Proposed Transmission Line Corridor
Northern Terminal Substation
to Pinjar Gas Turbine Power Station

State Energy Commission of Western Australia

Report and Recommendations
of the
Environmental Protection Authority

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Summary and Recommendations

The State Energy Commission of Western Australia (SECWA) has submitted a proposal to construct a power transmission line, with an associated corridor, between the existing Northern Terminal substation and a gas turbine power station at Pinjar which is presently under construction.

In considering SECWA's initial proposal the Environmental Protection Authority determined that the potential for environmental impact was such that the proposal would require assessment under Part IV of the Environmental Protection Act, 1986, and that the level of assessment would be a Public Environmental Report (PER) with an eight week public review period. The public review period concluded on 28 April, 1989 during which 118 submissions were received.

In the Public Environmental Report SECWA presented three corridor options (Figure 1) for the transmission line and indicated the preferred option for a corridor to accommodate a 1 x 330 kV transmission line.

During the public review of the document it emerged that the proximity of the preferred corridor option to the Meadowlands Estate Special Rural Zone was a major source of public concern. In order to relocate the corridor away from this area the Environmental Protection Authority requested that the possibility of crossing the Royal Australian Air Force(RAAF) exclusion zone around the 3TU communication facility be further investigated. Subsequent evaluation, by SECWA and the Department of Defence, of independent tests resulted in the relocation of the corridor into the exclusion zone and away from Meadowlands Estate.

This relocation resulted in the corridor impinging into the south western corner of Melaleuca Park Nature Reserve which is the subject of System 6 recommendation M9. SECWA indicated that the location of the transmission line corridor within the south west corner of Melaleuca Park was the only available alternative given the locational constaints formed by the reduced RAAF exclusion zone to the east and the public concern over the proximity to Meadowlands Estate to the west.

The park is regarded as being an important area for the preservation of flora and fauna and therefore any proposal that may lead to disturbance would require careful management.

Consideration of future power needs in the northern metropolitan area by SECWA resulted in a further change to the original proposal during the assessment phase, by specifying that in the long term two further lines could be required to transport power from a major power generation facility north of Perth to the Northern Terminal substation. Therefore, apart from the original 330 kV line a further 330kV line and one 132 kV line are planned.

This required the reservation of a separate corridor for the southern sector owing to the potential noise interference to the Overseas Telecommunications Commission (OTC) facility posed by more than one standard 330 kV transmission line in the preferred western corridor. Thus a separate corridor to the east of Whiteman Park was proposed for the future 330 kV line.

The Environmental Protection Authority regarded the provision of more than one transmission line corridor as environmentally unacceptable and requested SECWA to investigate the accommodation of the three proposed lines in the one corridor. Subsequent research by SECWA resulted in design changes to the transmission lines that would allow placement of all three lines in the one corridor.

It should be understood that the provision of a corridor with capacity for future transmission lines does not preempt an Environmental Protection Authority decision on any future source of electricity north of Perth for the south west grid.

As the original proposal as set out in the Public Environmental Report has undergone substantial changes, albeit improvements, the Environmental Protection Authority requested that SECWA inform interested parties of the changes. This was carried out by detailing the changes to the original proposal in a brochure and sending the brochure to all those parties who had made submissions on the Public Environmental Report. The brochure was also made available to the public through the Wanneroo and Swan local government offices and described in the local print media.

In order to allow any concerns on the modifications to be expressed, the Environmental Protection Authority felt a further public review period of approximately two weeks would be adequate, given the similarity of the final proposal to that originally put forward.

Further cooperation by the Department of Defence allowed a further change to the corridor route after the publication of the brochure. This entailed allowing the corridor to cross the disused RAAF bombing range which lies to the east of Lake Pinjar. Thus the final route of the proposed corridor (Figure 2) is from the Northern Terminal west to the western boundary of Whiteman Park thence north along the existing 132 kV Muchea line alignment to just south of Neaves Road and finally north-north-west directly to the Pinjar power station. This change would not affect any private property.

SECWA plans that the corridor will eventually accommodate three transmission lines. Width of the corridor varies between 200 metres and 1,000 metres, to allow some freedom of movement during the proposal stage, although only 160 metres of the corridor will be used for the transmission lines. The three lines and their approximate construction dates are as follows:

- 1 x 330 kV line - 1990
- 1 x 330 kV line - not before 1995
- 1 x 132 kV line - not before 1995

SECWA is presently seeking environmental approval for the corridor in relation to the first of these lines. The

preferred corridor is located substantially within State Forest 65 and therefore the impact on local communities is minimised.

During the assessment of the PER the major environmental issues considered were generally related to potential environmental impact on:

- local communities from the transmission line;
- Melaleuca Park from the transmission line;
- vegetation from clearing for line construction and operation; and
- the Gnangara underground water supply area.

The Environmental Protection Authority commends SECWA on its preparedness to take these concerns into account and make major modifications to reduce the environmental impact of the proposal. The Authority considers this an example of the ability of the environmental assessment process to allow modifications to be made to a proposal to make it environmentally acceptable.

Recommendation 1

The Environmental Protection Authority concludes that the project as described in the Public Environmental Report and as shown in Figure 2 of this Assessment Report, for a single transmission line corridor between the Northern Terminal substation and the Pinjar Gas Turbine Power Station is environmentally acceptable and recommends that it could proceed subject to the Authority's recommendations in this Assessment Report and the commitments made by the State Energy Commission of Western Australia with regard to environmental management of the project.

The Environmental Protection Protection Authority is opposed in principle to the unnecessary proliferation of transmission line corridors and considers that any future transmission lines proposed in this section of the metropolitan region should be required to utilise the corridor as assessed and approved in this report.

Recommendation 2

The Environmental Protection Authority recommends that all future major power transmission lines in this section of the metropolitan region should be located within the transmission line corridor agreed to in this Assessment Report.

The construction of the transmission line in the proposed corridor through the south west corner of Melaleuca Park Nature Reserve will require careful planning and management in order to protect the ecology of the nature reserve.

Recommendation 3

The Environmental Protection Authority recommends that prior to any ground disturbance activity in Melaleuca Park Nature Reserve, the State Energy Commission of Western Australia prepare and subsequently implement an environmentally sensitive construction and operation programme to minimise disturbance to the flora, fauna and wetlands of the nature reserve to the satisfaction of the Environmental Protection Authority upon advice from the Department of Conservation and Land Management.

Along the route of the proposed corridor there are significant areas of native vegetation such as north of Lake Pinjar. Clearing of the vegetation in these areas requires special consideration to minimise the environmental impact.

Recommendation 4

The Environmental Protection Authority recommends that prior to clearing of vegetation for construction purposes, the State Energy Commission of Western Australia identify those areas of significant native vegetation and then prepare and subsequently implement a plan for clearing requirements for areas identified to the satisfaction of the Environmental Protection Authority upon advice from the Department of Conservation and Land Management.

The majority of the transmission line corridor is within State Forest 65 which contains significant areas of Banksia woodland. Banksia species are highly susceptible to dieback disease and therefore care should be taken during construction of the power line to ensure that the pathogen is not spread.

Recommendation 5

The Environmental Protection Authority recommends that prior to the commencement of construction activity, the State Energy Commission of Western Australia prepare and subsequently implement a dieback hygiene programme to the satisfaction of the Department of Conservation and Land Management.

1. Background

In December 1988 the State Energy Commission of Western Australia (SECWA) presented a proposal to the Environmental Protection Authority for a transmission line corridor from the Northern Terminal substation at Ballajura to the proposed Pinjar gas turbine power station.

Upon consideration of this proposal the Environmental Protection Authority determined that the project would require assessment under Part IV of the Environmental Protection Act, 1986, and that the level of assessment would be a Public Environmental Report (PER).

The PER was submitted in March 1989 and underwent a public review period of eight weeks closing on 28 April 1989 from which 118 submissions were received. In tandem with the review of the documented proposal a public meeting was held by SECWA on 29 March 1989 where the proposal was outlined and questions from the audience addressed. Following a resolution of this meeting a further public meeting was held on 18 April 1989 at which officers of other Government departments, including the Environmental Protection Authority, attended to answer questions associated with the proposal and its assessment.

As a result of concerns raised at the public meetings and through responses during the public review period it became evident the location of SECWA's preferred corridor option (Figure 1) would require modification. The main concerns expressed related to the proximity of the corridor to the Meadowlands Estate Special Rural Zone.

Given the constraints applying to the location of the corridor from urban development - the exclusion zone around the Overseas Telecommunications Commission (OTC) facility and the exclusion zone around the Royal Australian Air Force (RAAF) communication facility (3TU) - shifting the corridor would require relaxation of one or more of these constraints.

Consequently, the Environmental Protection Authority asked the Department of Defence to provide technical justification for their requirement for a 9.6 km exclusion zone around the 3TU communication facility at RAAF Pearce.

An independent consultant was engaged to measure the noise interference likely to be caused by transmission lines at varying distances from the 3TU facility and the actual noise environment at the facility. The tests were jointly funded by the Department of Defence and SECWA, and carried out in August 1989. Evaluation of the data from the tests resulted in an agreement between the Department of Defence and SECWA which would allow the transmission lines to be placed at 7 km from the 3TU boundary and east of the Meadowlands Estate, provided the low noise environment at 3TU was not degraded by more than 1 decibel. From recent research SECWA are confident that changes in design to the transmission lines will allow this requirement to be met.

The original proposal from SECWA, as outlined in the PER, was for a 1 x 132 kV transmission line to be constructed at 330 kV standard which would be located in the corridor to the west of Whiteman Park, with any future lines requiring a separate corridor to the east of Whiteman Park. The reason for this separation was that because of potential noise interference from the transmission lines, only one conventionally designed 330 kV line could be located inside the Overseas Telecommunications Commission's 3 km exclusion zone.

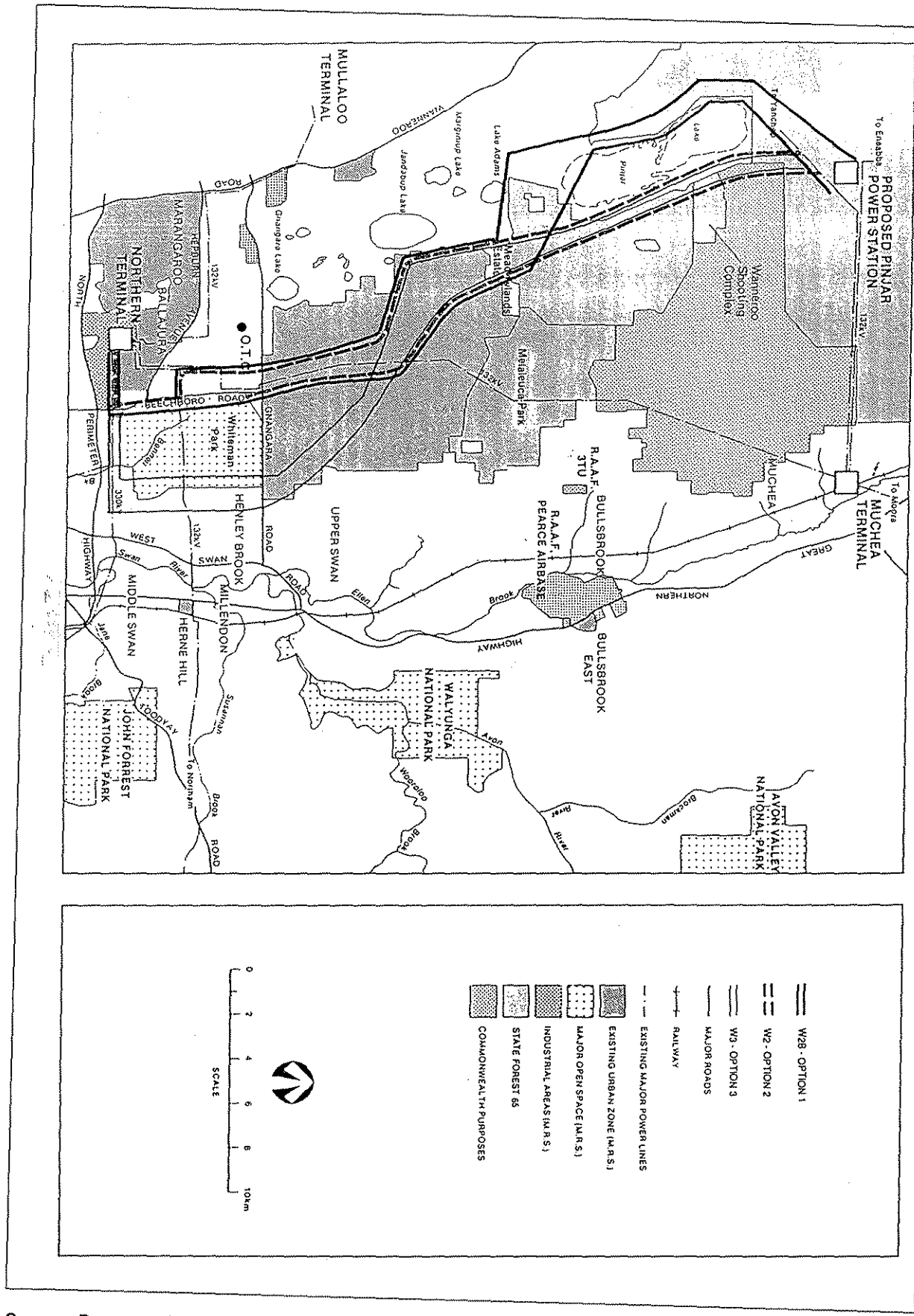
The Environmental Protection Authority regarded this separation as unacceptable and asked SECWA to examine means of placing all three transmission lines in the one corridor. SECWA's research into meeting this requirement was coincident with the Department of Defence stipulation on location of transmission lines inside the 3TU exclusion zone. Therefore, the design modifications that would allow a reduction in the noise interference generated from the transmission lines and hence enable location of the lines within 7 km of 3TU would also allow placement of all lines within the Overseas Telecommunication Commission exclusion zone.

In order to inform the public of the changes to the original proposal the Environmental Protection Authority asked SECWA to prepare a brochure outlining the changes and how they came about. This brochure was sent to all those people who made submissions on the original PER and was also made available to any other interested persons through the Wanneroo and Swan council offices and the Environmental Protection Authority. A further short period was made available for public submissions on the changes to the original proposal.

Following the publication of the brochure a further change was made to the corridor route. Negotiations with the Department of Defence allowed the corridor to cross the western portion of the disused bombing range which lies to the east of Lake Pinjar. This further change removed the route of the corridor from the Perry Road area.

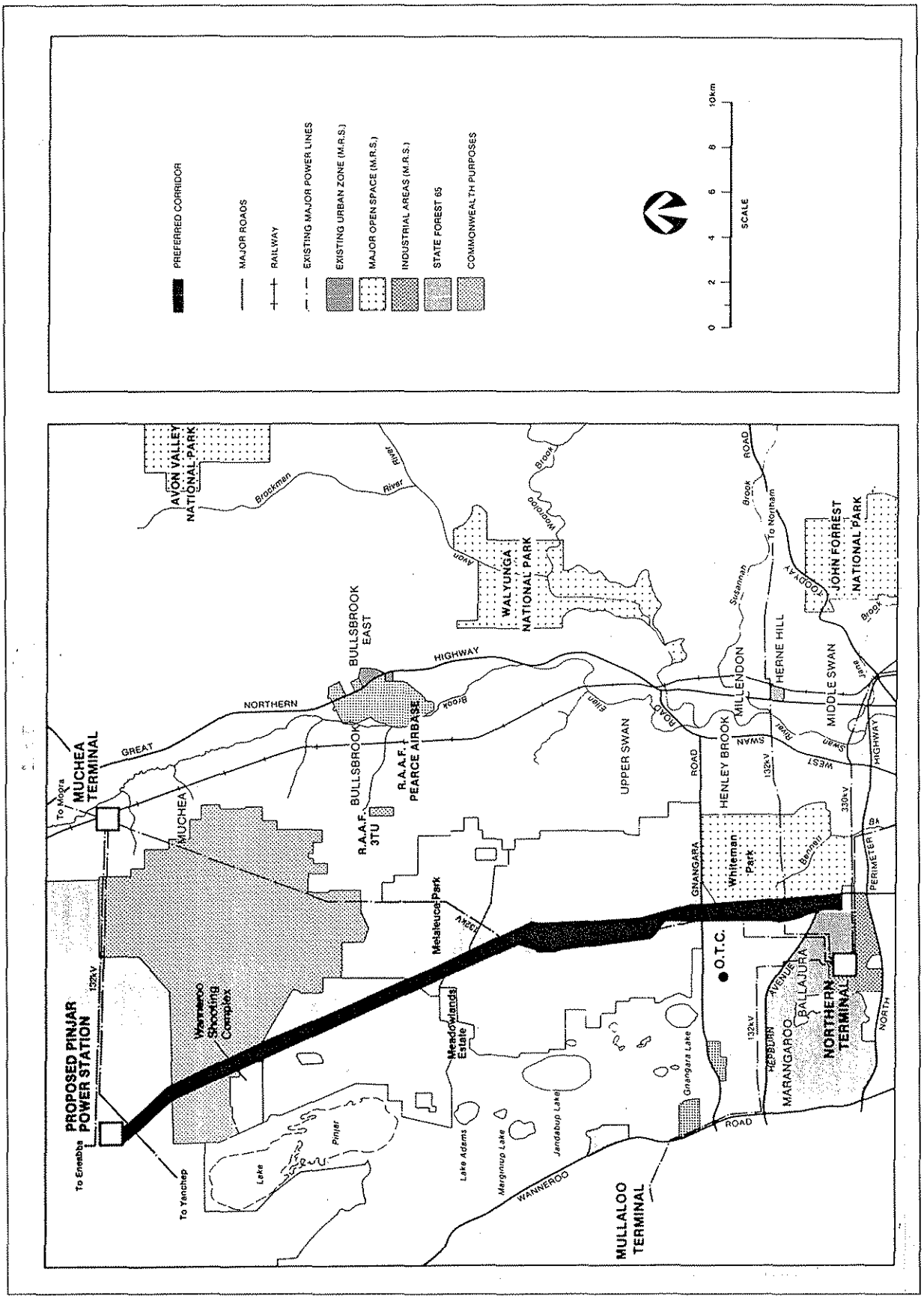
Consequently, the proposal is now for one corridor which follows the western boundary of Whiteman Park and proceeds north-north-west through the Gnangara and Pinjar pine plantations, to the gas turbine power station (Figure 2).

The original proposal as outlined in the Public Environmental Report for the location of the transmission line corridor and number of lines within the corridor has changed through the assessment process, including the public review phase, to reflect concerns raised during the process. This assessment report has noted the changes and the assessment is based upon the modified proposal.



Source : Dames and Moore

Figure 1: Original transmission line corridor options



Source : Dames and Moore

Figure 2: Amended transmission line corridor option

2. Project description

2.1 General

The proposal is to construct a power transmission line using 330kV structures and operating at 132kV between the existing Northern Terminal substation and a gas turbine power station which is presently being constructed near Pinjar.

It is necessary to view the proposal in terms of the long-term objectives for power supply for the region. It is envisaged that to meet the eventual requirements, two double-circuit 330kV lines could be necessary to transport power from a possible future power station north of Perth to the interconnected system at Northern Terminal.

Without in any way prejudging how, or if future power generation facilities north of Perth may occur, the Environmental Protection Authority nevertheless considers it appropriate that the present corridor proposal be assessed in the light of forseeable future demand for major transmission lines in the area.

SECWA claim the optimal method of achieving the long-term power supply objective is to construct the proposed Northern Terminal - Pinjar line on 330kV structures, and to energize this line at 132kV. When the long-term need for increased power supply arises, this 132kV line,can be easily upgraded to 330kV. It is envisaged that eventually, two 330kV lines and, one 132kV line will be required to meet the demand for power on the south west grid.

2.2. Construction and operation

The 132kV interconnection between Pinjar and the Northern Terminal will be constructed on double-circuit structures capable of supporting 330kV lines. The structures will be of the lattice steel tower type. Towers will be spaced at up to about 400m centres, and between 35m and 42m in height.

In certain situations where it is necessary to reduce the height of the towers - for example in the vicinity of aircraft take-off and landing approach areas - it is possible to reduce the tower height by about 4.5m or 5.0m by deleting the overhead earthwire.

In the vicinity of the RAAF and OTC communication facilities, a special design will be incorporated in order to maintain the noise from the power line below a certain standard.

The specific design of the line itself is currently under consideration. For the original proposal, the line was to consist of three cables each one consisting of a bundle of two conductors. Recent research has shown that by increasing the number of conductors in the bundle the noise generated is much less, so the cables for the proposed line are now likely to consist of bundles of four conductors.

Construction of the lines will be undertaken by contractors under SECWA supervision. The main components of the construction process are the installation of foundations for the structures, erection of towers, and stringing of the conductors.

3. Regional context

Figure 1 shows the regional metropolitan setting of the study area. It shows how the proposed site of the Pinjar gas turbine power station relates to the Northern Terminal substation, major transmission lines and other substations and power stations, and the spread of existing urban development in the Region.

Figure 1 also identifies the location of some of the major constraints on transmission line development, notably the OTC installation, the RAAF Pearce base at Bullsbrook, and the RAAF communication facilities (3TU).

The western boundary of the area of investigation was determined primarily by existing and committed urban development, as reflected in the Metropolitan Region Scheme (MRS). The southern boundary was determined by existing urban development and the fact that the transmission lines must run north from the Northern Terminal. The northern extremity was determined essentially by the need to ensure that lines approaching Pinjar from the east could provide sufficient clearance for aircraft in the vicinity of RAAF Pearce.

The eastern boundary of the study area was defined to allow for assessment of corridor options on the Darling Plateau. It was necessary to provide for these options because the radius of the exclusion zone originally requested by the OTC and RAAF severely limited the available options for corridors on the Swan Coastal Plain.

4. Issues raised in submissions

The public review period for the SECWA proposal was eight weeks for the original proposal and a further period of approximately two weeks for the amended proposal.

One hundred and eighteen submissions were recieved on the proposal, comprising 110 from the public and eight from Government departments.

Set out below are those issues raised and the Authority's or SECWA's response. The particular issues raised in submissions are set out in bold type, SECWA's response is in italics and the Authority's response in plain text. A full list of issues raised, the number of submissions raising it and where to find it in the text is tabled in Appendix 2.

4.1 Review procedure

Submissions:

a) **Period of public review too short.**

b) **Assessment procedure is merely a formality.**

Responses:

a) All projects assessed at the level of of Public Environmental Report have an eight-week public review period. This provides the public with adequate time for writing and presenting a detailed submission. The set period allows proponents to know in advance the timing for this part of the assessment process.

b) This project provides a good example of how a proposal can be modified as a result of the environmental impact assessment process so as to minimise the environmental impact of the project. The original proposal attracted criticism from the local public owing to its placement. Through the assessment process modifications have been made to the location of the proposed transmission line corridor to ensure it has a minimal environmental impact.

4.2 Health impacts

Submissions:

a) **Effects of electromagnetic radiation on human health not adequately addressed.**

b) **Health hazards associated with electromagnetic radiation should be investigated by an independent body.**

Responses:

a) *"The Environmental Protection Authority issued a report in June 1987 'Review of High Voltage ELF Transmission Line Fields and Human Health Effects'. That report remains the definitive statement on health effects from SECWA's overhead transmission lines".*

SECWA went on to say: "*SECWA designs and configures its transmission lines so as to minimise electric fields. The proposed design will result in levels at the edges of the easement well below IRPA guidelines.*

The values will be similar to those generated by existing transmission lines. SECWA seeks advice on such matters from international bodies and the Commissioner of Health in Western Australia".

b) *"SECWA considers the Environmental Protection Authority to be an independent body and the Environmental Protection Authority's 1987 report to be a report on such an investigation".*

The Environmental Protection Authority considers that SECWA should have referred to the 1987 Environmental Protection Authority report (Scott and Furphy, 1987) in their Pubic Environmental Report as a source of information on electromagnetic radiation. The controversy surrounding this issue means that it is important to provide sufficient information so as to allow the public to have informed debate on what is a highly emotional issue.

4.3 Public Environmental Report

Submissions:

a) **Economic cost is the sole determinant of location and nature of power line.**

b) **Alternatives were not considered.**

c) **The recent Victorian power line study was not taken into account.**

d) **Lack of community consultation during preparation of PER.**

e) **Position of alignment within the corridor was not given.**

f) **Report was lacking in necessary detail, so proper evaluation was difficult.**

Responses:

a) *"SECWA is charged with providing energy to the community in the most economic and reliable manner possible with due regard to public safety and other environmental concerns. In making the proposal for the new power line SECWA took both economic and environmental matters into account".*

In the light of the modifications to the original document that have improved the environmental acceptability of the project SECWA has demonstrated a willingness to examine the whole range of issues associated with the location of the power line.

b) *"Alternatives to the nature of the installation have been suggested as being underground cable and DC transmission. SECWA is conversant with both suggestions and gave them due consideration, neither are appropriate.*

The estimated cost of the double circuit 330 kV line is $0.3m per kilometre. The equivalent estimated costs for 330kV underground cable is $6.5m per kilometre for two circuits.

The cost of cabling is prohibitive and cabling would not be sustainable as a precedent, considering existing power lines through metropolitan urban areas.

Underground cabling does not eliminate fields and generates additional engineering problems which add to costs.

DC transmission is mainly used to move power over very long distances, about 600km or more. It is also used in a few special circumstances over short distances but it does not have general viable application over short distances and is not used as

such by the power industry worldwide. DC transmission is possible but would involve very expensive terminal equipment and either overhead lines or further expensive underground cabling. There would be no alternating magnetic fields but there are equivalent unproven health concerns from ion drift".

c) *"Power authorities worldwide have to deal with similar amenity problems. Community costs are also major issues.*

The Victorian reference is probably to the Richmond - Brunswick 220kV line which is now proposed to be underground. The circumstances in Victoria are essentially different from the Northern Terminal - Pinjar line because the Victorian line was to be routed entirely through inner urban areas and along scenic river land. The Victorian line was to be 220kV part double circuit with a capacity of 800MVA per circuit. The replacement cable is to be single circuit 220kV with a capacity of only 400MVA. The Pinjar-Northern Terminal circuits are to be 330kV with a capacity of 1,000MVA each".

d) *"The PER is a document for discussion and comment and intended as advice about the proposed project. Concern and regard for the local community were the reasons for SECWA to initiate the first public meeting and to fully support the second".*

e) *"SECWA has sought approval to place the line within the nominated corridor. It is possible that EPA could direct SECWA to place part of the line elsewhere".*

f) The Environmental Protection Authority approved the level of information contained in the PER prior to the document being released for public review. It was considered that sufficient detail was provided to allow the project to be adequately assessed. It should be borne in mind that the public review period offers an opportunity for concerned parties to make their own assessment and point out any deficiencies in the proposal as described.

4.4 Corridor location

Submissions:

a) Corridor should be in state forest, inside RAAF exclusion zone.

b) Above ground lines should be located away from people and houses.

c) Utilise one corridor instead of two.

Response:

Within the modifications to the proposal that have taken place during and as a result of the assessment process the above concerns have been alleviated. The location of the transmission line corridor is now substantially within state forest and away from any residences with the exception of the southern portion south of Gnangara Road. One corridor will be utilised for the three proposed lines.

4.5 Lifestyle and amenity

Submissions:

a) Lines will cause visual pollution.

b) Property will be devalued.

c) Lines should be put underground.

Responses:

a) *"As a matter of policy SECWA has adopted design criteria for overhead lines which attempt to minimise visual impact on the surrounding environment".*

The majority of the corridor is within forested areas thus the visual intrusion will be minimised.

b) This is not regarded as an environmental concern, however, with the modifications to the location of the corridor it would seem likely that no private property will be adversely effected.

c) Refer Section 4.3.

4.6 Other issues

Submissions:

a) Lack of coordinated planning by all parties involved.

b) Transmission lines should have been examined at the same time as the gas turbine site.

c) Existing Muchea line should be used.

Responses:

a) The difficulties associated with the proposal have shown that there was a lack of communication between Government departments involved including local government. It is hoped that the lessons learnt from this experience will result in a more informed approach to planning for future proposals.

b) The Authority's preference is always to assess a complete proposal rather than separately to consider the elements.

c) SECWA said in reply:

"The existing 132kV line runs through the 3TU exclusion zone and SECWA can not re-use that route without agreement from the Department of Defence".

5. Environmental issues

In considering the proponent's initial proposal, the Environmental Protection Authority determined that the potential for environmental impact was such that the proposal would require assessment under Part IV of the Environmental Protection Act, 1986, and that the level of assessment would be Public Environmental Report with an eight week public review period.

During the assessment process the proposal has been substantially modified to take account of a number of environmental concerns raised by the Environmental Protection Authority and the public.

Following a review of the environmental aspects of the modified proposal and taking into account submissions from the public and Government agencies, the Environmental Protection Authority concludes that the proposal would be environmentally acceptable subject to a number of conditions as discussed in the following sections of this report.

Recommendation 1

The Environmental Protection Authority concludes that the project as described in the Public Environmental Report and as shown in Figure 2 of this report, for a single transmission line corridor between the Northern Terminal substation and the Pinjar Gas Turbine Power Station is environmentally acceptable and recommends that it could proceed subject to the Authority's recommendations in this Assessment Report and the commitments made by the State Energy Commission of Western Australia with regard to environmental management of the project.

The Environmental Protection Protection Authority is opposed in principle to the unnecessary proliferation of transmission line corridors and considers that any future power lines proposed in this section of the metropolitan region should be required to utilise the corridor as assessed and approved in this report.

Recommendation 2

The Environmental Protection Authority recommends that all future major power lines in this section of the metropolitan region should be located within the transmission line corridor agreed to in this Assessment Report.

5.1 Impact on Melaleuca Park Nature Reserve

The proposed corridor route impinges on the south western corner of Melaleuca Park Nature Reserve. This reserve is the subject of System 6 recommendation M9 which describes the reserve as containing the most important example remaining in State Forest of the coastal vegetation type that is characteristic of the Bassendean Dune System. This system includes low open forest of banksia on the dunes and paperbark and white myrtle in the wetlands.

Whilst the Authority was reluctant to allow transgression of the corridor into the reserve it recognised the severe constaints applying to locating the corridor outside the reserve. The reduced RAAF exclusion zone prohibited moving it to the east, and the Meadowlands Estate residential area prevented a location further to the west. Therefore, in order to minimise adverse impact on the reserve the construction and operation of all lines placed within the corridor will require environmentally sensitive planning and management

Recommendation 3

The Environmental Protection Authority recommends that prior to any ground disturbance activity in Melaleuca Park Nature Reserve, the State Energy Commission of Western Australia prepare and subsequently implement an environmentally sensitive construction and operation programme to minimise disturbance to the flora, fauna and wetlands of the nature reserve to the satisfaction of the Environmental Protection Authority upon advice from the Department of Conservation and Land Management.

5.2 Visual impact

The original route of the transmission line was the subject of complaints from residents in the region of Meadowlands Estate and Perry Road regarding the adverse visual impact of the transmission line towers. The amended proposal has located the line substantially within State Forest 65 thus screening the line from nearby residence and public roads. The southern part of the route south of Gnangara Road will be located between Beechboro Road and the extension to Tonkin Highway and therefore will be visually intrusive. There is little that can be done to modify this aspect.

5.3 Clearing of vegetation

The corridor route north of Gnangara Road is substantially within State Forest 65. In the southern part of this area the predominant type of vegetation is pines within the Gnangara Pine Plantation. The clearing of the alignment will result in loss of earnings to the Department of Conservation and Land Management who manage the plantation. The Authority understands that compensation will be paid to the Department of Conservation and Land Management by SECWA for these losses.

In addition to the concerns expressed above in relation to Melaleuca Park, the corridor route traverses other

significant areas of native vegetation in the northern section The vegetation is primarily banksia woodland which is becoming geographically restricted in the metropolitan region owing to urban expansion.

SECWA has undertaken commitments (Appendix 1) to carry out pre-construction flora and fauna surveys after the position of the line within the corridor has been finalised. Should any gazetted rare or geographically restricted flora be encountered during the survey the alignment will be shifted so as not to cause any disturbance.

The Environmental Protection Authority is concerned with the minimisation of disturbance to native vegetation clearing and in the absence of a clear prescription in the form of a vegetation clearing policy by SECWA, requires that clearing and damage of native vegetation for this transmission line be minimised.

Recommendation 4

The Environmental Protection Authority recommends that prior to clearing of vegetation for construction purposes, the State Energy Commission of Western Australia identify those areas of significant native vegetation and then prepare and subsequently implement a plan for clearing requirements for areas identified to the satisfaction of the Environmental Protection Authority on advice from the Department of Conservation and Land Management.

5.4 Dieback management

The spread of dieback disease is a serious problem in areas of native vegetation. The predominant banksia species within State Forest 65 are very susceptible to dieback disease. As the disease can be easily spread by vehicles it is important to ensure that adequate measures are taken to minimise dieback movement, particularly during the construction phase when most vehicles will be present.

Recommendation 5

The Environmental Protection Authority recommends that prior to the commencement of construction activity, the State Energy Commission of Western Australia prepare and subsequently implement a dieback hygiene programme to the satisfaction of the Department of Conservation and Land Management.

5.5. Impacts on groundwater resources

State Forest 65 through which the transmission line passes, lies over the Gnangara groundwater mound, a Priority 1 groundwater supply area which is an integral part of Perth's water supply. It is therefore important that the proposed transmission line does not cause any polluting substances to enter the groundwater system. SECWA is aware of the importance of the Gnangara groundwater supply and have made a commitment to ensure that any potential contaminants used during the construction phase of the project will be strictly controlled and no disposal of these substances will take place on-site.

The Environmental Protection Authority regards the prevention of pollution to the groundwater system as being manageable and SECWA's commitment as an indication of serious intent on its part to prevent pollution of the groundwater.

5.6 Electromagnetic radiation

A high level of public concern was expressed at the possibility of adverse health effects from exposure to the electromagnetic field from power lines.

Wherever electricity is transmitted and used it produces electric and magnetic fields. This applies equally to electricity usage in the street, in the home, at work or in public places. Sources of electric and magnetic fields include: high-voltage power lines; street distribution lines; electrical equipment in factories, shops and offices; appliances in the home, and household wiring.

Electric and magnetic fields are concentrated close to the source, such as a power line, and reduce as distance from the source increases.

Electric fields are produced by the voltage of the supply and extend from the source to earth. These fields are basically constant for a particular source and do not vary with changing load on the source.

The electric fields produced from power lines outside a house contribute little to the electrical field within the house as the intervening building structure and vegetation conduct the field to earth. Electrical fields generated by household appliances are very low owing to the low voltage of the household supply.

Magnetic fields are produced by the flow of an electric current. The current and hence the magnetic field vary with the demand on the source, be it an electrical appliance, or a power line. As with electric fields the strength of the magnetic field varies with distance from the source. An essential difference between the two types of fields is that magnetic fields are not significantly reduced by buildings or vegetation.

Sources of magnetic fields in homes are the fields from external power lines, household wiring and household appliances.

Over the past 20 years considerable research effort has been directed at attempting to determine whether electromagnetic fields cause adverse health effects. The research to assess the effects of exposure to electromagnetic fields at the frequency used in electrical transmission lines has been divided into two categories: biological and epidemiological.

The biological research has been carried out in the controlled environment of a laboratory where the scientific parameters of the tests can be easily reproduced. These tests on laboratory animals have not provided evidence to show that electromagnetic fields from power lines are a danger to the health of people in normal suburban or domestic environment.

Epidemiological studies, which utilise statistical methods to evaluate possible associations between potentially harmful agents and patterns of disease in human populations, have produced inconclusive findings. Whilst some studies have reported a statistical association between power lines and increased risk of cancer others have found no such association.

The debate over the health issue prompted the Environmental Protection Authority to have a review carried out on high voltage power line fields and effects on human health in 1987 (Scott and Furphy, 1987). This review concluded that although a link between electromagnetic fields and human health is inconclusive, field levels in Western Australian installations will 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.

The International Non Ionising Radiation Committee (INIRC) was established in 1977 by the International Radiation Protection Association (IRPA) in conjunction with the World Health Organisation, to evaluate the health risks of human exposure to electromagnetic radiation. INIRC has produced guidelines for human exposure to electromagnetic fields from power lines.

The guidelines, reproduced in Table 1, are based upon an objective analysis of currently available knowledge. However IRPA/INIRC concede that further research is required to determine questions raised in epidemiological research.

Exposure Characteristics	Electric field strength kV/m	Magnetic flux *u*T
OCCUPATIONAL		
Whole working day	10	500
Short term	30[a]	5,000[b]
For limbs	-	25,000
GENERAL PUBLIC		
Up to 24 hours/day[c]	5	100
Few hours per day[d]	10	1,000

Table 1 : IRPA/INIRC limits of exposure to 50/60 Hz electric and magnetic fields (Interim Guidelines)

Notes:
(a) Short-term occupational exposure to electric field strengths between 10 and 30 kV/m is permitted provided the electric field strength (kilovolts/metre) multiplied by the duration of exposure (hours per work-day) does not exceed 80.
(b) Maximum exposure duration is 2 hours per work day.
(c) This restriction applies to open spaces in which members of the general public might reasonably be expected to spend a substantial part of the day, such as recreational areas, meeting grounds and the like.
(d) These values can be exceeded for a few minutes per day provided precautions are taken to prevent indirect effects.

To allow comparison of the limits of exposure set by IRPA/INIRC to the West Australian situation, results of a power line field survey contained in the Scott and Furphy report are set out in Table 2. The survey was carried out by Dr J Livingstone and Professor W Humpage of the Energy Systems Centre at the University of Western Australia. The derived results are from tests carried out on a double circuit 330 kV transmission line at Middle Swan which is similar to the proposed transmission line between Pinjar and Northern Terminal.

DISTANCE FROM CENTRE LINE (m)	ELECTRIC FIELD (kV/m)	MAGNETIC FIELD (*UT*)
0	3.3	2.3
10	2.5	2.5
20	1.0	1.6
30 (boundary of easement)	0.25	1.0

(Derived from Livingstone J and Humpage W, 1987).

Table 2 : Electrical and magnetic field levels under the SECWA 330kV Double Circuit Transmission line on Toodyay Road, Middle Swan.

Comparison of the tables shows the recommended safe exposure levels for the general public of 5 kilovolts per metre (kV/m) for electric fields and 100 micro tesla under normal suburban or domestic conditions would not be exceeded. The levels at the boundary of the SECWA easement, which is the nearest point a residence could be built, are 0.25 kV/m and 1 *u*T, which are well below the recommended levels.

The Environmental Protection Authority sought advice from the Health Department of Western Australia (Appendix 3) on the issue of electromagnetic radiation from the proposed transmission line. That Departments position was that "electric and magnetic field strengths in residential areas arising from the transmission lines will be well below the limits set down in the IRPA Guidelines. Fields in residential areas from the the transmission line will be lower than those arising from many household appliances in everyday use such as, electric mixers, fluorescent lamps and hair dryers".

The Victorian Power Line Review Panel which recently completed its final report regarded the issue of health and electromagnetic radiation to be extremely important. The Panel noted the lack of conclusive scientific evidence to prove or disprove the claims of adverse health effects. Given the importance of electricity to our way of life and the substantial costs associated with ensuring that all electromagnetic radiation from power lines was reduced to zero, the Panel expressed the view that, society has to make the decision on whether it will accept a certain level of risk associated with electromagnetic radiation from power lines.

The Power Line Review Panel went on to say that in their view the important aspect of this debate is the provision of adequate information to be made on the risks associated with electromagnetic radiation from power lines.

The Environmental Protection Authority agrees with this statement.

However it is often the case that the elements of a proposal are not all ready for environmentral assessment at the one time. This was the case with the Pinjar power station and the proposed power line. In view of this and the need for speedy implenentation of the power station proposal, if projected Perth power demands were to be met, the Authority acknowledged the need for separate assessment in this case.

6. Conclusion

The proposal by SECWA for a transmission line corridor between the Northern Terminal Substation and the Pinjar Gas Turbine Power Station 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.

In terms of this project the Environmental Protection Authority's assessment procedure, particularly the public review phase, has provided the opportunity for members of the public to express their concerns with a proposal and for the proponent to change the proposal to render it more environmentally acceptable. This has been done in a spirit of co-operation with those parties involved particularly SECWA, Department of Defence, Overseas Telecommunications Commission and the Powerline Action Group.

References

Powerline Review Panel 1989. Final Report: The Brunswick to Richmond Powerline Review Panel. Melbourne, July 1989.

Scott and Furphy Engineers Pty Ltd 1987. Review of High Voltage ELF Transmission Line Field and Human Health Effects: A Report to the Environmental Protection Authority. Perth, 1987.

Department of Conservation and Environment 1983. Conservation Reserves For Western Australia as recommended by the Environmental Protection Authority-1983. The Darling System - System 6. Perth, 1983.

Appendix 1

Environmental management commitments by the proponent

PROPOSED TRANSMISSION LINE
NORTHERN TERMINAL TO PINJAR POWER STATION
MANAGEMENT COMMITMENTS

A detailed study has been carried out to identify the location of suitable corridor between Northern Terminal and Pinjar on the basis of a range of economic, biophysical and social criteria. SECWA is willing to make the following commitments to ensure that the selected corridor causes the least environmental disruption:

- **Commitment 1:**
  The preferred corridor option will be examined in detail and the exact alignment of the powerline selected to take into account the economic, biophysical and social criteria referred to above. Specifically, the route alignment will be selected to minimise the clearing of vegetation, and avoid contact with rare plants and historic, Aboriginal, or other localised natural or cultural features of significance.

The proposed transmission line will pass through approximately 1km of Melaleuca Park. SECWA is prepared to make the following commitment in order to minimise the impact of the line:

- **Commitment 2:**
  SECWA will optimise the alignment of the transmission line in order to reduce the length of Melaleuca Park traversed. The towers in the vicinity of Melaleuca Park will be spaced so that a minimum number of towers will be located inside the park.

Melaleuca Park contains a small wetland which is located inside the proposed corridor. It is both ecologically and geotechnically undesirable to locate towers in a wetland. SECWA makes the following commitment regarding this wetland:

- **Commitment 3:**
  The transmission line will wherever possible be located to avoid the placement of towers within any wetland.

The major land use along the preferred corridor is State Forest which consists mainly of pine plantations. The visual impact of the segments of the preferred corridor that pass through the State Forest will be minimal. The backdrop provided by the Forest when the line emerges (from the south of Lake Pinjar) will help minimise visual intrusion outside the forest. SECWA is willing to make the following commitment to reduce visual intrusion:

- Commitment 4:
  SECWA will ensure that the spacing of towers and their levels will be given special attention during detailed design in order to minimise visual intrusion on the landscape, particularly where the line emerges from the State Forest.

The construction phase of the project can potentially lead to localised, physical damage to the landscape. This can occur as a consequence of moving heavy equipment to the site of each tower, prior to the installation of large foundations. SECWA is prepared to make the following commitment to ensure that there are no long term physical effects caused by the installation of the towers:

- Commitment 5:
  SECWA will make every effort to ensure that the physical disturbance to each tower site, the access road leading to the site, and land either side of the corridor will be kept to a minimum, and rehabilitated where necessary.

The preferred corridor is characterised by generally flat terrain and porous sands, hence runoff is unlikely to be a major problem. Vegetation surrounding each tower will be left undisturbed where possible, to minimise localised erosion. SECWA is willing to make the following commitment in respect of erosion:

- Commitment 6:
  Each tower site will be inspected annually to ensure that runoff is not causing localised erosion.

- Commitment 7:
  Should these inspections indicate erosion, the SECWA will notify the EPA and carry out remedial action. This would include recontouring and vegetation rehabilitation.

A desk-top investigation has been performed to ensure that the preferred corridor does not interfere with any known population of gazetted rare or geographically restricted flora. SECWA is willing to make the following commitment to ensure that rare flora are not impacted:

- Commitment 8:
  SECWA will undertake pre-construction flora and fauna surveys once the alignment of the line within the preferred corridor has been finalised.

- Commitment 9:
  The results of this survey will be forwarded to the EPA.

- Commitment 10:
  If any gazetted rare or geographically restricted flora are encountered during the pre-construction vegetation survey, the towers and access roads will be located so as not to cause any disturbance.

During the operation of the line, maintenance crews will require periodic access to the towers. Similarly, SECWA staff inspecting for erosion and vegetation growth under and near to the transmission lines, will require access. SECWA realises that such movements could increase the spread of dieback disease, and is therefore willing to make the following commitments:

- Commitment 11:
  SECWA will ensure that all maintenance and observation crews requiring access to the transmission line will strictly observe the comprehensive procedures developed by CALM, to minimise the risk of spreading dieback.

The transmission line corridor will result in some disruption to forest management practices in State Forest 65. SECWA recognise the importance of these practices, particularly from the point of view of forest productivity, aerial operations and fire management. They are therefore prepared to make the following commitment:

- **Commitment 12:**

  SECWA will continue to consult with CALM to ensure that routing and operation of transmission lines through the State Forest will cause as little disruption to forest management practices as is practicable. SECWA will inform CALM of the centre line of the route as soon as this has been determined, so that appropriate modifications can be made to forest clearing and fire management plans.

The preferred corridor traverses the Gnangara Groundwater Mound which is a major source of water for Perth. SECWA is willing to make the following commitment to ensure that their activities do not adversely affect the quality of groundwater:

- **Commitment 13:**

  Any fuel oils or potential groundwater contaminants that are used during the construction phase of the project will be strictly controlled. None will be disposed of on-site.

SECWA recognise that there is a need for an ongoing management programme to ensure that the commitments outlined above are addressed systematically, and that the results of the programme are referred to the EPA. The following commitment is given:

- **Commitment 14:**

  SECWA will prepare an Environmental Monitoring Programme (EMP) that will formalise the Environmental Commitments described above. The EMP will be prepared annually for three years, at which time the results of the Programme will be reviewed, and the form of ongoing monitoring re-assessed.

Appendix 2

List of issues raised in submissions

SUMMARY OF ISSUES RAISED	NUMBER RAISING ISSUE	REFERENCE IN REPORT
REVIEW PROCEDURE		
• Period of public review too short	17	4.1
• Assessment procedure is merely a formality	2	4.1
HEALTH IMPACTS		
• Effects of electro-magnetic radiation (EMR) on human health not adequately addressed	62	4.2
• Health hazards associated with EMR should be investigated by an independent body	5	4.2
PUBLIC ENVIRONMENTAL REPORT (PER)		
• Economic cost is the sole determinant of location and nature of power line	35	4.3
• Alternatives were not considered	11	4.3
• The recent Victorian powerline study was not taken into account	7	4.3
• Lack of community consultation during preparation of PER	29	4.3
• Position of alignment within the corridor was not given	18	4.3
• Report was lacking in necessary detail so proper evaluation was difficult	17	4.3
CORRIDOR LOCATION		
• Corridor should be in state forest inside RAAF exclusion zone	78	4.4
• Above ground lines should be located away from people and houses	85	4.4
• Utilise one corridor instead of two	18	4.4
LIFESTYLE AND AMENITY		
• Lines will cause visual pollution	36	4.5
• Property will be devalued	9	4.5
• Lines should be put underground	29	4.3
OTHER ISSUES		
• Lack of coordinated planning.by all parties involved	14	4.6
• Transmission lines should have been examined at the same time as the gas turbine site	8	4.6
• Existing Muchea line should be used	3	4.6

Appendix 3

Responses from Government agencies

1909

Western Australia

Health

Commissioner of Health

Your ref
Our ref
Enquiries

Mr RAD Sippe
A/Director
Evaluation Division
Environmental Protection Authority
1 Mount St
PERTH 6000

Dear Mr Sippe

Northern Terminal - Pinjar Transmission Line

I reply to your request for my Department's comments on the health impact of electromagnetic fields from the proposed Pinjar - Northern Terminal transmission line.

As you are probably aware, community interest in the health effects of electromagnetic fields arose from publicity given to epidemiological studies which indicated an association between residence near power lines and certain human cancers. There were, however, a number of inadequacies in the way some of these studies were conducted, and several other studies did not support their findings. Taken as a whole, the epidemiological data have been judged to be inconclusive, although it is recognised that they cannot be ignored and that further research of this type is required.

Recognizing the inconclusive nature of the epidemiological studies, the International Non-Ionising Radiation Committee (INIRC) did not give them any weight in formulating its guidelines for public and occupational exposure to ELF fields (most recent version enclosed). These guidelines, which form part of the World Health Organisation's (WHO) Environmental Health Criteria Programme, specify exposure limits based on established or predicted immediate health effects produced by currents induced in the body by external electric or magnetic fields. The recommended limits induce current densities that are at, or slightly above, those normally occurring in the body. They would not be expected, therefore, to have any significant biological effects.

While the epidemiological studies should not be ignored, the view of most health authorities is that they should not be taken into account when prescribing limits of exposure until more definitive data have been obtained. The current WHO/INIRC guidelines provide health professionals and power system designers with interim reference points for assessing the possible health impacts of existing and planned power transmission lines. Prudence suggests that until knowledge is more complete,

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Telegrams WAHEALTH Letters PO Box 8172 Stirling St Perth 6000

028976 INFO

exposure levels should be kept as low as is practicable. The INIRC has demonstrated its awareness of the sensitivity and currency of this issue through its relatively frequent reviews of the guidelines.

Power lines in Western Australia were studied in the June 1987 report compiled by Scott and Furphy Consulting Engineers for the Department of Conservation and Environment[1]. Appendix 2 of that report consists of a power line field survey undertaken by Dr J Livingstone and Prof D Humpage of the Energy Systems Centre at the University of WA. Of relevance to the proposed Pinjar - Northern Terminal Line are the measurements done on 330kV double-circuit transmission lines at Middle Swan and Carmel (Figures 1-4 and Tables 1&2). These data show that the maxima for both the electric and magnetic fields are below the latest INIRC recommended limits for the general public, which are 5kV/m and 100uT respectively. The magnetic field (which is suspected of being the more bio-effective) is considerably below the limit. These maxima predictably occur at or near the centre of the easement, and the fields diminish rapidly towards and beyond the easement boundary. The magnetic field at the boundary is typically about 1uT, which is one-hundredth of the INIRC limit.

It is reasonable to assume that the electromagnetic field strengths from the Pinjar - Northern Terminal line will be comparable to those from existing 330kV double-circuit installations and would, therefore, be associated with levels of exposure to ELF that are well within the INIRC limits.

In summary, epidemiological data exist which suggest that exposure to ELF at levels similar to those experienced in normal suburban environments could be associated with an increased risk of cancer. These studies, however, are widely judged to be inconclusive. Standard setting by international agencies, therefore, has been based on other evidence of biological effects of ELF which suggests that much higher levels of exposure to ELF, and certainly those likely to be associated with 330 kV power lines, are unlikely to be associated with any significant hazard to health.

Yours sincerely

Bruce K Armstrong
Commissioner of Health

25 August 1989

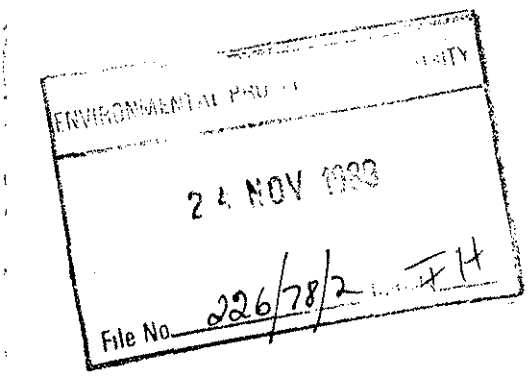
bka:amh 90815ba2

[1] "Review of High Voltage ELF Transmission Line Fields and Human Health Effects"

Western Australia

Environmental Health Branch
Radiation Health Section

Your ref
Our ref JT:SS TE235
Enquiries Thwaites Ext 2269



The Chairman
Environmental Protection Authority
1 Mount Street
PERTH W A 6000

Dear Sir,

Following the SECWA meeting on the 14th of November 1989 to which interested groups were invited to comment on the proposed transmission line to be constructed from the Pinjar Power Station to the Northern Terminal.

We note the transmission line will pass through non-residential areas. The line will however pass close to the Meadowland Estate and as such will attract comment from residents living in the area. From the description of the line voltage and easements to be used, it is unlikely that WHO guideline figures will be exceeded. It is inevitable that the line will draw criticism, most likely for asthetic reasons, which will undoubtedly be manifest as a health issue. Residents will also have a genuine concern for their health related to the electric and magnetic fields from the transmission line.

It is appropriate that the SECWA document, presented at the meeting, make some reference to the NH & MRC guideline figures and explain that electric and magnetic fields will be within the guideline figures for areas of high public occupancy.

A suggested form of the inclusion on health issues is set out below.

Electric and magnetic field strengths in residential areas arising from the transmission lines will be well below the limits set down in the NH & MRC Guidelines. Fields in residential areas from the transmission line will be lower than those arising from many household appliances in everyday use such as, electric mixers, fluorescent lamps and hair dryers.

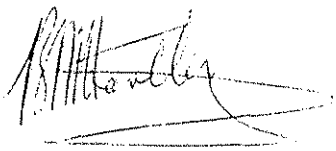
The strength of electric and magnetic fields will fall rapidly with distance from the transmission line and will be below the NH & MRC Guideline figures at a distance of 10 to 30m from the centre of the line route. A buffer zone has been planned which will be more than adequate to meet the requirements of the guidelines.

031403

Queen Elizabeth II Medical Centre Verdun Street Nedlands WA 6009
Tel (09) 389 2260 Fax (09) 381 1423 Letters GPO Box X2307 Perth WA 6001
The Health Department of Western Australia - promoting a smoke free environment

The NH & MRC guidelines were developed in order to protect the health of humans from potentially harmful effects of exposure to electric and magnetic fields at frequencies of 50/60 Hz and are primarily based on established or predicted effects. The guidelines represent the combined knowledge of our society on these types of fields presented in a form of most use in protecting the health of humans.

Yours sincerely,



B M Hartley
Physicist in Charge
Radiation Health

21 November 1989

jt211189.ss

WATER AUTHORITY of Western Australia

Your Ref
Our Ref
Enquiries N Arrowsmith
Tele Direct 420 2308

629 NEWCASTLE STREET
LEEDERVILLE W.A.
Postal Address: P.O. Box 100 Leederville
Western Australia 6007
Telephone: (09) 420 2420 Telex: AA 95140
Facsimile: (09) 328 2619

Chairman
Environmental Protection Authority
1 Mount Street
PERTH WA 6000

Attention: Mr R Griffiths

SUBMISSION ON PROPOSED TRANSMISSION LINE CORRIDOR - NORTHERN TERMINAL TO PINJAR POWER STATION

I refer to the above proposal which is currently being considered by your Authority. The Water Authority has two areas of concern with the proposed corridor, relating to the impact on the Authority's vegetation monitoring programme, and fuel storage during construction of the transmission lines.

Part of the Water Authority's monitoring programme which examines the impact of groundwater abstraction from the Gnangara Mound involves long term vegetation monitoring at numerous locations on the Mound. Fixed vegetation transects are used for this purpose. The monitoring programme forms part of the requirements of the Minister for Environment associated with approval for abstraction of water from the Gnangara Mound.

From the information provided by the SEC, two of the vegetation transects appear likely to be directly affected by construction of a transmission line/s within the preferred corridor. These two transects are:

- Neaves transect, located in the SW corner of Melaleuca Park; and

- P50 transect, adjacent to Perry Road, just south of the rifle range.

Each vegetation transect is 200 metres long and 40 metres wide.

The Neaves transect was established in 1966, and is extremely valuable as it enables comparisons of vegetation responses to water level variations over a long period of

time, and prior to public groundwater abstraction in the area. The transect is an extremely important element of the Authority's monitoring programme whose value will be negated by the effects of transmission lines.

The P50 transect was established in 1988, and is being used for a detailed study of the effects of well commissioning on vegetation. This research programme is unlikely to be completed prior to the end of 1991, and may extend beyond this date. The transect is also monitored as part of the Authority's long term monitoring programme.

Apart from the scientific value of these sites, considerable expenditure has been made in establishing and monitoring the transects.

Impacts on the vegetation transects from the transmission line could possibly occur in two ways:

- direct clearing of the vegetation transects themselves; and

- vegetation removal within about 500 m of the eastern side, and 200 m of the western side, of the transects. This is because vegetation removal will effect the water table under the transects, having implications for the determination of pumping effects on water table fluctuations and consequent vegetation responses.

For the above reasons, the Water Authority strongly opposes the clearing of vegetation within 500 m to the east and 200 m to the west of the established vegetation transects. It appears that such clearing could result from construction of the transmission line/s depending on their location within the proposed corridor.

I attach a map showing the approximate locations of the two transects and buffer areas. An officer of the Water Authority's Environmental Management Section is available to take EPA or SEC representative on-site if necessary. Also, the Water Authority can provide you with more detailed survey information on the transect locations, if required.

With regard to the storage of fuel, the proposed corridor falls within the Mirrabooka and Wanneroo Underground Water Pollution Control Areas. Bylaws for the protection of groundwater from pollution apply to these areas. As a part of the Bylaws, any fuel storage for construction crews en route must comply with the attached specification.

Should you have any enquiries relating to this submission, please contact the Authority's Environmental Officer on telephone 420 2308.

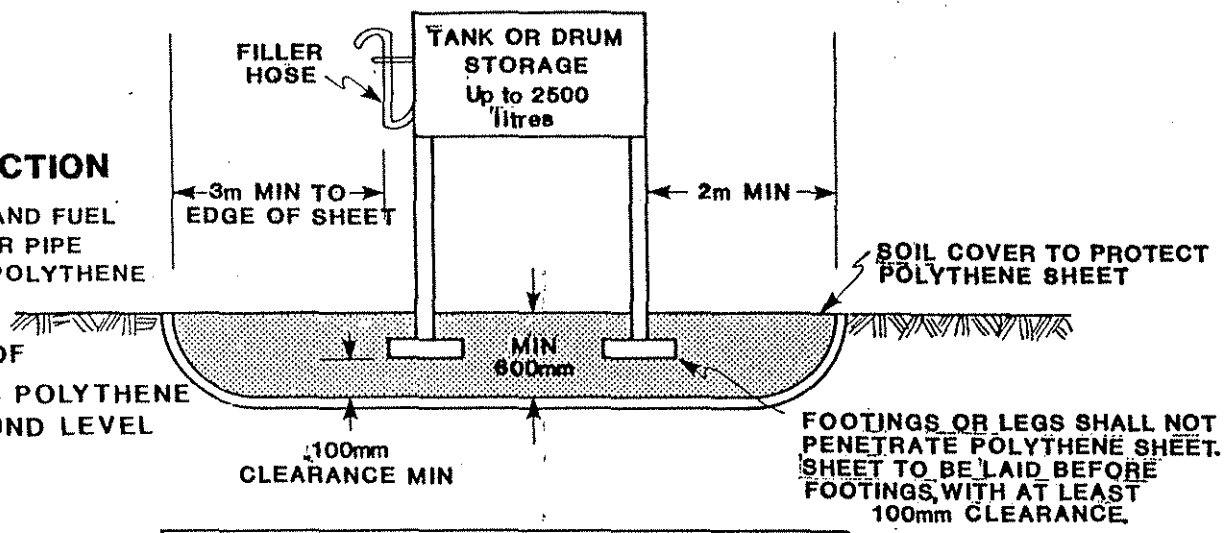
Yours sincerely

H B Ventriss
Manager, Groundwater

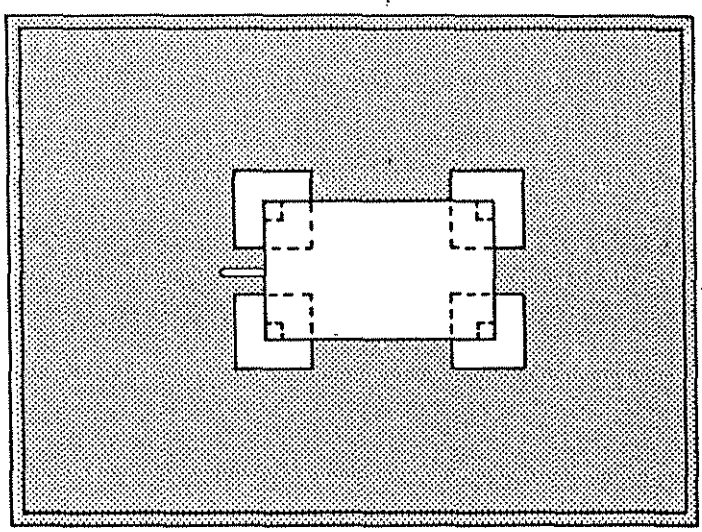
27 November 1989

CROSS SECTION

FILLER HOSE AND FUEL TANKER FILLER PIPE TO BE OVER POLYTHENE



PLAN



NOTES:

1. CONSTRUCTION OF FLAMMABLE LIQUID STORAGE TANK TO BE IN ACCORDANCE WITH FLAMMABLE LIQUIDS REGULATIONS 1967 AS AMENDED.
2. THE BELOW GROUND POLYTHENE LEAKAGE TRAP IS TO BE LEAKPROOF AND CAPABLE OF RETAINING ANY HYDROCARBON SPILLAGE. THE SHEET MUST BE SEAM WELDED AT EDGES, TO FORM A CONTINUOUS SHEET OVER THE SPECIFIED AREA.
3. THE POLYTHENE SHEET THICKNESS REQUIRED:– 0.2mm
4. THE POLYTHENE SHEET (OR OTHER IMPERVIOUS LINING) MUST BE APPROVED BY THE WATER AUTHORITY AND INSTALLED IN THE PRESENCE OF A WATER AUTHORITY REPRESENTATIVE.
   PHONE: 420 3019 or 420 2520
5. FOOTINGS OF THE TANK, OR FENCE POSTS OVER THE POLYTHENE SHEET ARE NOT PERMITTED TO PUNCTURE THE SHEET. A MINIMUM CLEARANCE OF 100mm IS REQUIRED.
6. ON REMOVAL OF THE FUEL TANK, ALL OIL CONTAMINATED SOIL MUST BE DISPOSED OF OUTSIDE THE U.W.P.C. AREA, AT AN APPROVED WASTE DISPOSAL SITE.
7. THE FILLER HOSE AND FUEL TANK FILLER PIPE MUST BE OVER THE POLYTHENE, WITH A MINIMUM CLEARANCE TO THE EDGE OF THE SHEET OF AT LEAST 3 METRES.

ORIGINAL DRAWING SIZE	DRN	Water Authority of Western Australia	TEMPORARY SMALL ELEVATED FLAMMABLE LIQUIDS (HYDROCARBONS) INSTALLATIONS IN UNDERGROUND WATER POLLUTION CONTROL AREAS			
A4	CHD		FILE	PROJECT	PLAN	ISSUE

FORM 6050

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

Please address all enquiries to: NORTHERN FOREST REGION
3044 ALBANY HIGHWAY
KELMSCOTT W A 6111
TELEPHONE: (09) 390 5977

Your Ref:
Our Ref: NR 17/01/01 EAJ:ja
Enquiries: Mr Jenkins

The Chairman
Environmental Protection Authority
1 Mount Street
PERTH WA 6000

ATTENTION: Mr R Griffiths

PROPOSED TRANSMISSION LINE CORRIDOR NORTHERN TERMINAL TO PINJAR POWER STATION

Regional Manager for the Northern Forest Region, Mr Eric Jenkins, and Regional Planning Officer Mr Alan Briggs, attended an information meeting conducted by Mr Martin Pitt of SECWA on Tuesday 14 November, 1989.

Effect of Easement on State Forest

The effects of the proposed line route on CALM land and operations will be the following:

1. Some 255 hectares of pines will require to be clear felled prior to maturity and maximum economic return, and this land will be permanently lost to CALM requirements.

2. The necessity to prematurely remove and market approximately 15,000m^3 of pine volume from the area required for the line will divert operators from the wider spread thinning of pines over the Gnangara mound to the basal area agreed with WAWA.

3. Of the approximately 15,000m^3 of pine to be removed an estimated 6,000m^3 is required for processing in the medium density fibre plant which will commence operations in the Metropolitan area later in 1990.

   To avoid waste this material will require to be stockpiled until it can be accepted into the factory. To prevent deterioration of logs arising from drying out and consequent splitting and insect and fungal attack, the stockpile will need to be sprayed once or more daily. Space and water and power supply for this can be found in CALM land at Gnangara, but costs will be incurred due to deferral of return from extraction costs, extra distance and double handling to stockpile site, preparation of stockpile floor and installation of sprays and pumps.

4. During the construction period there will be increased usage and wear and tear on existing Departmental roads.

   It is important that these roads be kept open and in a safe condition at all times of the year to maintain emergency access for wildfire suppression (nine months of the year) and search and rescue.

5. The Department carries out regular aerial prescribed burning of the Gnangara-Pinjar pines in order to minimise the possibility of damage to the pines and to neighbouring property from fires occurring in the pines.

   Aerial spreading of fertiliser is also carried out from time to time, using contract aircraft operating from strips within the plantation.

   Power lines through the plantation constitute a physical hazard to low flying fixed wing aircraft used for aerial burning, and an obstacle for helicopters and crop spreading fixed wing aircraft.

6. The Department is reliant upon VHF radio contact with personnel operating in the pines for reasons of safety, fire control, and operational efficiency.

   Ground to air radio contact is also necessary during use of aircraft for prescribed burning, aerial fertilising, and fire reconnaissance.

   The extent to which will be jeopardised by the powerlines is unknown.

7. The corridor includes a shooting complex leased from CALM by the Wanneroo Shire. This will require to be relocated by agreement between SECWA and the Shire.

Summary of Environmental Costs

1. Loss of approximately 300 hectares of multi-purpose State Forest land, and approximately 30 hectares of State Forest proposed to be Nature Reserve (Melaleuca Park).

2. Deferment of rate of thinning over Gnangara Mound due to the requirement to mount a more intensive operation over a smaller area.

3. Installation of irrigated stockpile at Gnangara with consequent increased water usage, and drainage from logs into the underground reservoir, unless:

(i) Clearing can be deferred until the medium density fibre factory commences operating later in the year. (Work on pylons only could proceed earlier with less wastage.)

or (ii) SECWA can find an alternative irrigated site off the Gnangara mound for stockpile. A maximum flat area of 5-10 hectares is required.

4. Decreased ability and/or increased cost of measures designed to reduce risk to life, property and vegetation from wildfires in the Gnangara-Pinjar area.

5. Dependence on native or imported timber to replace produce intended to be harvested later from the cleared plantation area.

Summary of Financial Costs

1. Loss of income due to premature harvesting of pine.

2. Cartage to stockpile, double handling at stockpile, installation of irrigation equipment, supply of water.

3. Road repairs and maintenance.

4. Increased cost of burning, fire suppression fertilising operations or costs of not being able to carry out those operations safely.

Compensation

The Department will require a satisfactory agreement to compensation for these disadvantages, prior to agreeing to the power line installation.

Of major concern is the replacement of the land lost.

Syd Shea

SYD SHEA
EXECUTIVE DIRECTOR

22 November, 1989

ALL CORRESPONDENCE TO BE ADDRESSED TO CHIEF EXECUTIVE

IN REPLY PLEASE QUOTE

YOUR REF

OUR REF

Mr A Jackson:as

808-2-30-2 V2

DEPARTMENT OF
PLANNING AND URBAN DEVELOPMENT

CHAIRMAN
ENVIRONMENTAL PROTECTION AUTHORITY

ATTENTION: MR R GRIFFITHS

SECWA PROPOSED TRANSMISSION LINE CORRIDOR NORTHERN TERMINAL TO PINJAR POWER STATION.

Recently the Department attended a briefing by SECWA, together with all authorities concerned, on the preferred corridor arrived at through the PER process.

Representatives were requested to submit any further comments to you.

The Department considers the revised alignment preferable to the previous options, on the basis that private property and the rural zone are less affected, and that a shorter overall route is involved.

Previous comment in relation to Whiteman Park is reiterated. In this respect it is presumed that the actual line corridor (i.e. 160m wide) will pass outside the Park's western boundary.

Yours faithfully

Gordon G Smith

GORDON G SMITH
SECRETARY

20 November 1989

08/1368

Oakleigh Building 22 St. Georges Tce., Perth, Western Australia 6000 Tel (09) 425 7333 Fax (09) 325 4173