Denison 3D Seismic Survey - Shire Of Irwin

Arc Energy Limited and Origin Energy Developments Pty Ltd

Report and recommendations
of the Environmental Protection Authority

Environmental Protection Authority
Perth, Western Australia
Bulletin 1147
September 2004

Environmental Impact Assessment Process Timelines

Date	Progress stages	Time (weeks)
27 April 2004	**Level of assessment set (following any appeals upheld)**	**0**
8 June 2004	**Proponent document released for public comment**	**6**
27 July 2004	**Public comment period closed**	**7**
17 Aug 2004	**Final proponent response to the issues raised**	**3**
13 Sept 2004	**EPA report to the Minister for the Environment**	**4**

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Summary and recommendations

This report provides the advice and recommendations of the Environmental Protection Authority (EPA) to the Minister for the Environment on the environmental factors relevant to the proposal by ARC Energy Limited and Origin Energy Developments Pty Limited as co-proponents (referred to in this report as ARC/ Origin), to carry out a 3D seismic survey for petroleum exploration purposes over approximately 400 square kilometres of land in the Shire of Irwin.

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to the proposal and on the conditions and procedures to which the proposal should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit.

Relevant environmental factors

The EPA decided that biodiversity conservation (flora, fauna and nature conservation) is the relevant environmental factor for this proposal requiring detailed evaluation in this report. Key issues relating to this factor include:-

a) direct impacts on flora, vegetation and fauna habitat;
b) direct impacts on fauna;
c) indirect impacts on flora, vegetation and fauna habitat; and
d) quality and security of seismic line closure and rehabilitation / regeneration.

There were a number of other factors which are relevant to the proposal, but the EPA is of the view that the information set out in Appendix 3 provides sufficient evaluation of these factors.

Conclusion

The EPA has considered the proposal by ARC Energy Limited and Origin Energy Developments Pty Limited to carry out a 3D seismic survey over a total area of approximately 400 square kilometres within the Shire of Irwin, as described in the proponents PER and proponent's response to submission document.

The EPA has concluded that it is unlikely that the EPA's objectives would be compromised, provided there is satisfactory implementation by the proponent of their commitments and the recommended conditions set out in Appendix 4, and summarized in Section 4.

Recommendations

The EPA submits the following recommendations to the Minister for the Environment:

1. That the Minister notes that the proposal being assessed is for a 3D seismic survey covering approximately 400 square kilometres within the Shire of Irwin;
2. That the Minister considers the report on the relevant environmental factor of 'biodiversity conservation' as set out in Section 3;
3. That the Minister notes that the EPA has concluded that it is unlikely that the EPA's objectives would be compromised, provided there is satisfactory implementation by the proponent of the recommended conditions set out in Appendix 4, and summarised in Section 4, including the proponent's commitments.
4. That the Minister imposes the conditions and procedures recommended in Appendix 4 of this report.

Conditions

Having considered the proponent's commitments and the information provided in this report, the EPA has developed a set of conditions that it recommends be imposed if the proposal by ARC / Origin for the Denison 3D Seismic Survey is approved for implementation.

These conditions are presented in Appendix 4. Matters addressed in the conditions include the following:

a) that the proponent fulfil the commitments in the Consolidated Commitments statement set out as an attachment to the recommended conditions in Appendix 4;

b) preparation and implementation of a significant flora and communities management plan;

c) development and implementation of a seismic line rehabilitation plan;

d) lodgment of a rehabilitation performance bond; and

e) preparation and implementation of a fire management plan.

It should be noted that the proposed survey is also subject to the requirements of the *Petroleum Act 1967*.

Contents

1. Introduction and background

This report provides the advice and recommendations of the Environmental Protection Authority (EPA) to the Minister for the Environment on the environmental factors relevant to the proposal by ARC Energy Limited and Origin Energy Developments Pty Limited as co-proponents (referred to in this report as ARC/ Origin), to carry out a 3D seismic survey for petroleum exploration purposes over approximately 400 square kilometres of land in the Shire of Irwin.

The proposal, which is described within ARC/Origin's Public Environmental Review (PER) document (IRC Environmental, 2004) was referred to the EPA in February 2004 by the Department of Industry and Resources. The proposal affects a significant portion of the Beekeepers, Yardanogo and Dongara Nature Reserves, which are conservation reserves vested in the Conservation Commission of Western Australia, and other native vegetation on Crown land and private property.

In April 2004 the EPA determined the level of assessment for the proposal at Public Environmental Review (PER) and the PER was released for 4 weeks public review from 8 June to 6 July 2004. Submissions from the owners of land directly affected by the proposed survey were accepted over a further 3 week period until 28 July 2004.

Further details of the proposal are presented in Section 2 of this report. Section 3 discusses the environmental factors relevant to the proposal. The Conditions and Commitments to which the proposal should be subject, if the Minister determines that it may be implemented, are set out in Section 4. Section 5 presents the EPA's conclusions and Section 6, the EPA's Recommendations.

Appendix 5 contains a summary of issues raised in submissions and the proponent's response to submissions. This document is included as a matter of information only and does not form part of the EPA's report and recommendations. Issues arising from this process, and which have been taken into account by the EPA, appear in the report itself.

2. The proposal

The proposed Denison 3D Seismic survey, which is proposed to commence in the fourth quarter of 2004, will take place within a survey area with an estimated gross area of approximately 394 square kilometres (39400 hectares). Approximately 782 hectares (2% of the gross area) will be directly accessed by survey activities. Approximately 11455 hectares (29% of the gross survey area) occurs in nature reserves and a further 9900 hectares (25% of the gross survey area) supports native vegetation.

Up to approximately 279 hectares of land within Beekeepers, Yardanogo and Dongara Nature Reserves will be directly accessed by the survey and a further area of up to 126 hectares of

native vegetation outside reserves will be directly accessed. Approximately 250 private land holdings are affected by the proposed survey.

The Denison 3D seismic survey will involve partial clearing of vegetation (referred to as rolling) in lines with a maximum width of approximately 4 metres and with short sections of greater width at turning points. In the majority of the vegetated portion of the survey area a 240 metre by 480 metre interval grid pattern of access-lines will be constructed to allow access by four wheel drive trucks carrying seismic impulse generating equipment and light vehicles carrying receiving equipment. In a portion of the survey area, including part of the Yardanogo Nature Reserve, the access line grid is proposed to be at 240 x 240 metre intervals. The survey will also involve drilling of a number of drill holes (up to 130) of maximum depth 200 metres for data acquisition purposes.

Following the survey it is proposed that ARC / Origin will undertake line access closure and site rehabilitation activities on access lines created by the survey on an ongoing basis until completion criteria agreed by the Department of Conservation and Land Management have been achieved.

The main characteristics of the proposal are summarised in Table 1. A detailed description of the proposal is provided in Section 2 of the PER (IRC Environmental, 2004).

The potential impacts of the proposal predicted by the proponent and their proposed management are summarised in Attachment 1 of the PER.

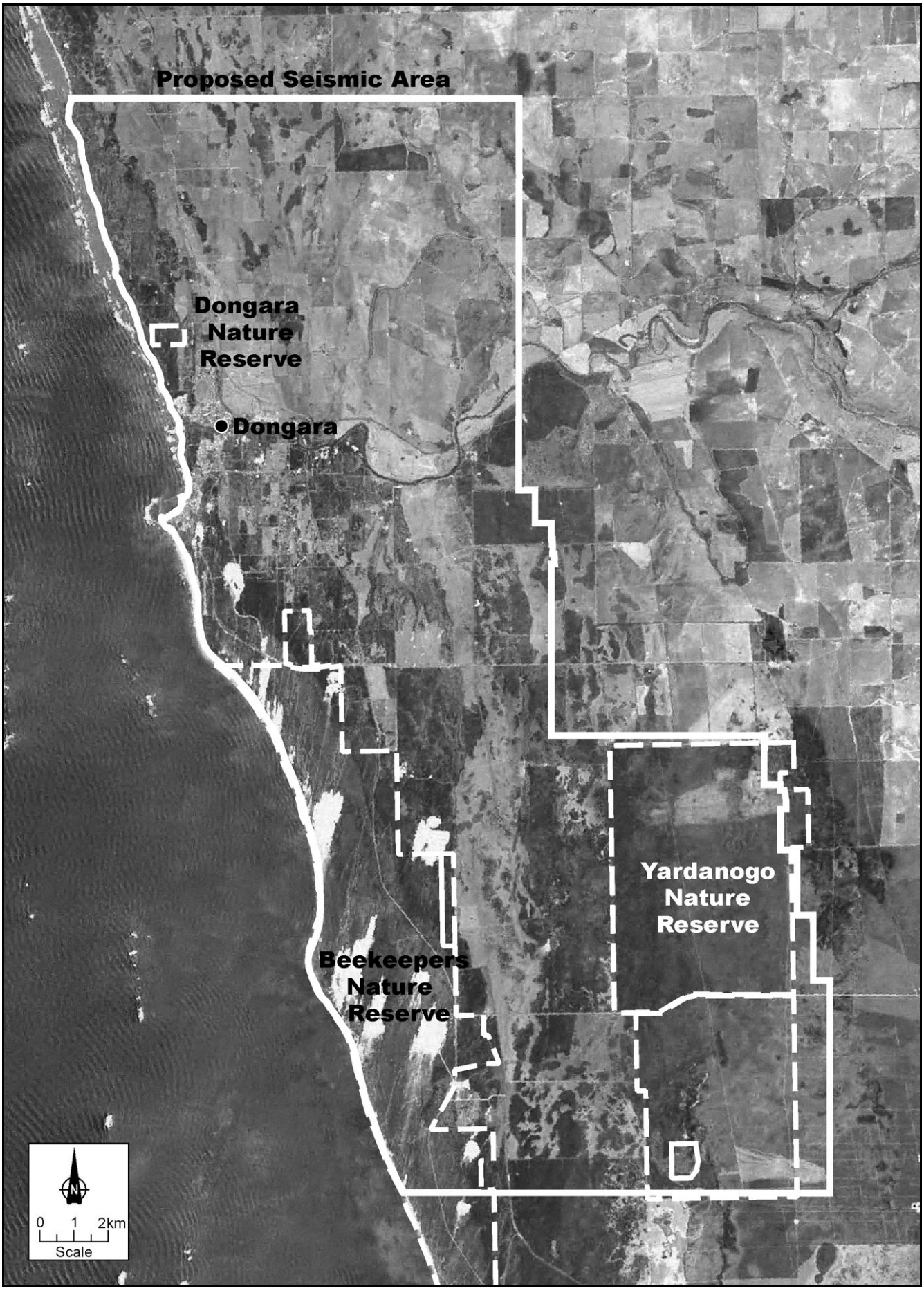

Figure 1: Location and boundary of the Denison 3D Seismic Survey
(April 2002 - from 'Public Environmental Review: Denison 3D Survey')

Table 1: Key proposal characteristics

Element	Description
Type of survey	3D seismic.
Timing and maximum duration of survey	Preparatory work ~30 days. Survey ~90-120 days. Demobilisation ~15 days. Rehabilitation – until completion criteria achieved
Total length of seismic lines (line kilometres)	Total line length = 2,229 kilometres approximately. Total line length over cleared land = 1,076 kilometres approximately. Estimated total line length over nature reserves = 795 kilometres approximately Total line length over other areas of remnant vegetation (outside nature reserves) = 358 kilometres approximately
Maximum width of line rolling	4 metres* : Note:- 1. some 'turning areas' (up to 5metres x 5metres) will be required to reduce the requirement for connecting tracks, facilitate avoidance of environmental constraints and allow for exceptional circumstances (for example tyre repairs). 2. line width will typically be 3metres and average no more than 3.5 metres.
Total land area within survey boundary	39,400 hectares approximately
Approximate area of cleared land in survey area	18,045 hectares approximately
Area of nature reserves in survey area	11,455 hectares approximately
Area of remnant native vegetation in survey area (excluding nature reserves)	9,900 hectares approximately
Maximum total area of seismic lines that would be rolled (ie area of source and receiver lines)	Approximately 782 hectares (2.0% of the total survey area) will be accessed for data acquisition
Area of seismic lines over cleared land (non-nature reserve areas)	377 hectares. approximately
Maximum area of seismic lines in nature reserves to be rolled	Approximately 279 hectares Beekeepers Nature Reserve = 117 hectares (2.5% of the reserve within the survey area) Yardanogo Nature Reserve = 161 hectares (2.4% of the total reserve) Dongara Nature Reserve = 0.7 hectares (1.3% of the total reserve)
Maximum area of seismic lines over remnant vegetation (excluding nature reserves) to be rolled	126 hectares (1.3% of the remnant vegetation in the survey area outside of nature reserves)
Number of data acquisition holes(up-holes) required	Up to 130 up-holes across the survey area (up to 50 in the nature reserves)
Diameter of data acquisition holes (up-holes)	0.625 metres to 0.75 metres
Maximum depth of data acquisition holes (up-holes)	≤ 200 metres
Plant and equipment details for survey	Camp (including office, mess and accommodation). Up to five truck-mounted source vehicles. Up to 10 camp-based vehicles (including fuel, water and fire trucks). Up to 17 seismic line crew vehicles.
Approximate number of persons involved	~65 personnel including sub-contractors.
Operation hours	Daylight hours only, 7 days/week.

3. Relevant environmental factors

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to the proposal and the conditions and procedures, if any, to which the proposal should be subject. In addition, the EPA may make recommendations as it sees fit.

The identification process for the relevant factors selected for detailed evaluation in this report is summarised in Appendix 3. The reader is referred to Appendix 3 for the evaluation of factors not discussed below. A number of these factors, such as noise and Aboriginal Heritage, are relevant to the proposal, but the EPA is of the view that the information set out in Appendix 3 provides sufficient evaluation.

It is the EPA's opinion that biodiversity conservation (flora, fauna and nature conservation) is the relevant environmental factor for this proposal requiring detailed evaluation in this report. Key issues relating to this factor include:-

a) direct impacts on flora, vegetation and fauna habitat;
b) direct impacts on fauna;
c) indirect impacts on flora, vegetation and fauna habitat; and
d) quality and security of seismic line closure and rehabilitation / regeneration.

The above relevant factor was identified from the EPA's consideration and review of all environmental factors generated from the PER document and the submissions received, in conjunction with the proposal characteristics.

Details on the relevant environmental factor and related key issues are discussed in Sections 3.1. The description of the factor shows why it is relevant to the proposal and how it will be affected by the proposal. The assessment of the factor is where the EPA decides whether or not a proposal meets the environmental objective set for that factor.

3.1 Biodiversity conservation - flora, fauna and nature conservation

3.1.1 Description

As indicated in Section 2, the Denison 3D survey will lead to significant areas of disturbance to vegetation, on private land, Unallocated Crown Land (UCL) and in the Beekeepers, Yardanogo and Dongara Conservation Reserves.

The key issues identified by the EPA in relation to this proposal relate to the conservation of biodiversity in areas of high quality native vegetation and habitat, particularly within the Beekeepers, Yardanogo and Dongara Nature Reserves and are summarised in Table 2.

Table 2: Key environmental issues relevant to the environmental factor 'Biodiversity conservation'

Issue	Key aspects
Direct Impacts on flora, vegetation and fauna habitat	• Approach to biological surveys undertaken during the EPA assessment process • Potential for impacts on significant environmental features including significant flora, plant communities and fauna habitat resulting from rolling of vegetation along seismic access lines • Risk of creating or exacerbating erosion and vegetation loss in areas of fragile coastal dune environments
Direct impacts on fauna	• Direct mortality and injury to fauna caused by vegetation rolling along seismic lines
Indirect impacts on flora, vegetation and fauna habitat	• Risks and methods of avoidance for introduction and spread of non indigenous plants, animals and disease, particularly in Nature Reserves, during the survey • Contingency strategy in the event of accidental fire ignition caused by survey activities
Quality and security of seismic line closure and rehabilitation / regeneration	• Ability to prevent third party access lines following the survey • Potential for the survey access lines to become permanent or longer term access tracks within previously isolated areas of Nature Reserves and Unallocated Crown Land leading to second order impacts • Effectiveness of, and long term commitment to, adequate rehabilitation of seismic access lines, weed and disease control and mitigation actions

3.1.2 Submissions

The majority of submissions in relation to the PER relate to the establishment, use, closure and rehabilitation of seismic access lines in areas of native vegetation (including Nature Reserves) and the potential impacts of these lines on flora, fauna and other values. The proponent's summary of, and detailed response, to issues raised in submissions is provided in electronic (compact disk) format in Appendix 5

3.1.3 Assessment

The aspect of the proposal relevant to this factor is the establishment, use, rehabilitation and closure of seismic access lines within the survey area and the Beekeepers, Yardanogo and Dongara Nature Reserves.

The EPA's overarching environmental objectives for biodiversity conservation that are of relevance to this proposal are listed in Table 3.

Table 3: EPA environmental objectives relevant to the proposal

Environmental Sub-factor	EPA Objective
Biodiversity	• Protect biodiversity consistent with the principles set out in the National Strategy for the Conservation of Australia's Biodiversity
Flora & vegetation	• Maintain the abundance, species diversity, geographic distribution and productivity of vegetation communities • Protect Declared Rare and Priority Flora, consistent with the provisions of the *Wildlife Conservation Act 1950*
Fauna	• Protect Specially Protected (Threatened) and priority Fauna listed by CALM , consistent with the provisions of the *Wildlife Conservation Act* 1950 • Maintain the abundance, diversity and geographical distribution of fauna • Improve understanding of the fauna of the proposal area through appropriate survey
Ecological communities	• Maintain or enhance the distribution, extent and integrity of plant and animal communities at levels that will meet the EPA's objective for the conservation of biodiversity
Nature reserves	• Ensure that the values of conservation reserves impacted by the proposal are not significantly compromised

Direct impacts on flora, vegetation and fauna habitat

The proponent has partially completed a multiple phase planning process for identification of seismic survey areas likely to be regarded by CALM as of high risk / sensitivity for the purposes of biodiversity conservation. Areas of this type are to be identified on the basis of the presence of Declared Rare Flora (DRF) or priority flora, threatened fauna habitat (eg mallee fowl nests), restricted plant communities or sensitive species such as long-lived plant species, using information from desktop and field biological surveys. This process is described in more detail in Section 5.2 of the PER. For the final stage of the proponent's planning process it is proposed that detailed field surveys within identified areas of high sensitivity or risk will be undertaken by a botanist acceptable to the Department of Conservation and Land Management (CALM) as input to the final alignment of seismic survey lines.

In its advice, CALM raised the issue of the need for an agreed process to deal with situations where impacts on DRF were unavoidable. In the response to submissions document, the proponent responded to this issue by stating that only one species, *Stawellia dimorphantha* (DRF) has been identified to date as being likely to be impacted by the survey.

The proponent proposes that in the event that it appeared impracticable to avoid any impact on DRF, surveys would be undertaken to gather the necessary further information required on

this and any other affected DRF taxa to allow for a decision, prior to line preparation, to either relocate or hand prepare survey lines or obtain approval from the Minister for Environment to take an acceptable number of affected Declared Rare Flora.

Following the proponent's response to submissions CALM has again raised the issue of the need to develop and apply a contingency strategy in the event that impacts on (taking of) individuals or populations of Declared Rare Flora (and other sensitive flora or ecological communities) is found to be unavoidable.

The EPA accepts that the impacts of disturbance created by the rolling of seismic lines of average width 3.5 metres is of a lower order and scale than permanent large scale clearing. The proponent has indicated an intention to avoid impacts on significant flora and vegetation wherever possible by realigning the access lines and hand cutting paths for laying of receiver lines by personnel on foot. As indicated in the proponent's response to submissions however, there remains a level of risk, that after all efforts to avoid significant areas have been considered by the proponent, there remains a desire by the proponent, to impact on one or more populations of significant flora species or on uncommon or restricted plant communities.

The EPA considers that there is a need for full confidence, on the part of the managers of land affected by the survey, that the impacts on flora and vegetation will be evaluated in detail and managed in a way that protects significant flora and vegetation and is consistent with the EPA's objectives and the approach to vegetation protection set out in the EPA's Position Statement Number 2 on Environmental Protection of Native Vegetation (EPA, 2000). While the *Wildlife Conservation Act 1950* provides for a formal process of authorisation, by the Minister for the Environment, for the 'taking' of DRF, the ability of the Minister to require proponents to undertake post-approval management or mitigation actions for other significant flora, communities or habitat, under that Act, is unclear.

The EPA therefore considers that the possibility of DRF, priority flora or restricted plant communities being impacted by seismic lines needs to be addressed in the requirements imposed by the Minister for the Environment for the implementation of this proposal. In particular there is a need to facilitate any requirements for further flora survey work to provide information to aid the line selection process and for measures to avoid or mitigate impacts on significant species and communities. Ideally following the detailed surveys of identified sensitive areas planned by the proponent as part of the implementation of the proposal, the particular flora taxa and geographic areas supporting restricted communities potentially affected by the proposal that require management and / or mitigation actions would be identified by CALM. Management of these species and / or communities could then be undertaken by the proponent in accordance with a formal plan.

The EPA considers that the above management requirements could be addressed by the requirement for preparation and implementation by the proponent, of a 'Significant Flora and Communities Management Plan' as a condition on the Minister's approval of the project. A recommended environmental condition to achieve the objectives of this recommendation is provided as Condition 6 in Appendix 4 of this report.

Indirect Impacts on flora, vegetation and fauna habitat

In the PER document the proponent has put forward a regime of detailed planning procedures and environmental controls that should, if fully implemented, protect the environmental values of vegetation affected by the Denison 3D survey during the survey programme.

However, in relation to management of fire risk, CALM has advised that the likely timing of the survey is one of very high fire risk such that any fire ignition caused by survey activities would require a high level of fire preparedness and response to avoid the possibility of uncontrollable fires, particularly within the 3 Nature Reserves.

While the proponent has indicated the intention to provide for contingencies in the event of fire ignition caused by the survey the EPA considers, in relation to the protection of the values of affected native vegetation (particularly Nature Reserves) that these contingencies are of high importance and should become a significant formalised component of approvals. The EPA has therefore recommended the imposition of an environmental condition requiring the preparation of fire management plan to meet CALM's recommended requirements. This plan could be prepared as a component of the proponent's proposed Environmental Management Plan (EMP).

A recommended condition relating to the requirement for a fire management plan is provided as Condition 9 in Appendix 4 of this report.

Direct impacts on fauna

There is some potential for the seismic survey to result in direct impacts on small invertebrate and reptile fauna individuals (kills) particularly during vegetation rolling. The proponent has committed to avoiding key habitat types for significant fauna identified by previous fauna surveys in the area and in desktop survey currently in progress.

While there is a degree of risk associated with any activity involving disturbance to native vegetation, the EPA considers that significant impacts on listed threatened fauna appear unlikely due to:

- the restricted area and limited duration of the impact of seismic lines;
- planned identification and avoidance of habitats of threatened fauna;
- planned avoidance of areas of likely key fauna habitat, such as riparian vegetation; and
- most listed threatened fauna species for the area being widely dispersed bird species.

The proponent has committed to reporting and documenting any fauna injuries or mortalities resulting from the survey.

Seismic line closure and rehabilitation

While vegetation impacted by rolling of the seismic lines would, in the absence of further vehicular access or threatening processes, be expected to recover in the medium term from

the disturbance caused by the survey, the Dongara area is periodically subject to significant levels of vehicular access by members of the general public, wildflower pickers, beekeepers and other persons. There is a significant risk that if access to seismic lines is not prevented and vegetation regeneration is not fully established and protected from further disturbance following the survey, the lines may become long term or permanent pathways for vegetation disturbance and degrading processes.

The proponent's response to submissions indicates that even in seismic lines prepared using the rolling method, recovery of vegetation may take a considerable period of time. The response document indicates that previous experience is that it takes approximately 3 years for vegetation on seismic lines to reach 40% cover, within an area of vegetation with an average cover of 70-to 100%. In areas where seismic lines associated with older surveys have lead to significant soil disturbance or compaction, full regeneration has not occurred within 15 years.

The proponent has reached agreement with CALM on the majority of the completion criteria to be applied to post survey seismic line condition. These criteria are provided in Table 3.3 (page 40) of the proponent's response to submissions. The proponent has proposed to monitor line closure and rehabilitation for an indeterminate period following the survey (until CALM agreement that track closure and rehabilitation/revegetation completion criteria have been achieved) and undertake further management actions as required in order to meet the agreed completion criteria.

CALM has advised that full achievement of agreed rehabilitation and access closure completion criteria should be regarded as critical to the environment acceptability of the proposed survey, indicating that the impact of the survey on nature reserves, albeit seen by the proponent as temporary, will continue to present a residual risk to nature reserve values for some years to come. The primary risk is considered to relate to post survey access by third parties and to the potential for seismic lines to become permanent tracks with consequential long term ecological damage to the reserves from erosion, weeds and disease. CALM has therefore recommended to the EPA that the project be subject to a financial assurance such as bank guaranteed performance bond to be used primarily for the purposes of track closure over a 5 year period in the event of default on these requirements by the proponent.

The EPA therefore recommends an environmental condition be imposed on the proposal requiring that the proponent provide a financial assurance to the value of $117 500 for the contingent provision of funds to CALM for seismic line access closure in the event that ARC / Origin are unable, for financial or other reasons to fulfil commitments to undertake work required to achieve agreed completion criteria. This bond should be capable of being reviewed by the Chief Executive Officer of the Department of Environment over time in order to take into account changes in management costs, inflation and the environmental performance of the proponent in complying with rehabilitation requirements.

It is also proposed that the bond condition be linked to achievement of explicit performance requirements, specified within a Seismic Line Rehabilitation Plan which would be required by an environmental condition recommended by the EPA.

Recommended conditions to achieve the objectives of these recommendations are provided as Conditions 7 and 8 in Appendix 4 of this report.

3.1.4 Summary

Taking into account available information as discussed in Section 3.1.3, the EPA considers that it is unlikely that the EPA's objectives would be compromised by the proposal, provided there is satisfactory implementation, by the proponent of the recommended conditions set out in Appendix 4, and summarised in Section 4, including the proponent's commitments.

The EPA has recommended specific environmental conditions for this proposal relating to the requirement for a management plan for significant plant species and communities, a seismic line rehabilitation plan and a rehabilitation performance bond.

4. Conditions and Commitments

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to the proposal and on the conditions and procedures to which the proposal should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit.

In developing recommended conditions for each project, the EPA's preferred course of action is to have the proponent provide an array of commitments to ameliorate the impacts of the proposal on the environment. The commitments are considered by the EPA as part of its assessment of the proposal and, following discussion with the proponent, the EPA may seek additional commitments.

The EPA recognises that not all of the commitments are written in a form which makes them readily enforceable, but they do provide a clear statement of the action to be taken as part of the proponent's responsibility for, and commitment to, continuous improvement in environmental performance. The commitments, modified if necessary to ensure enforceability, then form part of the conditions to which the proposal should be subject, if it is to be implemented.

4.1 Proponent's commitments

The proponent's commitments as set in the PER and subsequently modified, as shown in Appendix 4, should be made enforceable. Where these commitments or other material discussed in the PER cover matters subject to environmental conditions the requirements of the condition should apply to the extent of any inconsistency.

4.2 Recommended conditions

Having considered the proponent's commitments and the information provided in this report, the EPA has developed a set of conditions that it recommends be imposed if the proposal by ARC / Origin for the Denison 3D Seismic Survey is approved for implementation.

These conditions are presented in Appendix 4. Matters addressed in the conditions include the following:

a) that the proponent fulfil the commitments in the Consolidated Commitments statement set out as an attachment to the recommended conditions in Appendix 4;

b) preparation and implementation of a significant flora and communities management plan;

c) development and implementation of a seismic line rehabilitation plan;

d) lodgment of a rehabilitation performance bond; and

e) preparation and implementation of a fire management plan.

It should be noted that the proposed survey is also subject to the requirements of the *Petroleum Act 1967.*

5. Conclusions

The EPA has considered the proposal by ARC Energy Limited and Origin Energy Developments Pty Limited to carry out a 3D seismic survey over a total area of approximately 400 square kilometres within the Shire of Irwin, as described in the proponents PER and proponent's response to submission document.

The EPA has concluded that it is unlikely that the EPA's objectives would be compromised, provided there is satisfactory implementation by the proponent of their commitments and the recommended conditions set out in Appendix 4, and summarized in Section 4.

6. Recommendations

The EPA submits the following recommendations to the Minister for the Environment:

1. That the Minister notes that the proposal being assessed is for a 3D seismic survey covering approximately 400 square kilometres within the Shire of Irwin;
2. That the Minister considers the report on the relevant environmental factor of 'biodiversity conservation' as set out in Section 3;
3. That the Minister notes that the EPA has concluded that it is unlikely that the EPA's objectives would be compromised, provided there is satisfactory implementation by the proponent of the recommended conditions set out in Appendix 4, and summarised in Section 4, including the proponent's commitments.
4. That the Minister imposes the conditions and procedures recommended in Appendix 4 of this report.

Appendix 1

References

References

Environmental Protection Authority (EPA) (2000). *Environmental Protection of Native Vegetation in Western Australia.* EPA Position Statement No 2. Perth, December 2000

IRC Environmental (2004). *Denison 3D Seismic Survey – Public Environmental Review*

Appendix 2

List of persons and organisations who provided a submission on the PER

List of persons and organisations who provided a submission on the PER

Organisations:

Department of Conservation and Land Management

Water Corporation

Wildflower Society of Western Australia

Individuals:

Mr R Tauss

Mr A Smith

Mr & Mrs C & J Creese

WF Arkell

Mr C Mercer

PN & ML Swift

Dr G Thompson

Appendix 3

Summary of identification of relevant environmental factors

Summary of identification of relevant environmental factors

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
BIOPHYSICAL			
Biodiversity Conservation	The proposal has potential for impacts on biodiversity as populations of threatened flora and specially protected fauna occur within the survey area	Public The proposal is contrary to EPA Position Statement No 2 as 32 percent of the survey area is in native vegetation in conservation reserves and the biodiversity of this area should be protected. Protection of biodiversity will not happen if this proposal goes ahead.	**Considered to be a relevant environmental factor**
Flora and vegetation	The proposal involves disturbance to up to 400 hectares of native vegetation	CALM The proponent needs to identify a process for managing and gaining formal approval for unavoidable impacts on threatened flora (DRF) in Nature Reserves and located on private property.	**This issue is discussed in the EPA's report as part of the factor of biodiversity conservation**
Fauna	The scale of impact of the proposal relative to areas of fauna habitat and the non permanent nature of disturbance limits the potential of the survey to impact significantly on fauna. Desktop and field surveys of areas of high risk / sensitivity are planned to provide information as the basis for the final alignment of seismic lines.	Public The EPA should not approve of this development until a comprehensive survey is undertaken of the terrestrial vertebrate fauna in the area, specifically those areas gazetted as nature reserves, that adequately reports on the potential impacts that the seismic survey is likely to have on this biota. Specific management plans should then be prepared to minimise these impacts and this information should be released for public comment.'	**This issue is discussed in the EPA's report as part of the factor of biodiversity conservation**
Conservation areas	The survey area affects a substantial portion of conservation reserves	Conservation Commission: The Commission recommends that the proposal be subject to a formal level of assessment. The Commission also recommends that conditions include a requirement for a rehabilitation bond noting the substantial impacts that could occur within the Beekeepers, Yardanogo and Dongara Nature Reserves. CALM The Department recommends that a bank guaranteed performance bond be set for the project to ensure compliance and adequate rehabilitation.	**This issue is discussed in the EPA's report as part of the factor of biodiversity conservation**

Appendix 3: Summary of identification of environmental factors

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Wetlands	The survey lines will avoid impacts wetland areas by using existing access tracks and deviating or terminating seismic lines outside the riparian zone	Nil	**Factor does not require further evaluation**
Soil	Survey access lines in steep coastal dune slopes and crests will be deviated away from steep areas or hand cut to minimise disturbance. Completion criteria relating to the erosion post survey have been agreed with CALM	Nil	**Factor does not require further evaluation**
POLLUTION			
Noise	The proposed survey is of short term (one season) duration. Noise levels emitted from survey equipment is similar to noise emitted from agricultural equipment and vehicles commonly used in the area	Nil	**Factor does not require further evaluation**
Other emissions	Minor emissions are possible from drill holes and the proposed survey camp which will be located on cleared private land. These will be managed according to Council requirements and industry best practice for environmental protection	Nil	**Factor does not require further evaluation**
SOCIAL SURROUNDINGS			
Cultural heritage	Nine archeological and ethnographic sites are know from the region. None of these will be impacted by the survey	Nil	**Factor does not require further evaluation**

Appendix 4

Recommended Environmental Conditions and Proponent's Consolidated Commitments

Statement No. XX

RECOMMENDED CONDITIONS AND PROCEDURES

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

DENISON 3D SEISMIC SURVEY :
WITHIN PETROLEUM EXPLORATION LEASES
EP 413, L1, L2
LOCALITY OF DONGARA, SHIRE OF IRWIN

Proposal: The preparation of seismic access lines, including related flora and vegetation survey activities, deployment and use of seismic impulse generation and reception equipment, acquisition of seismic data, and access lines closure and rehabilitation, as documented in schedule 1 of this statement.

Proponents: ARC Energy Limited and Origin Energy Developments Pty Limited

Proponents' Addresses:

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West Perth, WA 6005

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34 Colin Street
West Perth, WA 6005.

Assessment Number: 1514

Report of the Environmental Protection Authority: Bulletin 1147

The proposal referred to above may be implemented by the proponent subject to the following conditions and procedures:

1 Implementation

1-1 The proponent shall implement the proposal as documented in schedule 1 of this statement subject to the conditions of this statement.

2 Proponent Commitments

2-1 The proponent shall implement the environmental management commitments documented in schedule 2 of this statement.

3 Proponent Nomination and Contact Details

3-1 The proponent for the time being nominated by the Minister for the Environment under section 38(6) or (7) of the *Environmental Protection Act 1986* is responsible for the implementation of the proposal until such time as the Minister for the Environment has exercised the Minister's power under section 38(7) of the Act to revoke the nomination of that proponent and nominate another person as the proponent for the proposal.

3-2 If the proponent wishes to relinquish the nomination, the proponent shall apply for the transfer of proponent and provide a letter with a copy of this statement endorsed by the proposed replacement proponent that the proposal will be carried out in accordance with this statement. Contact details and appropriate documentation on the capability of the proposed replacement proponent to carry out the proposal shall also be provided.

3-3 The nominated proponent shall notify the Department of Environment of any change of contact name and address within 60 days of such change.

4 Commencement and Time Limit of Approval

4-1 The proponent shall substantially commence the proposal within three years of the date of this statement or the approval granted in this statement shall lapse and be void.

Note: The Minister for the Environment will determine any dispute as to whether the proposal has been substantially commenced.

4-2 The proponent shall make application for any extension of approval for the substantial commencement of the proposal beyond three years from the date of this statement to the Minister for the Environment, prior to the expiration of the three-year period referred to in condition 4-1.

The application shall demonstrate that:

1.the environmental factors of the proposal have not changed significantly;

2.new, significant, environmental issues have not arisen; and

3.all relevant government authorities have been consulted.

Note: The Minister for the Environment may consider the grant of an extension of the time limit of approval not exceeding three years for the substantial commencement of the proposal.

5 Compliance Audit

5-1 The proponent shall prepare an audit program and submit annual compliance reports to the Department of Environment which address:

1.the status of implementation of the proposal as defined in schedule 1 of this statement;

2.evidence of compliance with the conditions and commitments; and

3.the performance of the environmental management plans and programs.

Note: Under sections 48(1) and 47(2) of the *Environmental Protection Act 1986*, the Chief Executive Officer of the Department of Environmental Protection is empowered to monitor the compliance of the proponent with the statement and should directly receive the compliance documentation, including environmental management plans, related to the conditions, procedures and commitments contained in this statement.

6 Significant Flora and Communities Management Plan

6-1 Prior to ground-disturbing activities and in consultation with the Department of Conservation and Land Management, the proponent shall prepare a Significant Flora and Communities Management Plan to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

Advisory agency (See procedure 3):

- Department of Conservation and Land Management

The objective of this Plan is:

- to ensure the conservation of significant flora species and communities which occur within the vicinity of seismic survey lines within the seismic survey area shown in figure 1 of schedule 1.

This Plan shall address:

1 the management, monitoring and reporting of impacts on Declared Rare Flora and priority flora species and restricted plant communities, within the seismic survey area, as identified by the Department of Conservation and Land Management following surveys to be undertaken by the proponent as part of the implementation of this proposal;

2 any targeted regional surveys that are required prior to ground disturbing activities to provide further information on the conservation status of each of the species and /or communities referred to in 1 above;

3 any regeneration or revegetation strategies that are required for species and / or communities referred to in 1 above, including completion criteria to be met for species and /or communities impacted following the seismic survey;

4 any management or mitigation actions required to address any failure to achieve regeneration completion criteria identified under 3; and

5 any further investigations into the regeneration and seed ecology of affected species or communities in order to determine appropriate regeneration methodologies, if completion criteria are not being achieved;

6-2 The proponent shall implement the Significant Flora and Communities Management Plan required by condition 6-1, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority and the Department of Conservation and Land Management.

6-3 The proponent shall make the Significant Flora and Communities Management Plan required by condition 6-1 publicly available, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

7 Seismic Line Rehabilitation Plan

7-1 To ensure that rehabilitation is optimised, the proponent shall, prior to ground-disturbing activities, develop a Seismic Line Rehabilitation Plan, for areas of native vegetation disturbed by activities related the seismic survey, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority and the Department of Conservation and Land Management.

The long term objective of this plan is to ensure that disturbed areas of vegetation do not become permanent areas for vehicle access and that vegetation disturbed during the seismic survey is returned to a condition similar to adjacent undisturbed areas.

The Plan shall relate to all areas of native vegetation disturbed during the survey such as seismic lines staging areas, turning areas and encampments and shall include :

1 an Access Line Closure Plan which includes:

- identification of seismic access lines utilised during the survey that require actions to prohibit public access;
- methods of access closure for identified seismic access lines;
- performance criteria (including completion criteria) for the effectiveness of closure of seismic access lines; and
- contingency actions to be carried out in the event that the defined completion criteria are not being met.

2 a Vegetation Management Plan which includes:

- delineation of areas of vegetation proposed to be disturbed by the survey;
- a baseline vegetation study identifying the appropriate techniques for regeneration or revegetation of the vegetation types affected by the survey;
- details of weed management to be undertaken following the survey;
- details of dieback management to be undertaken following the survey;
- development of specific rehabilitation performance criteria, including completion criteria for the restoration of affected areas to a condition

equivalent to, or better than, their condition immediately prior to the survey;

- proposed methods for rehabilitation / regeneration of seismic access line and other disturbed areas;
- a monitoring program to determine rehabilitation success; and
- contingency actions to be carried out in the event that the defined performance criteria are not being met.

3 A Soil Conservation Management Plan which includes

- delineation of seismic access lines and other areas disturbed with steep slopes and/or erosive soils;
- operational methods of minimisation and remediation of soil erosion in on the identified access lines and other areas disturbed during and following the survey;
- performance criteria (including completion criteria) for the effectiveness of the proposed methods of minimisation and remediation; and
- contingency actions to be carried out in the event that the defined performance criteria are not being met.

7-2 The proponent shall implement the Seismic Line Rehabilitation Plan required by condition 7-1 until such time as the Minister for the Environment determines, on advice of the Environmental Protection Authority, that the proponent's rehabilitation responsibilities have been fulfilled.

7-3 The proponent shall make the Seismic Line Rehabilitation Plan required by condition 7-1 publicly available, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

8 Rehabilitation Performance Bond

8-1 As security for the due and punctual observance and performance by the proponent of the requirements of condition 7 to be observed, conformed and complied with, the proponent shall lodge with the Chief Executive Officer of the Department of Environment on demand prior to ground-disturbing activity, an irrevocable Performance Bond as nominated and approved by the Chief Executive Officer in his sole unfettered discretion to a cash value and in a form acceptable to the Chief Executive Officer ("the Security") which Security at the date hereof being $117, 500.

8-2 The Chief Executive Officer may review the Security required by condition 8-1 at any time or times and if, on such review, the Chief Executive Officer considers that a security has ceased to be acceptable to the Chief Executive Officer, then the Chief Executive Officer may, with the approval of the Minister for the Environment, require the proponent to furnish replacement or additional security for performance by the proponent of its obligations under condition 7.

8-3 The proponent shall within 14 days after written request by the Chief Executive Officer furnish replacement or additional security in such sum as the Chief Executive Officer shall nominate, in a form and upon terms and conditions

approved by the Chief Executive Officer, which approval shall not be unreasonably withheld. On receipt of approved replacement security the Chief Executive Officer shall release and discharge the original security.

Note: In the preparation of advice to the Chief Executive Officer in relation to condition 8.1, the Environmental Protection Authority expects that the advice of the following agencies will be obtained:

- Department of Conservation and Land Management;
- Department of Industry and Resources; and
- Department of Environment.

9. Bush Fire Management Plan

9-1 Prior to ground-disturbing activity, the proponent shall prepare a Bush Fire Management Plan to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

This plan shall include:

1 bush fire prevention measures;
2 bush fire detection and reporting procedures;
3 fire brigade and proponent fires suppression equipment and preparedness measures; and
4 training of personnel for fighting fires.

9-2 The proponent shall implement the Bush Fire Management Plan, required by condition 9-1, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

9-3 The proponent shall make the Bush Fire Management Plan, required by condition 9-1 publicly available to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

Note: In the preparation of advice to the Minister, the Environmental Protection Authority expects that the advice of the following agencies will be obtained:
- Department of Conservation and Land Management; and
- Fire and Emergency Services Authority.

Procedures

1 Where a condition states "to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority", the Environmental Protection Authority will provide that advice to the Department of Environment for the preparation of written notice to the proponent.

2 The Environmental Protection Authority may seek advice from other agencies or organisations, as required, in order to provide its advice to the Department of Environment.

3 Where a condition lists advisory bodies, it is expected that the proponent will obtain the advice of those listed as part of its compliance reporting to the Department of Environment.

Notes

1 The Minister for the Environment will determine any dispute between the proponent and the Environmental Protection Authority or the Department of Environment over the fulfilment of the requirements of the conditions.

3 Within this statement, to “have in place” means to “prepare, implement and maintain for the duration of the proposal”.

4 Compliance and performance reporting will endeavour to be in accord with the timing requirements of the *Petroleum Act 1967*.

Schedule 1

The Proposal (Assessment No. 1514)

Seismic surveys are necessary to assist with planning petroleum exploration drilling activities. The primary objective of the survey is to define prospects for future drilling and thus contribute to future development of oil and gas production from the companies' tenements.

The main activities to be conducted include:

- flora and vegetation surveys to identify areas of potentially high sensitivity to disturbance by seismic access line preparation;
- establishing a base camp and ongoing provision of supplies;
- preparing survey grid (access line preparation and surveying);
- drilling of boreholes (for up-hole logging necessary to the survey);
- acquiring data (surface seismic acquisition and up-hole logging); and
- demobilising, rehabilitating and closing vehicular access to seismic lines, and monitoring.

An aerial photograph showing the location and boundary of the survey area is provided in Figure 1.

The key characteristics of the proposal are listed in Table 1 (overleaf).

Figures (attached)

Figure 1 – Location and boundary of the seismic survey
Figure 2 – Indicative alignment of seismic survey access lines

Table 1: Key proposal characteristics

Element	Description
Type of survey	3D seismic.
Timing and maximum duration of survey	Preparatory work ~30 days. Survey ~90-120 days. Demobilisation ~15 days. Rehabilitation – until completion criteria achieved
Total length of seismic lines (line kilometres)	Total line length = 2,229 kilometres approximately. Total line length over cleared land = 1,076 kilometres approximately. Estimated total line length over nature reserves = 795 kilometres approximately Total line length over other areas of remnant vegetation (outside nature reserves) = 358 kilometres approximately
Maximum width of line rolling	4 metres* : Note:- 3. some 'turning areas' (up to 5metres x 5metres) will be required to reduce the requirement for connecting tracks, facilitate avoidance of environmental constraints and allow for exceptional circumstances (for example tyre repairs). 4. line width will typically be 3metres and average no more than 3.5 metres.
Total land area within survey boundary	39,400 hectares approximately
Approximate area of cleared land in survey area	18,045 hectares approximately
Area of nature reserves in survey area	11,455 hectares approximately
Area of remnant native vegetation in survey area (excluding nature reserves)	9,900 hectares approximately
Maximum total area of seismic lines that would be rolled (ie area of source and receiver lines)	Approximately 782 hectares (2.0% of the total survey area) will be accessed for data acquisition
Area of seismic lines over cleared land (non-nature reserve areas)	377 hectares. approximately
Maximum area of seismic lines in nature reserves to be rolled	Approximately 279 hectares Beekeepers Nature Reserve = 117 hectares (2.5% of the reserve within the survey area) Yardanogo Nature Reserve = 161 hectares (2.4% of the total reserve) Dongara Nature Reserve = 0.7 hectares (1.3% of the total reserve)
Maximum area of seismic lines over remnant vegetation (excluding nature reserves) to be rolled	126 hectares (1.3% of the remnant vegetation in the survey area outside of nature reserves)
Number of data acquisition holes(up-holes) required	Up to 130 up-holes across the survey area (up to 50 in the nature reserves)
Diameter of data acquisition holes (up-holes)	0.625 metres to 0.75 metres
Maximum depth of data acquisition holes (up-holes)	≤ 200 metres
Plant and equipment details for survey	Camp (including office, mess and accommodation). Up to five truck-mounted source vehicles. Up to 10 camp-based vehicles (including fuel, water and fire trucks). Up to 17 seismic line crew vehicles.
Approximate number of persons involved	~65 personnel including sub-contractors.
Operation hours	Daylight hours only, 7 days/week.

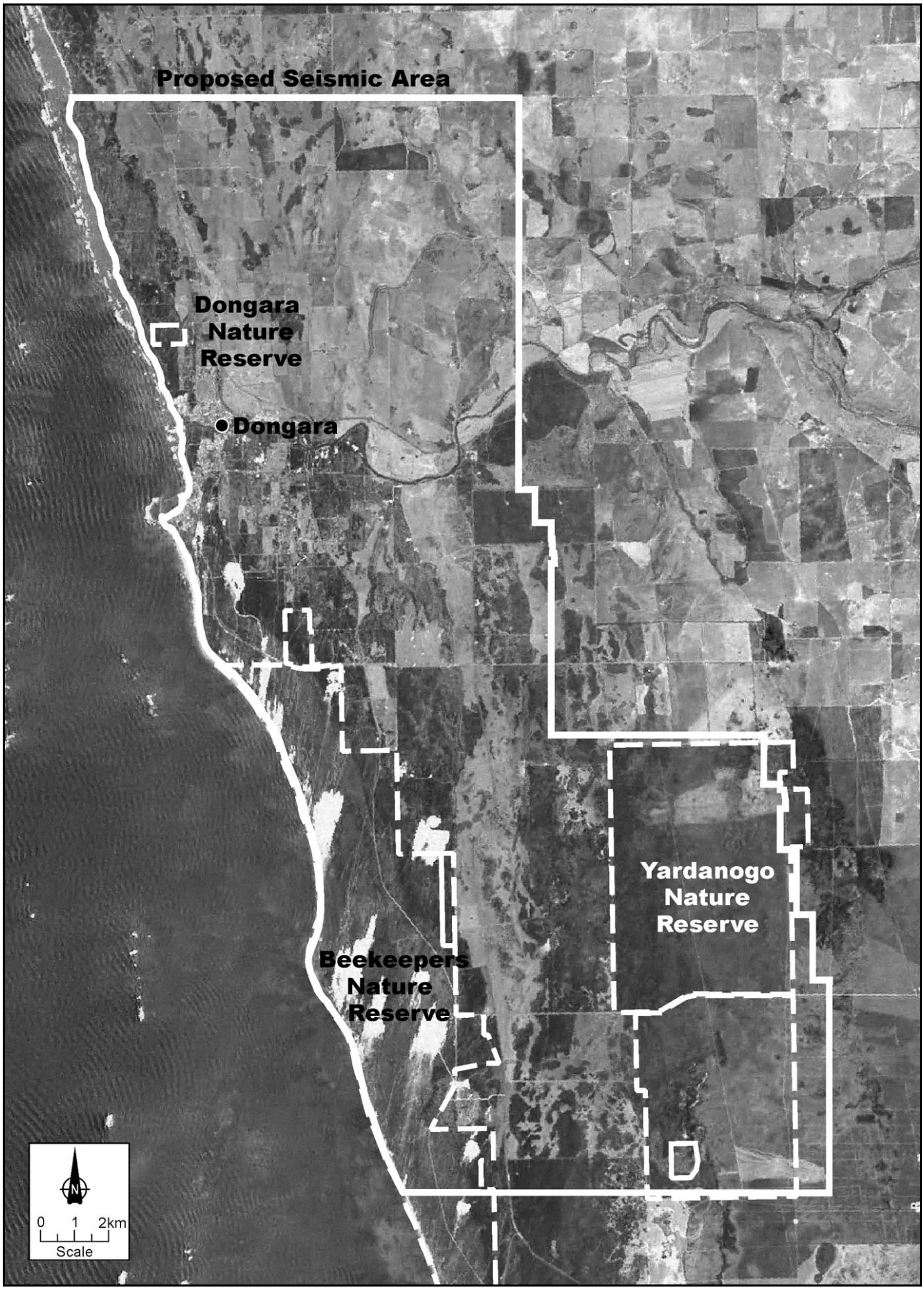

Figure 1: ***Location and Boundary of Denison 3D Survey***
(April 2002 - from 'Public Environmental Review: Denison 3D Survey')

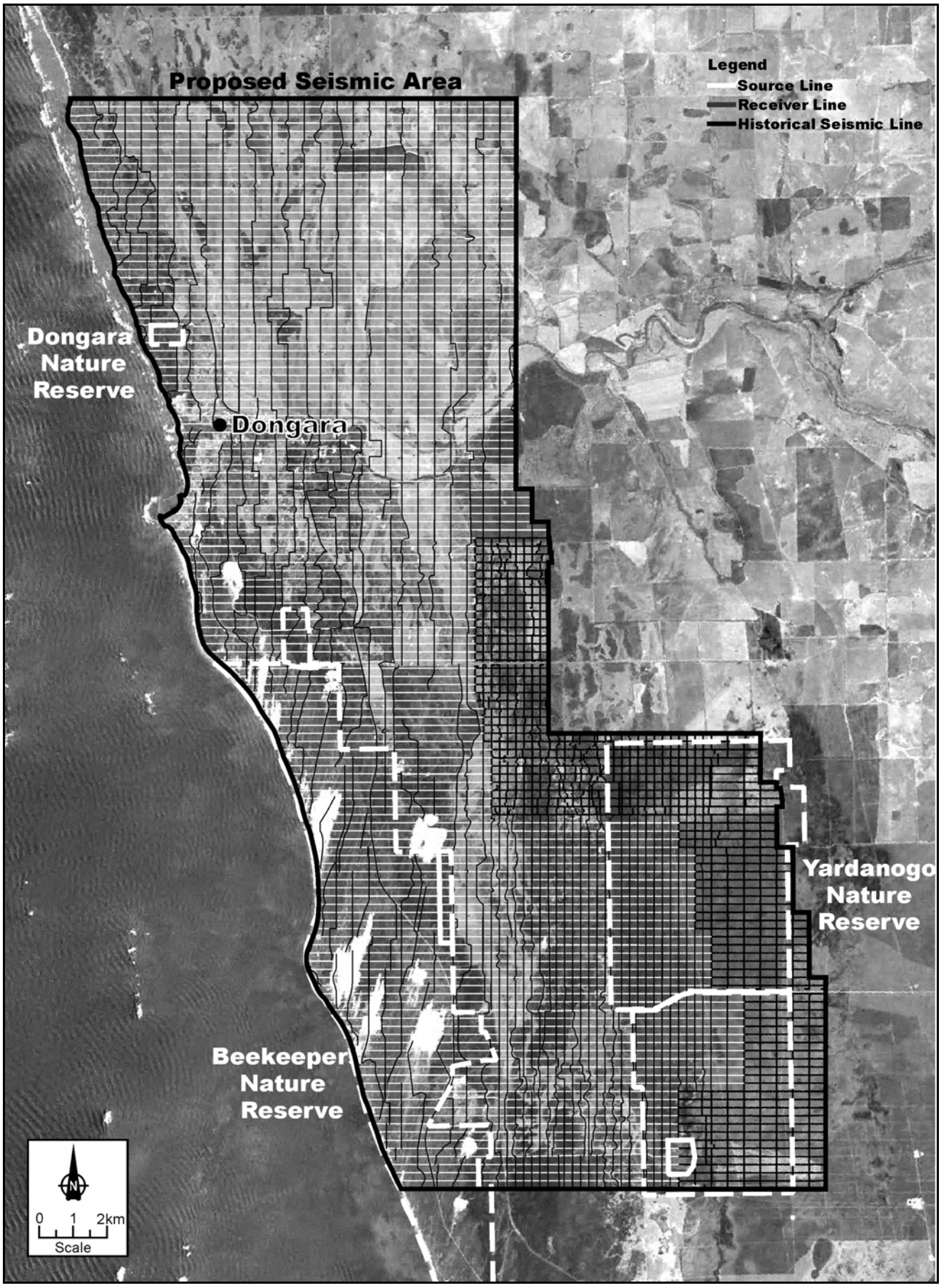

Figure 2: ***Indicative location of seismic access lines***
(April 2002 - from 'Public Environmental Review: Denison 3D Survey')

Schedule 2

Proponent's Environmental Management Commitments

August 2004

DENISON 3D SEISMIC SURVEY, SHIRE OF IRWIN

(Assessment No. 1514)

ARC Energy Limited
Origin Energy Developments Pty Limited

Proponent's Environmental Management Commitments – August 2004

DENISON 3D SURVEY (Assessment No. 1514)

Note: The term "commitment" as used in this schedule includes the entire row of the table and its six separate parts as follows:

- a commitment number;
- a commitment topic;
- the objective of the commitment;
- the 'action' to be undertaken by the proponent;
- the timing requirements of the commitment; and
- the body/agency to provide technical advice to the Department of Environment.

Topic	Proponent's Objective	Action	Timing	Advice
General Environmental Management	Manage the environmental aspects of the Denison 3D Seismic Survey to minimise its impacts on the environment.	**1** Fully implement steps 1 to 17 of the Seismic Survey Line Planning Process (Figure 2.3) presented in this PER document, prior to preparing the seismic lines.	Before the survey.	DoIR;; CALM; FESA; Shire of Irwin; Department of Agriculture (DoA).
		2 Develop an Environmental Management Plan (Denison 3D Seismic Survey Environmental Management Plan(EMP)) that incorporates steps 18 to 19 of the Seismic Survey Line Planning Process (Figure 2.3 of the PER document), and includes specific plans and procedures to: 1 minimise the environmental impacts on native flora, fauna, conservation areas, surface and groundwater, soil and landform, and cultural heritage sites; 2 manage the spread of weeds and soil borne pathogens, noise and dust, wastes, hazardous materials, and fire risks; 3 engage stakeholders in the planning process, maintain avenues of communication during the survey and satisfactorily manage complaints or concerns raised by landowners or members of the public; 4 train the workforce on the environmental values of the area and the procedures to follow for minimising environmental impacts; 5 undertake ongoing auditing and reporting on the environmental performance during the survey; and 6 rehabilitate the survey area and monitor rehabilitation success after the survey has been completed.		
		3 Implement the EMP referred to in Commitment 2.	During all phases of the survey.	

Topic	Proponent's Objective	Action	Timing	Advice
Vegetation and Flora	Minimise effects of the proposal on sensitive areas, discrete colonies of rare plants and other significant species.	**4** Fully implement steps 1 to 13 of the Vegetation and Flora Management Process (Figure 5.1 of the PER document), prior to preparing the seismic lines consistent with the requirements of Environmental Condition 6.	Before the survey.	CALM.
		5 Incorporate into Seismic Survey EMP, step 14 of the Vegetation and Flora Management Process (Figure 5.1of the PER) and specific management measures to: 1 plan the locations of the camp site and seismic lines to minimise impacts on native vegetation; 2 minimise the disturbance of all native vegetation occurring across the proposed seismic survey area, and particularly in areas of agreed high sensitivity or risk, when laying out the seismic lines or drilling the up-holes; and 3 protect DRF and Priority listed plant species wherever they occur across the proposed seismic survey area, consistent with the requirements of Environmental Conditions 6 and 7.		
		6 Implement the vegetation management measures detailed in the Denison 3D Seismic Survey EMP consistent with the requirements of Environmental Conditions 6 and 7.	During and after the survey.	CALM.

Topic	Proponent's Objective	Action	Timing	Advice
Weeds	Minimise the risk of introducing exotic species and spreading weeds in the region.	**7** Fully implement steps 1 to 10 of the Weed Management Process (Figure 5.2 of the PER document) prior to preparing the seismic lines.	Before the survey.	CALM.
		8 Consistent with the requirements of Environmental Condition 7, incorporate into the Seismic Survey EMP, steps 11 to 17 of the Weed Management Process (Figure 5.2 of the PER document) specific management measures to control weeds including: 1 appropriate hygiene techniques to control the spread of noxious and environmental weeds along the proposed seismic survey areas with high risk; 2 conducting inspections of the survey area for the introduction or spread of weeds; and 3 eradicating introduced weeds along the railway line in the Beekeepers Nature Reserve and other areas affected by survey activities where considered necessary.	Before, during and after the survey	
		9 Implement the weed management measures detailed in the Seismic Survey EMP.	During and after the survey.	
Dieback	Minimise the risk of introducing or spreading dieback into uninfected areas and areas of agreed high sensitivity or risk.	**10** Fully implement steps 1 to 9 of the Dieback Management Process (Figure 5.3 of the PER document) prior to preparing the seismic lines.	Before, during and after the survey.	CALM.
		11 Consistent with the requirements of Environmental Conditions 7, incorporate into the Denison 3D Seismic Survey EMP, steps 10 to 14 of the Dieback Management Process (Figure 5.3) and specific management measures to control spread of dieback including: 1 appropriate hygiene techniques to control the spread of dieback along the proposed seismic survey areas with high risk; and 2 conducting inspections of the survey area for the introduction or spread of dieback.		
		12 Implement the dieback management measures detailed in the Denison 3D Seismic Survey EMP.	During and after the survey.	

Topic	Proponent's Objective	Action	Timing	Advice
Rehabilitation and revegetation	Ensure, that rehabilitation achieves a stable and functioning landform which is consistent with the surrounding landscape and other environmental values.	**13** Consistent with the requirements of Environmental Condition 7, fully implement steps 1 to 7 of the Rehabilitation/Revegetation Management Process (Figure 5.9 of the PER document) prior to preparing the seismic lines.	Before the survey.	CALM.
		14 Consistent with the requirements of Environmental Condition 7, incorporate into the Denison 3D Seismic Survey EMP, steps 8 to 14 of the Rehabilitation/Revegetation Management Process (Figure 5.9 of the PER document) and specific management measures to: 1 plan rehabilitation and revegetation in disturbed areas that is appropriate for the existing land use of the area; 2 engage stakeholders in the planning process; 3 monitor rehabilitation/revegetation against clearly defined completion criteria of rehabilitation success (that includes criteria relating to: implementation of the EMP; decommissioning; landform; and vegetation); and 4 minimise the potential for long-term environmental impacts such as erosion, weed infestation and access by the general public through effective closure of access to seismic lines.	Before, during and after the survey	
Rehabilitation and revegetation	Ensure, that rehabilitation achieves a stable and functioning landform which is consistent with the surrounding landscape and other environmental values.	**15** Consistent with the requirements of Environmental Condition 7, implement the rehabilitation and revegetation measures detailed in the Seismic Survey EMP.	Before and after the survey.	CALM
		16 Provide funds to CALM for a trial burn programme in the Yardanogo Nature Reserve for the purpose of obtaining quantitative data on the use of burning as a best-practice management measure for regeneration of vegetation on seismic line.	Funds to be provided within 60 days of receipt of invoices from CALM for work carried out and within 3 years following the completion of the survey	
		17 Support CALM's involvement in the annual auditing and monitoring of the Denison 3D seismic survey area by providing funding to CALM to cover administration costs of this work with a cumulative total amount up to $15,000	Funds to be provided within 60 days of the the receipt of invoices from CALM for work carried out.	

Topic	Proponent's Objective	Action	Timing	Advice
Significant flora and fauna	Protect significant flora and fauna and their habitat from unacceptable impacts	**18** Implement a field survey of native fauna in vegetation community types that are likely to be inhabited by rare, endangered or disturbance-sensitive fauna, if considered necessary by CALM, based on the findings and recommendations of the desk-top fauna survey (Bamford 2004, in prep.).	Before the survey.	CALM.
		19 Incorporate into the Seismic Survey EMP, specific management measures to: 1 plan the locations of the camp site and seismic lines to minimise impacts on native fauna; 2 minimise the disruption of native fauna in nature reserves and other agreed high sensitivity or risk areas when laying out the seismic lines or drilling the up-holes; 3 minimise the impacts on native fauna from the activities of the workforce at the camp; and 4 protect Threatened or Priority fauna.	Before the survey	
		20 Implement the fauna management measures detailed in the Seismic Survey EMP.	During and after the survey.	
Conservation and rehabilitation in Nature Reserves	Protect flora and fauna and other environmental values of Nature Reserves affected by the survey consistent with the management objectives for those areas.	**21** Consistent with the requirements of Environmental Conditions 6 and 7, incorporate into the Seismic Survey EMP, specific management measures to: 1 protect the conservation values of the nature reserves; 2 communicate to the workforce the conservation values and specific procedures to be used when working in the nature reserves; and 3 rehabilitate and revegetate disturbed areas to promote recovery of native vegetation in the nature reserves.	Before the survey.	CALM.
		22 Consistent with the requirements of Environmental Conditions 6 and 7, implement the management measures detailed in the Seismic Survey EMP for protecting the conservation values of the nature reserves.	During and after the survey.	

Appendix 5

Summary of Submissions and Proponent's Response to Submissions (see attached compact disk)

Paper copies of the response to submissions document are available from the EPA Service Unit on request.