 Introduction

1.1 Transmission Line Routes

The State Energy Commission (SECWA) is considering three possible transmission line routes for the supply of power to a proposed mineral sands mine at Beenup (North-east of Augusta) in the SW of Western Australia.

The three alternative routes were identified from an exhaustive corridor selection procedure which combined all relevant environmental, social, economic and technical data. This base information permitted objective priority ratings to be allocated to alternative routes. (SECWA, 1991)

The most southern route option, the Manjimup - Beenup route, rated highly after taking into consideration the potential implications of the line on the management of State Forest, general environmental impacts, and potential conflicts with the public and other users of the land along the proposed route.

1.2 Scope of this Report

This report examines a portion of one transmission line corridor option - the Manjimup - Beenup route (M-B route), specifically between Channybearup Road in the east and the Donnelly River in the west.

The distance of the proposed transmission line route considered in this report is approximately 35 km in comparison to the total length proposed of 90 km. Accordingly, some aspects estimated from the recommendations of this report cannot be directly compared with those estimated in the CER (SECWA, 1991).

The Consultative Environmental Review (CER) (SECWA,1991) considered a 1 km wide corridor in which an actual easement would be more closely determined at a later date. This report closely examines the key factors for the location of the easement, and will offer recommendations on a preferred route and other aspects which will minimise the impact of the establishment of a new powerline, primarily through forest.

The Forest Blocks through which the corridor traverses or runs adjacent to are :

Beavis, Channybearup, Lindsay, Strickland, Solai, Carey, Court and Giblett.

1.3 Powerline Concepts

The central features of a powerline are structures and strung wire conductors. The area which contains the structures and conductors (with or without a service track) will be referred to as the easement. Beyond the physical structures, there is an equally important surrounding security zone in which the powerline must be maintained. This is referred as the profile.

The profile dimensions are determined by the specifications of the line, which are influenced by the likely hazards in the vicinity of the line and accepted safety standards.

The profile width is normally determined by the adjacent tree heights. Trees which have the potential to fall over the structures and conductor are removed. The width can be varied by raising structure height, altering the distance between structures (affects the mid span sag height and swing arc), and considering the insulator arrangements. In certain circumstances SECWA may be prepared to accept some degree of risk by not removing all trees which represent a hazard to the line.

1.4 The Forests of the Region

The proposed powerline will transect several vegetation types comprising the Tall Forest Formation of the Warren Sub-District within the Darling Region (Beard 1981). These formations occur in extensive stands, often of mixed overstory tree species, predominantly exceeding 30 metres in height. There is diverse representation of understory and shrub species.

This vegetation association is roughly restricted to the area bounded by the Vasse Highway, Donnelly River to the SW Highway, then South-east generally towards Denmark. (The area will be further referenced in this report as the Karri Region). A different vegetation type is associated with the narrow south coast hinterland.

Vegetation in the Karri Region is a mosaic controlled by topographic position and geology. Karri forest (E. diversicolor) is mainly restricted to red earths of the lower slopes. Jarrah (E. marginata) dominates the lateritic gravels higher on the ridges. Marri (E.calophylla) merges with both karri (lower mid slopes) and jarrah (upper slopes). On the poor sites forest gives way to heath and low scrub, while some intermediate poorly drained areas are dominated by bullich (E. megacarpa) and blackbutt (E.patens). (Beard 1981).

The forest within the Karri Region can be broadly divided into two types - the jarrah and karri forests ;

The jarrah forest in the Karri Region is the southern variant of a forest which ranges from slightly north of Perth to the south coast and east into the wheat belt. The entire jarrah forest zone has a productive area of approximately 1,324,000 hectares (CALM, 1987-c). Within the Karri Region there is approximately 200,000 hectares of jarrah managed by CALM and another 14,000 hectares within private property (FD, 1981).

The karri forest is restricted to a core area of the Karri Region, and has western outliers in the Margaret River - Augusta area and in the east isolated sites within the Mt. Barker area. The total area of Karri forest within the CALM estate is 174,000 hectares, with 169,400 hectares within the Karri Region. In addition, within the Region there is approximately 12,000 hectares of privately-owned karri forest. (CALM, 1987-b).

The Karri Region has generally been considerably disturbed over the past 50 - 60 years with commercial logging and other forest activities.

2.0 Line Proposal Details

The complete specific details proposed for the M-B Transmission Line are found in the SECWA CER and Supporting Document 1 (SECWA, 1991). The essential aspects proposed in the CER are summarised here.

2.1 General Details

Construction period	summer months
Private properties	18 traversed
Total distance	90 km
State Forest distance	77 km
Use of existing roads	70 km
Forest clearing	approx 320 hectares
Karri forest clearing	approx 60 hectares
Virgin karri forest	approx 20 hectares (balance cut-over forest

NOTE :
Distance considered within this review - approximately 35 km

2.2 Easement details

Structure Type	towers or concrete poles
Structure height	20 - 30 m
Structure site	within easement
Easement width	40 m (trees removed, disturbed)
Span distance	300 - 400 m

2.3 Safety Profile details

Width proposed	40 m either side (tree height factor)
Max height angle	45 degrees from base of tower

SECWA (SECWA, 1991) has proposed that with cooperation from CALM, the profile zone could be silviculturally managed by CALM, to maintain the vegetation profile nominated in Figure 1(a). There is potential that the management of this zone could be implemented commercially.

2.4 Vegetation disturbance

Structure site	cleared
Easement	disturbed in removing high vegetation
Profile	up to tree height, safety clearing
Access track	maintained under line, or use existing
Drainage lines	understory vegetation retained

SECWA have reviewed underground cables and Very Tall Line Structures (towers to 110 m high), however the cost is considered excessive, and do not eliminate all problems.

In the CER it was proposed that where mature karri forest is encountered, trees in excess of 20 m height outside the profile will be selectively felled to minimise dangers to structures and conductors.

Three levels of forest disturbance occur in the security zone :

(Figure 1(a) details concepts of proposed clearing from CER)

(a) At the structure positions the site is cleared and maintained clear of vegetation (approximately 10 x 10 m square);

(b) Between structures, on the actual easement, vegetation is felled or cleared to remove species which will grow to within 4 metres of the mid span sag of the conductor. The width varies between 20 and 40 metres. If the natural vegetation will not exceed these specifications, the disturbance can be minimal;

(c) Either side of the easement, the objective is to remove vegetation which rises at approximately 45 degree profile from the base of the line, the distance dependant upon tree height. Thus with predominant tree height of 30 metres, the profile width should be approximately 30 metres, and maintained in that condition.

Therefore the total impact of powerline establishment is determined by the extent of the three levels of disturbance.

3.0 Forest Management

3.1 Logging History

The Jarrah forest has traditionally been cut under a variable-intensity selection cutting system. Since the early 1980's in the higher rainfall zones, thinning intensities have increased to produce higher quality commercial forests.

Logging in the jarrah forest since the mid 1970's has been modified to take into account the presence of the Jarrah Dieback disease. Areas which have been infected by the disease are logged heavily in winter, removing merchantable stems before the disease kills them. In dieback-free forest, logging is carried out under strict hygiene regulations in dry soil conditions. This minimises the potential for further spread of the disease. The forest is heavily thinned, aiming for the retention of future crop trees or seed trees.

The pure karri stands cut prior to 1940 used the clearfelling technique. Regeneration from these stands are currently being thinned. Between 1940 and 1966 mixed species karri stands were cut using a group selection system. Due to resultant regeneration suppression, regeneration protection complications, and future management implications, the seed-tree/clearfelling system was re-introduced. Cut-over forest is regenerated through natural seed germination or direct seedling establishment. Since 1966 approximately 25,000 hectares of karri forest in the Karri Region has been regenerated by this technique.

Dieback management is carried out within the karri forest, however the karri in association with well-drained soils is not affected by the dieback disease.

Soil conservation measures are carefully managed in all forest types. This level of management and control is carried out under existing Codes of Forest Practice, directed by CALM over all forest activities.

3.2 Reserves

CALM has established a system of reserves which aim to retain representative examples of natural ecosystems. There are five categories of land managed by CALM in the Karri Region :

Nature Reserve

- conservation, scientific or historical values
- may not be commercially exploited
- ecological damage not permitted

National Park

- landscape, scientific, cultural & recreation values
- flora & fauna may not be exploited
- recreational management

Conservation Park

- landscape, scientific, recreation values
- flora & fauna may not be exploited
- recreational management
- lesser importance than National Parks (mostly size)

State Forest

- managed for multiple use values
- management for various priorities (conservation, recreation, protection, production, mining and utility)

Timber Reserve

- similar to State Forest, usually smaller in size

In addition to the above formal reserves, CALM uses a system of reserve zones adjacent to certain roads and drainage lines. These have the objectives of maintaining vistas along roads, linking undisturbed forest creating faunal corridors, maintaining protection buffer zones between intensively managed areas, protecting the often narrow steam ecological status, and protecting water courses from siltation, erosion and other degradation (L&FC, 1991).

4.0 Management Criteria

4.1 Production Forest

State Forest and Timber Reserves are the principal areas of production forest. Forest management in these areas is based upon the integration of two philosophies ; sustained yield (the maintenance of the forest to sustain production of various commodities), and multiple use (a wide range of compatible forest uses are sustained).

Not every forest area is capable of sustaining all types of activities. Accordingly CALM has developed a priority land use planning system. The resources and environment of each area is assessed against the demands and conflicts over that area, and a priority zone is allocated. Associated with each priority zone are compatible uses, conditional uses and non-compatible uses. (CALM, 1987-b).

The establishment and maintenance of powerlines is conditional with forests with a production management priority. Those conditions include minimization of clearing of forest (including the multiple utility use of routes), prevention of the spread of dieback, avoidance of salinity, soil and water degradation, and the minimization of aesthetic impact. In general, CALM seek to minimise the development of utilities on Crown Land to maintain the forest estate and conservation integrity of forest areas.

The potential for other uses of State Forest are :

Compatible	- catchment protection - timber production - water production
Conditional	- nature conservation - recreation - public utility - mining (where imposed)
Not compatible	- none specifically detailed

4.2 Conservation Forest

The establishment of powerlines within National and Conservation Parks is conditional on the impacts upon the primary values of the Parks (CALM, 1987-b) .

Powerline establishment through Nature Reserves is designated as not compatible, specifically in relation to the objectives for the reservation of the area (CALM, 1987-b).

The potential for land use in these conservation areas is summarised :

	National & Conservation Park	Nature Reserve
Compatible	nature conservation catchment protection	nature conservation catchment protection
Conditional	recreation water production public utility mining <- where imposed ->	recreation mining
Not compatible	timber production	timber production water production public utilities

(from CALM, 1987-b)

4.3 Heritage Forest

Under the Australian Heritage Commission (AHC), forest which is recognized of national significance may be nominated or listed in the Register of the National Estate. When listed, they are commonly referred to as Heritage Forest.

Under the Australian Heritage Commission Act, the Australian Government is bound to restrict or minimize action which may adversely affect the values for which the forest was listed. The Commonwealth does not have the power to manage the land. Legally, the AHC listing status does not impose constraints or controls over the actions of the State, Local Government or private land owners.

In Western Australia there is an agreement between the AHC and CALM to mutually identify and manage forest with National Estate values. The agreement takes into account the CALM land use planning concepts and aims to permit systematic assessment of National Estate values. The first stage of the study involves the Karri forests (AHC, 1991) and is currently under investigation. The findings are not available at the time of this report.

The current status of forest in the vicinity of the eastern half of the proposed M-B transmission corridor (the review area of this report) is indicated on the plan of the CER Attachment 1 (SECWA, 1991). Strickland and part of Solai Forest Blocks have been registered with the AHC, while Beavis (part) and Giblett Forest Blocks have been interim listed. As part of the CALM-AHC review it is believed the above blocks and others will be re-assessed for National Estate values (possibly Lindsay, Court and the balance of Solai).

4.4 National Estate Criteria

Eight fundamental criteria for National Estate value have been adopted by the AHC. (AHC, 1990-a).

Summarised below are these criteria referencing sites important to Australia's natural or cultural history :

A: Importance in the pattern or process of development ;

B: Possess uncommon, rare or endangered aspects;

C: Potential information which will increase knowledge;

D: Represents the characteristics of places or environments;

E: Exhibits valued aesthetic characteristics;

F: Demonstrates creative or technical achievements;

G: Social, cultural or spiritual associations;

H: Associations with individuals or groups of people.

The consideration of any area for National Estate status includes an analysis of attributes and values and a comparison with similar places. Assessment ratings are made for the fundamental criteria. For large and complex areas, the analysis would include the homogeneity, condition and integrity of landscapes, land systems, ecosystems, catchment areas, extent of values and prescribed management regimes.

The nomination of an area requires a thorough examination of a wide array of attributes. Forest areas with the following attributes are considered of high National Estate value :

Specific attributes

- rare flora or vegetation types
- rare fauna
- soil or geological associations with vegetation
- natural feature
- historical or cultural site

Broadscale attributes

- large scale ecological continuity and diversity
- limited past disturbance from mankind
- irregular treatment of disturbing operations
- spectacular natural landscape
- significant physical variation
- limited occurrence

Forest areas in the vicinity of the proposed transmission line have been nominated and registered with the AHC. These areas meet several of the fundamental criteria of National Estate (N.E.) :

N.E. Criteria Number	Criteria Details	Suggested AHC Rating
A(3)	The areas exhibit richness and diversity	high
D	The areas are part of a forest which represents a recognized natural environment	high
E	The forest type has natural aesthetic characteristics valued by the community	high

The N.E. areas are representative of the larger karri forests which has an overall forest reservation of approximately 35% (CALM, 1987-b). Although these areas have significant undisturbed portions, they do not form large contiguous blocks of virgin forest. These particular areas hold importance in the diversity of landforms, particularly in association with the Donnelly River valley.

It is widely accepted that the karri forest is not endangered. The diversity of forest values can be sustained under the current level of reservation (for conservation) and the existing system of multiple use and priority management.

The integrity of the undisturbed areas are not under threat from the current management concepts applied to the surrounding forests.

We have made no attempt to formally assess areas under AHC criteria, and the suggested AHC ratings for each criteria above, takes into account knowledge of the extent and diversity of the karri forests. These area ratings reflect a combination of aesthetic, conservation and condition values, including those of regenerated and intensively managed stands.

5.0 Forest Condition adjacent to Proposed Line

5.1 Method of appraisal

Through the use of maps and aerial photographs, forest types and conditions within and adjacent to the corridor were plotted. The area was then field checked for accuracy and specific sites/zones/areas examined as alternative routes or sites.

Along the corridor an assessment of forest condition was made. The categories used were for jarrah and karri forest :

Category A. Virgin Forest
Category B. Selection Cut Forest
Category C: Clearfelled and/or Regenerated Forest
Category R. Recreational or Aesthetic site or zone

These categories were then scaled according to forest quality (based upon the maximum level achievable in that category) :

Categories A - C

Quality 1 - Excellent
2 - Good
3 - Average
4 - Fair
5 - Degraded
0 - Current Logging Operations

Category R

This category was scaled on the basis of visual distance from the focus point :

Level 1 - Foreground
2 - Medium distance
3 - Long distances
4 - not visible

5.2 Forest Quality

There is no universal definition of forest quality. The natural ecosystem is in a constant, although slow development-disturbance cycle. Natural processes operate over very small to very large areas. A forest area may be of high quality in a scientific sense (i.e. it is the best capable of that association) yet it would not be classified as high quality on the unscientific scale which converts biggest to best.

The key attributes which would generally contribute to a high quality forest are suggested to be:

broad extent of forest
full crown development on most trees
high average tree height (in comparison to maximums known)
high average tree diameter (" " " ")
high tree stocking over area
dominance of a particular species
wide variation of topography
a low level of natural damage (fire, disease, wind)
no dominating un-natural disturbances

Although an area of virgin forest could fulfil many of these attributes, it does not automatically follow that it is high quality forest. Alternatively, a cut-over forest could be considered quality forest, as this is evidenced in several karri forest areas, including the 100 Year Forest, Valley of The Giants, Channybearup and One Tree Bridge. The biggest difference is the undisturbed nature of virgin forest.

Under the classification used in this review, the higher quality forest areas are levels 1 and 2. Depending upon different points of view, an A2 (virgin forest) may be equitable with a B1 (old selection cut forest) or C1 (old clearfelled and regenerated forest).

The concept of Quality Forest will be used in this report. Here it represents virgin or minimally disturbed forest, with appearance, dimension, scale and location which approaches a high level of development of the species and forest type.

For practical purposes, forest adjacent to the proposed powerline route has been grouped according to virgin forest and disturbed forest with varying quality levels.

The findings of the assessment are detailed in Figure 2.

A powerline route was nominated and an estimate of the impact of the powerline specifications on forest zones was made. The impact was categorized as :

IA - the easement zone
IB - the profile zone

with scales of impact :

Level 1 - complete forest structural impact (long term)
2 - forest overstory loss only (long term)
3 - negligible vegetation damage (medium and long term)

The results have been generalized in Table 4 (Section 6).

5.3 Forest disturbances

It is believed that all forest adjacent to the reviewed route had been subjected to a number of man-associated disturbances. The impact of those disturbances varies according to the agency of disturbance, the techniques employed, and the time since disturbance. The most evident were :

All areas

- protective burning
- possibly wildfires

Restricted areas

- selective logging
- clearfelling to seed trees and regenerated
- thinning operations
- railway (log haulage) formation construction
- track establishment
- recreational tracks
- major road clearing
- drainage lines off roads and tracks
- traffic visibility clearing
- dieback disease infection
- severe fire damage
- soil erosion
- water course siltation or scouring
- water point establishment
- powerline establishment and maintenance
- selection tracks for logging, burning, gravel sources
- firebreaks around properties and plots

Specific sites

- gravel, sand or earth pits or quarries
- tree species trial plots

Accordingly, even in the least disturbed area adjacent to the major log haulage route which the transmission line is recommended to follow, the forest would have been subjected to the following disturbances :

- several fuel reduction burns and possibly a wildfire
- road selection investigations
- road clearing operations
- possibly road widening, straightening or upgrading
- road safety profile felling
- drainage line interference
- likely the establishment of "5 chainer" burning tracks

(these were established before broadscale protection burning

techniques were adopted. Burning in the early period [prior 1960's] was restricted between major roads and the "5 chainers" parallelling these roads on either side)

5.4 The Review Area

This review required a close examination of the forest condition within the proposed M - B corridor. In order to assess the proposed line, the forest blocks (discrete management areas defined by CALM) adjacent to the line were considered. The forest blocks and details of their condition are shown in Tables 1 and 2 :

Table 1

Forest Condition for Forest Blocks
Adjacent to Proposed Manjimup - Beenup Transmission Corridor

Forest Block	Total Block Area (hectares)	Virgin Forest Karri	Virgin Forest Jarrah	Cut-over Forest Karri	Cut-over Forest Jarrah	Even-aged Regeneration Karri	Even-aged Regeneration Jarrah
		<----- Percentage of Block Area ------->					
Beavis	4804	39.0	19.1	26.8	11.8	16.4	3.1
Channybearup	5137	0.6	2.2	61.8	34.6	15.5	3.3
Lindsay	4505	1.1	0.1	59.7	38.3	4.9	-
Strickland	2775	17.9	23.8	8.7	48.1	2.7	27.2
Solai	3604	3.9	5.5	48.0	41.4	7.0	-
Carey	5442	21.3	51.6	8.0	18.5	5.0	7.2
Court	2797	14.6	16.4	54.6	11.1	17.0	-
Giblett	3949	53.6	23.9	4.6	15.5	-	-
Total	33013 hectares						

Source : CALM, FMIS, 1991.

It is of interest to note that the proportion of disturbed forest in these forest blocks varies greatly. Channybearup, Solai and Lindsay all have more than 90% of the forest areas previously cut-over. Some of those areas have been regenerated before the 1940's, and today are recognized as potential production forests while some have high aesthetic value. Other blocks such as Giblett, Carey and Beavis have generally less than 1/3 of the forest area disturbed.

Table 2

Cutting and Regeneration of Karri Forest

	Cut-over (hectares)	Regenerated hectares (% cut-over)
Prior 1940	7113	1438 (20.2%)
1940 - 1966	2147	87 (4.0%)
1966 +	2017	1355 (67.2%)

Source : CALM, FMIS, 1991.

It is of interest to note that of the 2017 hectares of karri forest cut-over within this review area since 1966, (excluding thinning of karri forest), only 1335 hectares, or 67% of the cut-over karri has been regenerated up to the end of 1990 (CALM FMIS, 1991). There is a time lag between logging and regeneration, contributed to by significant factors of the timing of natural seed development and man-controlled situations in nurseries. Assuming that some regeneration carried out in 1991 has not been recorded in CALM FMIS, the percentage not regenerated to that period is high considering the review area is approximately 20% of the Karri Region. The approximately 600 hectares not regenerated in the review area is within the capability of CALM's regional resources to regenerate in the short-term. However, the additional regeneration requirements from elsewhere within the Region indicate that there could be a larger than normal backlog area of regeneration treatment in the Region.

- Eastern and Western portions of block have been registered with AHC.
- Central section between Lamp and Lease roads (regeneration areas) have been excluded from AHC register.
- Siting of line recommended from this review :
  (a) new clearing - nil
  (b) adjacent exiting road - 10.25 km

Carey (From Seven Day Road along Waistcoat Rd to its limit)

- Two sections of quality K forest.
- Three sections of good J forest.
- Large area of J and K regeneration in the east and west
- Westerly forest adjacent private property is mixed J & K.
- Most westerly portion of this block contains the landform change associated with the Darling Plateau grading down to the lower Blackwood Plateau. The soils of the Darling Plateau are predominantly lateritic loams, whereas the Blackwood Plateau is dominated by sands, with some lateritization in higher levels.
- Siting of line recommended from this review :
  (a) new clearing - 0.25 km
  (b) adjacent exiting road - 6.75 km

Cleave (proposed route from Vasse Highway, north-west to crossing point on Donnelly River)

- Donnelly River zone has JM and some K.
- Most of area is low quality J, lightly selection cut.
- Soils sandy, with exception of Donnelly valley which is sandy loam.
- Siting of line recommended from this review :
  (a) new clearing - 1.15 km
  (b) adjacent exiting road - 0.10 km

5.5 Uniqueness

The Karri Region can certainly be considered a unique forest area. Within it there are a wide variety of sites, either of natural or man-induced importance. Certain forest blocks have been nominated or listed on the National Estate. These National Estate nominated blocks have high proportions of virgin forest (Strickland = 40%, Beavis = 58%, Giblett = 77%), however these blocks each have large areas of disturbance through logging, roading. (Table 2).

It is not believed that the recommended transmission line route passes through any specific area or site which is unique. The uniqueness applied to the area generally is due to the location and limited size (on a world basis) of the karri forest, and the concentration of undisturbed forest

areas. The construction of a carefully routed powerline will create long-term disturbances and forest structural changes to a small area, largely disturbed along much of the length through earlier road construction. This new disturbance is not considered to significantly lower the uniqueness of the Karri Region, any particular Forest Block, any particular Reserve or Estate concept, nor the general appearance of recognized public usage areas. The powerline establishment will have no additional effect upon the floral genetic pool of any area, nor the movement of fauna.

The only potential area of specific significance is the reported location of an example of Opercularia volubilis, a species which is not considered under threat, nor declared as rare and endangered (SECWA, 1991(b)). It is recommended that further surveys take place on the recommended route to determine the extent of this species. It is likely that with delineation, clearing of these areas could be avoided.

The scale of disturbance is summarized in Table 3.

Table 3

Dimension of Disturbance along Recommended Route

These calculations have been made using the route and clearing configurations recommended in this report. (Figures 1(b) and 1 (c)).

Table 3(a). Distances by Forest Type

Forest Block	Quality Karri	Karri Logged	J-M-K Logged	Regen J & K	Recent J & K	Private Property	Total
		(kilometres of line)					
Channyb	-	4.00	1.50	0.50	-	3.00	9.00
Solai	-	3.00	0.50	-	1.00	-	4.50
Lindsay	-	-	1.75	-	-	-	1.75
Beavis E	3.50	-	3.00	-	-	-	6.50
C	-	-	0.75	2.00	-	-	2.75
W	0.75	-	0.25	-	-	-	1.00
Carey	1.25	-	2.75	3.00	-	1.50	8.50
Cleave	-	-	1.25	-	-	-	1.25
Totals	5.50	7.00	11.75	5.50	1.00	4.50	35.25 km

Table 3(b). Average widths of actual disturbance (easement and profile). Additionally there may be some selective felling outside these distances.

	Quality Karri	Karri Logged	J-M-K Logged	Regen J & K	Recent J & K	Private Property (forest)
	(metres excluding existing roads)					
Adj road	20	60	60	20	20	60
New clear	na	80	80	20	20	80

Table 3(c). Disturbed Areas by Forest Type

Forest Block	Quality Karri	Cut Karri	J-M-K Cut	Regen J & K	Recent J & K	Private Property	Total
(hectares impacted, easement plus profile, less haul road)							
Channyb	-	26.0	9.0	1.0	-	18.0	54.0
Solai	-	18.0	3.0	-	2.0	-	23.0
Lindsay	-	-	10.5	-	-	-	10.5
BeavisE	7.0	-	18.0	-	-	-	25.0
C	-	-	4.5	4.0	-	-	8.5
W	1.5	-	1.5	-	-	-	3.0
Carey	2.5	-	16.5	6.0	-	9.0	34.0
Cleave	-	-	7.5	-	-	-	7.5
Totals	11.0	44.0	70.5	11.0	2.0	27.0	165.5 ha

Table 3(d). Percentage of Forest Block Areas in Line by Forest Type

Forest Block	Quality Karri	Cut Karri	J-M-K Cut	Regen J & K	Recent J & K	Total
(% Forest Block area impacted, from Table __ (b) above)						
Channyb	-	0.51	0.18	0.02	-	0.71%
Solai	-	0.50	0.08	-	0.06	0.64%
Lindsay	-	-	0.23	-	-	0.23%
Beavis	0.18	-	0.50	0.08	-	0.76%
Carey	0.05	-	0.30	0.11	-	0.46%
Cleave	-	-	0.24	-	-	0.24%

The details in Tables 3 (a) to (c) compare favourably with those stated in the CKR, and summarised in section 2, but should be considered in the light of the review area, not the proposed total line.

The percentage figures of Table 3 (d) provide the broader picture - less than 1% of any particular forest block will be disturbed by the establishment of a new powerline along the recommended. The overall disturbance of the line having less than 0.5% of the total area when private property is considered.

It is also apparent that the transmission line established with minimal impact attitudes would only disturb less than 0.01% of the quality forest of those areas currently registered with the AHC.

The recommended level of activity will result in marginal additional forest disturbance. There will be short-term impacts, however in the medium and long-term, these impacts will be less than those of the already established roading system.

6.0 Impacts of Line Establishment

Most activity impacts on forests are short-term, although long-term impacts have taken place when operational planning and implementation have not recognized the risks or completed using accepted management practices.

Forest activities impact upon the following aspects of forests :

- soils
- water quality
- forest structure
- species dominance/abundance
- faunal habitat
- wilderness attributes

Although some of the above impacts are automatically associated with forestry activities, management practices have been developed in order to eliminate or minimise particularly the long term impacts. Some short term impacts are unavoidable, however the objective of management practices is to determine the particular risks of operations, the methods which reduce the impacts and the creation of regulatory or control systems to ensure careful implementation. This is largely carried out in CALM through Management Plans, Annual Plans, Site or Coupe Plans, Job Prescriptions, and Operational Tests.

The following are considered the principal aspects where a powerline has the potential to create forest impacts. The existing forest condition requires careful advance evaluation and the likely possible techniques employed to minimize any additional impacts.

6.1 Disease

The principal disease in forest areas of Western Australia is jarrah dieback disease. The cause and spread of this disease is well documented. CALM has developed a number of techniques to limit the spread of the disease. The fundamental aspect of the system is equipment hygiene to reduce the amount of soil debris carried by earth-moving equipment and the restriction of equipment movement when the disease is most active. These aspects, when implemented with accurate knowledge of the disease location, permits a high degree of security of dieback-free forest.

Within the review area CALM have formally mapped for dieback only Carey and Strickland forest blocks. During the field survey associated with this review, approximately 5 areas were noted as having possible dieback infections (Cleave, Beavis x 2, Lindsay, Carey).

SECWA has indicated that all earth-moving operations would be carried out under dry soil conditions. In addition, other specific hygiene requirements would be followed.

6.2 Ecology and Conservation

The establishment of a powerline through a forest will cause disturbance. If the route largely follows the alignment of existing roads, the degree of disturbance is reduced.

The principal disturbance is the impact on forest structure. Overstory trees are removed from the easement and to varying degrees, dependant upon tree height, away from the line.

As regeneration is not prevented in the easement or profile, there should be limited ecological impact associated with the line establishment. Species will be able to regenerate and animals will have free movement. There is likely to be sustained dominance of understory species without the development of an overstory.

The powerline will create additional disturbance over the route, however such disturbance would be less than the long-term impact of the existing major log roads, which the route follows.

6.3 Production

In the limited areas where the line passes through or adjacent to reserves, the impact on production forestry is negligible. There will be some revenue obtained by CALM from such establishment, however in the long-term revenue would not be expected.

In much of State Forest, production activities are compatible. Where the proposed powerline passes through forest managed for production, some impact is likely. Although revenue from the line establishment will occur, the future production potential will not be achieved. This can be off-set through the silvicultural management of the profile area. As regeneration reaches a height where it may interfere with the security of structures or conductors, CALM could systematically plan for the treatment of these stands, commercially removing chipwood, poles and minor produce.

This option may not be practical over some areas, however the scale of loss in productive forests would be no more than 140 hectares (Table 4(c)) or 0.42% of the review area forests.

6.4 Water, Soils and Erosion

The establishment of a powerline will be carried out under the Code of Forest Practices developed by CALM. Although there will be ground and vegetation disturbances during the construction phase, the impact will be minimal.

Drainage zones will be minimally disturbed to reduce run-off, and steep slopes with disturbance will have cut-off drains installed where necessary.

In most instances the drainage flow will be unchanged from that of the adjacent road. In newly cleared sections, suitable drainage will be provided.

The actual ground disturbance will not be great, and regeneration will be permitted to recommence (naturally) immediately. If necessary, the spreading of native seed along sections can be used to supplement natural regeneration.

6.5 Recreation

The proposed powerline does not pass directly through any area considered specifically a recreation focus.

The recommended route intersects with recreational transit routes in five positions along the reviewed section :

- Channybearup Road - bitumen road, other powerlines in the vicinity, private property, minimal tree removal,

- Seven Day Road (twice - in Solai and Beavis Blocks). Both intersections have been cleared of understory and some trees to improve vehicle visibility associated with the logging usage. The powerline will cross at these intersections with minimal additional disturbance. Tree removal will be limited to those of high potential danger to the line or structures. Poles may be considered in these situations.

- Vasse Highway - bitumen. Other powerlines in the vicinity. Private property on one side and low height forest on the other.

- Bibbulmun Track - Crosses on the Lefroy Brook in 1930's regenerated karri forest. A visual impact would be evident to walkers. This could be minimised through careful location of structures, use of poles and minimal additional clearing for a short distance adjacent to the track.

Table 4

Impact of Powerline Establishment on Forest Types

	Quality Forest	Cut-over (Mature)	Regenerated Forest	Heaths, Scrub Swamplands
Tree ht (m)	40-60	30 - 50	15 - 30	2 - 6
	(Impact Levels - see text above)			
Easement (adjacent to existing road or track)	2	2	2	3
Easement (through uncleared forest - requires new access track)	1	1	1	2
Profile (average forest)	2-3	2-3	2-3	3
Profile (quality forest)	3	na	na	na

Forest types traversed are summarised in Table 5.

Table 5

Line Distances along Recommended Route

Forest Type		Adjacent Rd	Through Forest (km of line)	Private land
Young regeneration	(J/K)	4.25		
Recent cut-over forest	(J/K)	2.00		
Selection cut forests	(J/K)	13.75	2.50	
Old regeneration	(K)	-		
Virgin Karri		3.50		
Virgin Jarrah		4.25		
Private Land				4.50
Total Distance 34.75 km		27.75	2.50	4.50

In summary, although impacts on the forest will take place as a result of a powerline establishment, the impacts can be minimised through careful planning, implementation, maintenance and management. Specifically the following will be used :

- careful route selection,
- equipment hygiene clearing techniques,
- line specifications which take into account quality forest,
- special treatment at sensitive sites.

7.0 Recommendations

7.1 Alignment or route

The nominated corridor is largely centred over two major log haulage roads - Palings and Waistcoat Roads. In four sections totaling 2.5 km, the corridor does not follow an existing road, and would necessitate a complete easement and profile clearing.

In order to minimise significant clearings specifically for the powerline, yet strive to maintain practical and economic straight sections, the following alignment selection criteria are recommended :

1. Locate structure positions as close to existing roads as safety permits,

2. Locate centre line of easement over existing road alignments wherever practical,

3. Maintain emphasis of selecting easement on sides with lower quality forest,

4. Locate line adjacent to roads in karri forest with AHC consideration,

5. Traverse regeneration stands in preference to mature stands,

6. Traverse cut-over forest in preference to lower disturbed forest,

7. Crossings of public roads on existing log road alignment, with minimum additional vegetation disturbance,

8. Traverse private property wherever possible.

Applying these criteria to the nominated corridor has resulted in a recommended alignment which has only three sections which do not follow an existing road alignment - west of Channybearup Road, east of private property adjacent to Vasse Highway and the westerly portion Vasse Highway to the Donnelly River.

7.2 Clearing methods

1. Minimize clearings on high quality karri forest sections (irrespective of existing or potential AHC status),

2. Carry out all earth-moving activities in dry soil conditions to further prevent the spread of dieback,

3. Where possible restrict clearing of easement to trees and high understory species. Felling, log removal and debris removal activities will disturb the site. Where practical leave undisturbed understory or shrub sections.

4. Tree and high understory removal only in drainage lines, leaving shrub vegetation intact. Avoid ground disturbance during debris disposal.

5. Rehabilitation of sections of the line could be considered in consultation with CALM. There may be areas which would benefit from enhancement seeding following disturbance.

6. Develop in conjunction with CALM a detailed clearing prescription for each discrete section of forest.

7.3 Profile techniques

1. In quality karri forest areas, limit profile treatment to selective safety felling as necessary, with regular inspection for trees with structural defects, (see Figure 1 (b) for clearing specifications)

2. In other forest (has been disturbed at some time), treat the profile on a selective safety tree removal on a 45 degree/tree height basis.
(see Figure 1 (c) for clearing specifications)

3. The maintenance of vegetation profile clearances could be silviculturally managed. As trees grow into the profile, blocks could be commercially harvested. It is recommended that SECWA liaises with CALM to investigate this potential.

7.4 Structure and line configurations

1. Where possible extend structure height,

2. In order to raise the sag height, shorten spans where practical,

3. In sensitive visual areas, use single pole structures.

4. Where practical consider the use of poles to reduce the general visual impact of the line at ground level, and would result in less ground disturbance around the structure positions.

7.5 Risks and Values at Stake

1. There are a number of risks to the security of powerlines. These include trees falling over line or structure, branches over lines and arcing to close vegetation. The latter can be controlled generally through removal and maintenance of vegetation which grows into the line safety zone. The odds of trees falling can also be minimized through heavy profile treatment or selective felling of trees which appear to have defects or leans towards the line. Regular inspections should maintain this security.

2. There are 7 sections of quality karri forest along the line. Although there has been some disturbance in these areas, it is desirable, particularly in recognized valued sites or publicly observed sites, that the easement and profile treatment be carried out with utmost sensitivity to minimize disturbance and visual impacts. It is believed that SECWA could carry some risk of line damage in these sections, accepting that normal treatment would be seen as unacceptable damage.

3. The damage associated with the construction and maintenance of the line can only be considered as localized and generally of low level. There will be long-term impacts of the structure of the forest along the easement. This impact however will be less than the adjacent road, where vegetation is prevented for re-establishment. The profile areas will have some structural impacts, however the ecological continuity is not altered.

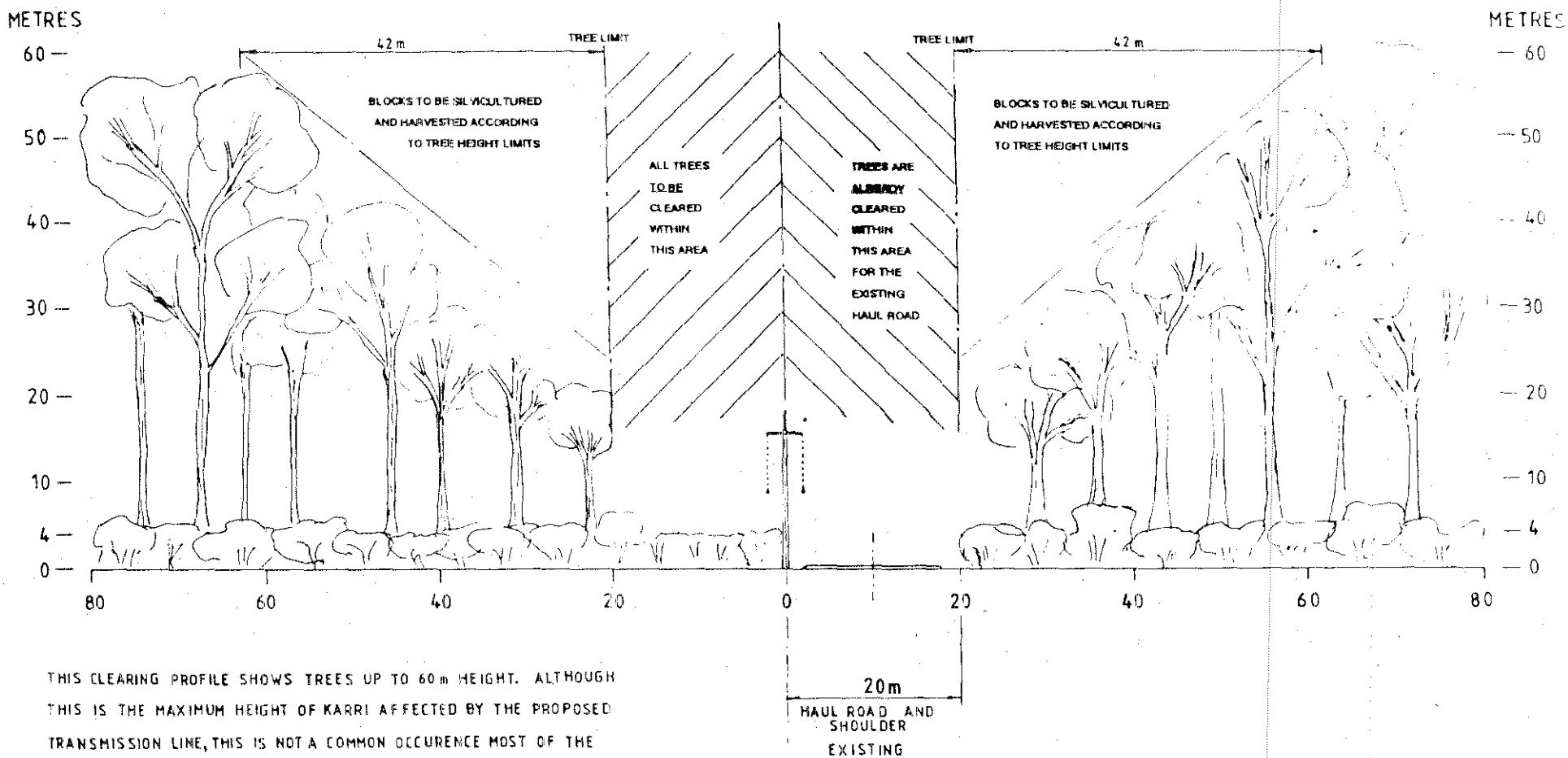
4. Although the line will pass through or adjacent to quality forest, including some areas listed or nominated with the AHC, it is not considered that the impacts of the line will alter the significance of the broader forest values of the areas. Thus with 3.5 km of the lines passing virgin karri stands, at a 20 m easement (plus minor safety treatment), only 7.0 hectares of forest will be affected, generally at impact levels less than the existing road. With the proposed National Estate Forest zone of Strickland, Beavis (part), Giblett, Solai and Lindsay forest blocks having an approximate area of 18,500 hectares, the low impact on quality forest amounts to no more than 0.1% of the area. The line activities will not influence the movement of fauna, nor the sustaining of

floral genetic mixing. There will be minor structural losses within normal and quality forests, however these will have negligible impact on the value of the broader areas of forest which are considered to be of high conservation value. The value of these areas lie in the continuity and integrity of large areas of forest, not measured by the loss of individual trees adjacent to an artificial boundary (road).

CLEARING DRAWING NO. 2:

PROPOSED CLEARING REGIME IN FOREST AREAS BETWEEN MANJIMUP AND THE VASSE HIGHWAY
REFER TO CLEARING DRAWING NO 1 FOR CLEARING DETAILS OF AREAS TO BE REGISTERED ON THE NATIONAL ESTATE WITH NOMINATED STANDS OF SIGNIFICANT KARRI

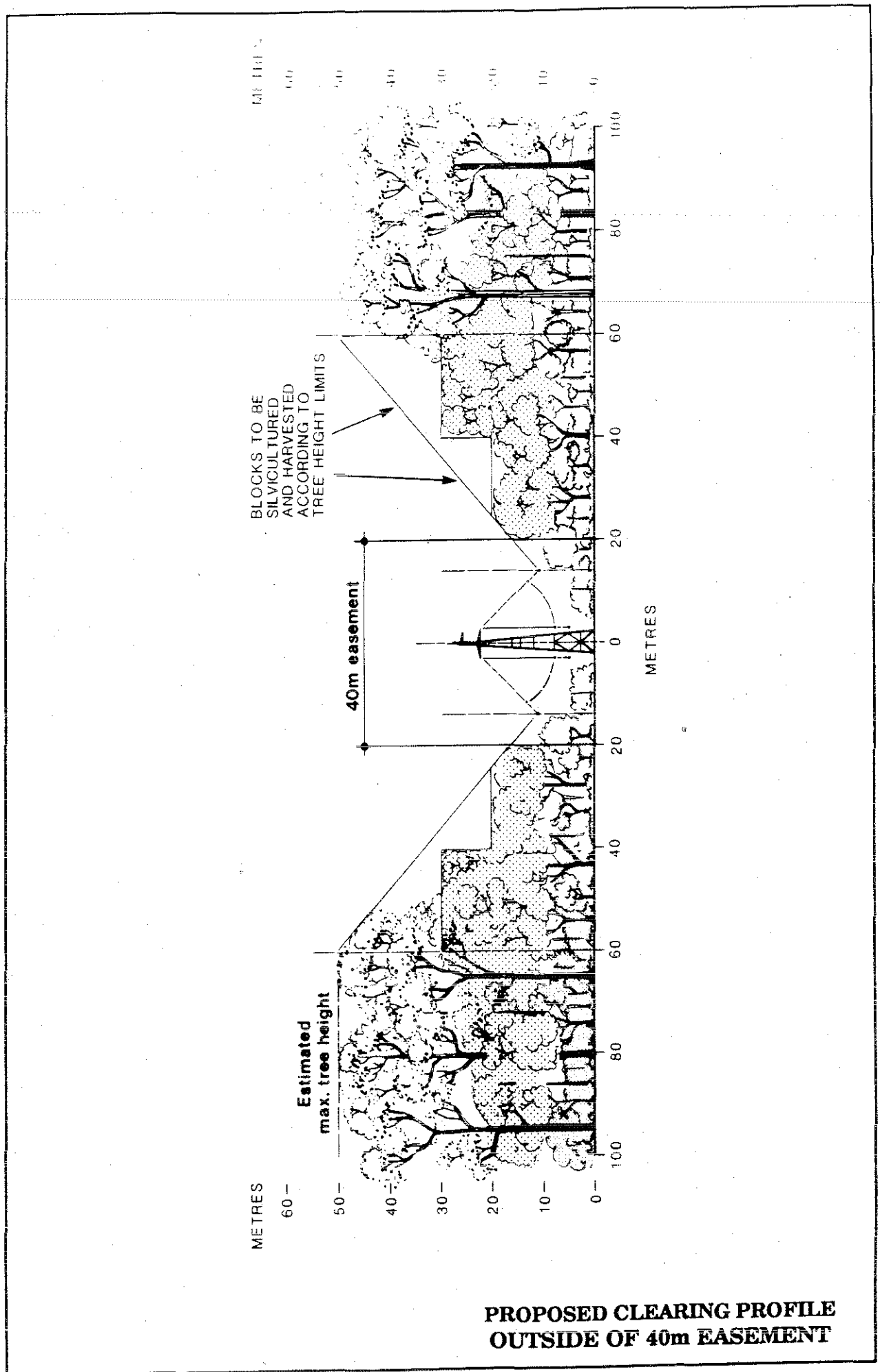
TO AVOID HAZARDOUS AND FIRE RISK SITUATIONS FROM FALLING LIMBS OR WINDBLOWN BARK STRIPS, A 40M WIDTH SHALL BE KEPT CLEAR ABOVE A 4M HEIGHT LIMIT



THIS CLEARING PROFILE SHOWS TREES UP TO 60 m HEIGHT. ALTHOUGH THIS IS THE MAXIMUM HEIGHT OF KARRI AFFECTED BY THE PROPOSED TRANSMISSION LINE, THIS IS NOT A COMMON OCCURENCE MOST OF THE KARRIS ENCOUNTERED ARE IN THE ORDER OF 30 TO 50m HIGH.

Figure 1(c) Recommended Clearing Profiles in General Forest Areas.

Figure 1(a). Clearing Profiles for Proposed 132 kV Line, as described in SECWA CER (1991(a))



PROPOSED CLEARING PROFILE OUTSIDE OF 40m EASEMENT

FIGURE 5b
DAMES & MOORE

9.0 References

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8.0 Summary

This review has examined the easterly 35 km portion of the proposed Manjimup - Beenup transmission route. This area was closely examined because of the presence of forest registered under the National Estate, and generally because the route passes through areas recognized as good forest within the broader Karri Forest Region.

After close examination of the corridor, a route has been recommended which will create minimal additional disturbance of the forest generally, National Estate areas and Quality Forest zones.

The line is recommended to closely follow existing major log haulage routes. In areas of better quality forest the line is to be close to the road and the forest be selectively treated for line protection, thereby reducing the forest disturbance in Quality Forest.

A number of recommendations have been suggested to minimize the impact of the powerline - specifically the clearing specifications, clearing techniques, maintenance and structure positions or configurations.

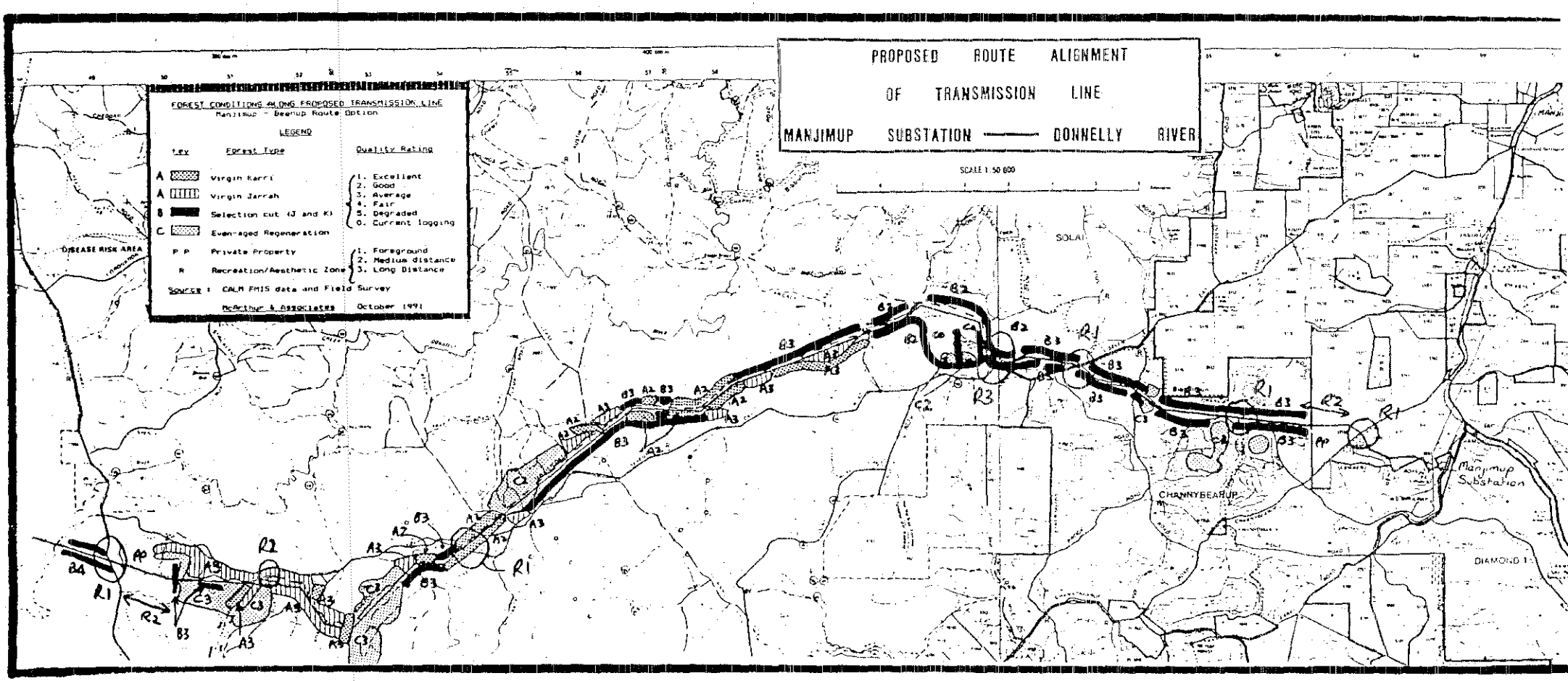
There will be seven areas of Quality Forest disturbed - totalling 5.5 km within the 35 km review route. The types and extent of disturbance will have negligible impact on the integrity of the National Estate areas. The significance of the National Estate areas will remain and the values associated with these areas will not be altered.

SECWA should be prepared to accept these higher standards of specifications for the proposed line if it is to pass through Quality Forest areas. In doing so, it should be recognized that the SECWA will be absorbing some supply risks associated with tall trees adjacent to the line. The final configuration should take into account not only SECWA risks, but also the dangers associated with powerlines in forests.

In conclusion, the planning, implementation, maintenance and management of this proposed powerline can only be achieved through a full cooperative approach between CALM and SECWA. A comprehensive review of perceived impacts to all sections should permit the establishment of an important powerline through quality forests, with minimal forest disturbance.

McArthur & Associates

October 1991


PROPOSED ROUTE ALIGNMENT
OF TRANSMISSION LINE
MANJIMUP SUBSTATION —— DONNELLY RIVER
SCALE 1:50 000
FOREST CONDITIONS ALONG PROPOSED TRANSMISSION LINE
Manjimup - Beenup Route Option
LEGEND
Key
Forest Type
Quality Rating
A Virgin Karri
A Virgin Jarrah
B Selection cut (J and K)
C Even-aged Regeneration
P P Private Property
R Recreation/Aesthetic Zone
1. Excellent
2. Good
3. Average
4. Fair
5. Degraded
6. Current logging
1. Foreground
2. Medium distance
3. Long Distance
SOURCE : CALM FMIS data and Field Survey
McArthur & Associates
October 1991
DISEASE RISK AREA
SOLAI
CHANNYBEARUP
Manjimup Substation
DIAMOND T