



ENVIRONMENTAL MANAGEMENT PLAN

Digby Dartmoor Seismic Program

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Digby Dartmoor Seismic Program

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Essential
Petroleum
Resources
Limited

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1 INTRODUCTION

1.1 Project Outline

Essential Petroleum Resources Limited (Essential Petroleum) is the operator of the Exploration Permit No. 151 (PEP 151) located west of Portland in the Otway Basin, southwest Victoria. Essential Petroleum is proposing to conduct a seismic exploration survey (termed the Digby Dartmoor Seismic Program) in order to define potential hydrocarbon reserves. It is expected that a maximum of approximately 105 km of seismic lines will be surveyed as part of its Onshore Otway Basin 2008 Seismic Survey Program.

Although the seismic lines either connect or overlap, the proposed project broadly has two locations, divided by the Dartmoor Hamilton Road (Figure 1). The site north of the Dartmoor Hamilton Road (termed the Digby site) (Figure 2) is located on areas zoned as 'farming' (which includes private freehold land, predominantly on areas subject to farming and grazing and areas of plantation) and 'public conservation and resource' (which includes areas of plantation and State Forest). The closest seismic line to Digby is approximately 12 km west of the township (see Figure 1). The site south of the Dartmoor Hamilton Road (termed the Dartmoor site) (Figure 3) is also located on areas zoned as 'farming' (which includes private freehold land, predominantly on areas subject to grazing and areas of plantation) and 'public conservation and resource' (which includes areas of plantation and State Forest). The closest seismic line to Dartmoor is approximately 4 km to the east (Figure 1). One of the north-south lines is continuous between both areas.

This study identifies environmental risks and mitigation procedures for the proposed seismic operation. The purpose of this document is to obtain approval from the Department of Primary Industries (Minerals and Petroleum Division) for the proposed survey activities.

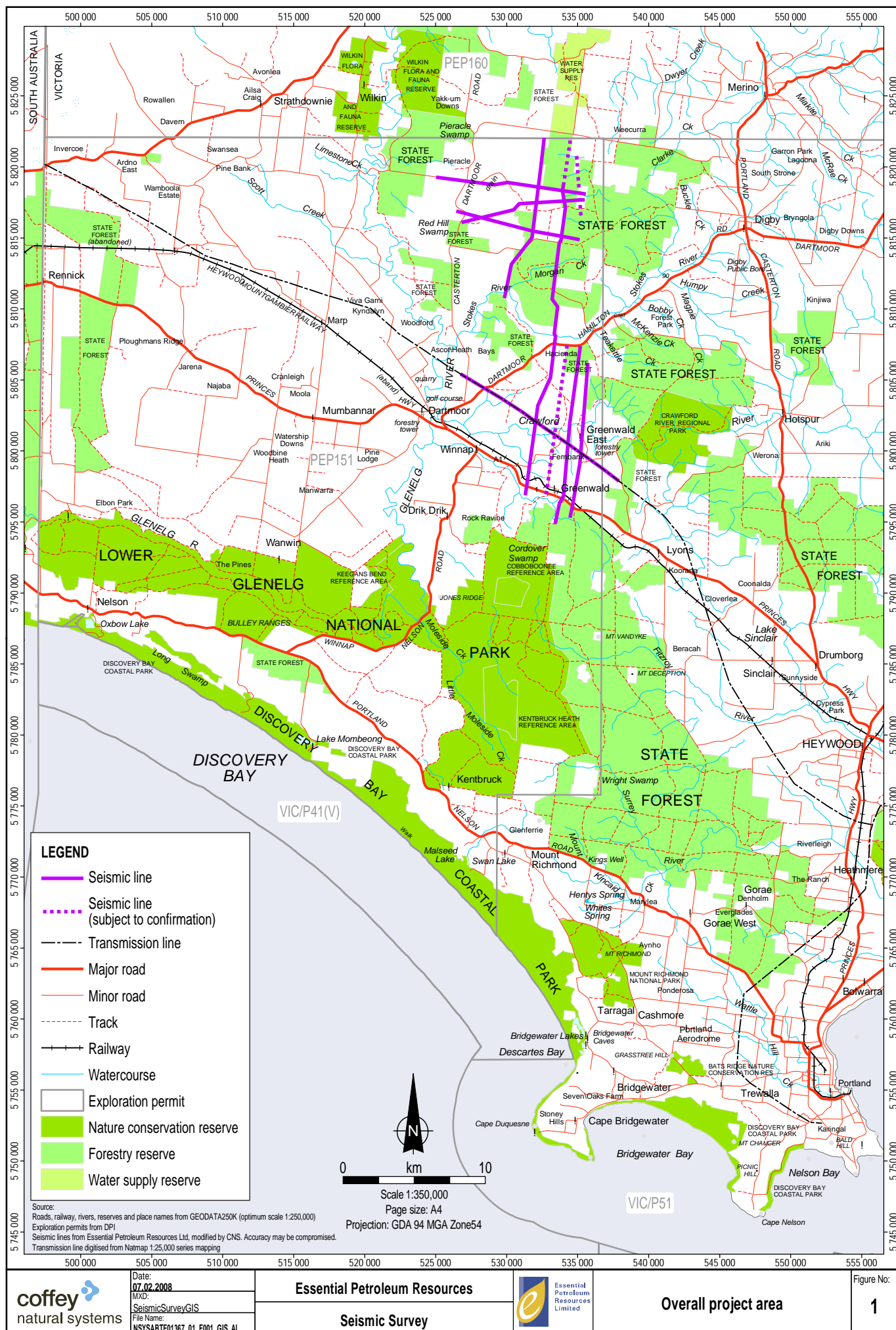
The survey is expected to commence in late February 2008, and will take approximately 12 days to complete. Preparatory works such as the cutting of vegetation for access tracks (where necessary) will be undertaken prior to the commencement of the survey. Further details about the project are provided in Section 3.

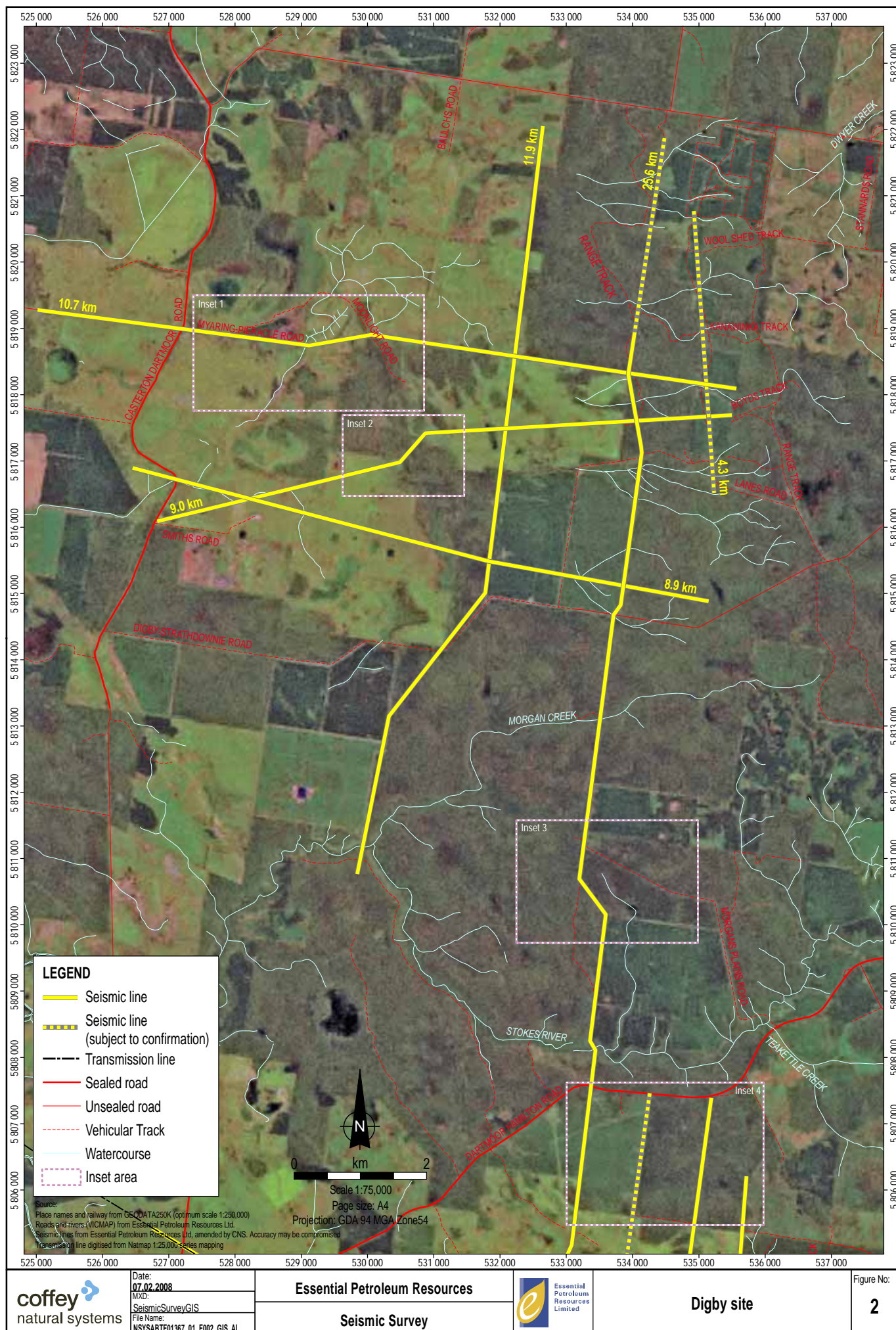
1.2 Project Proponent

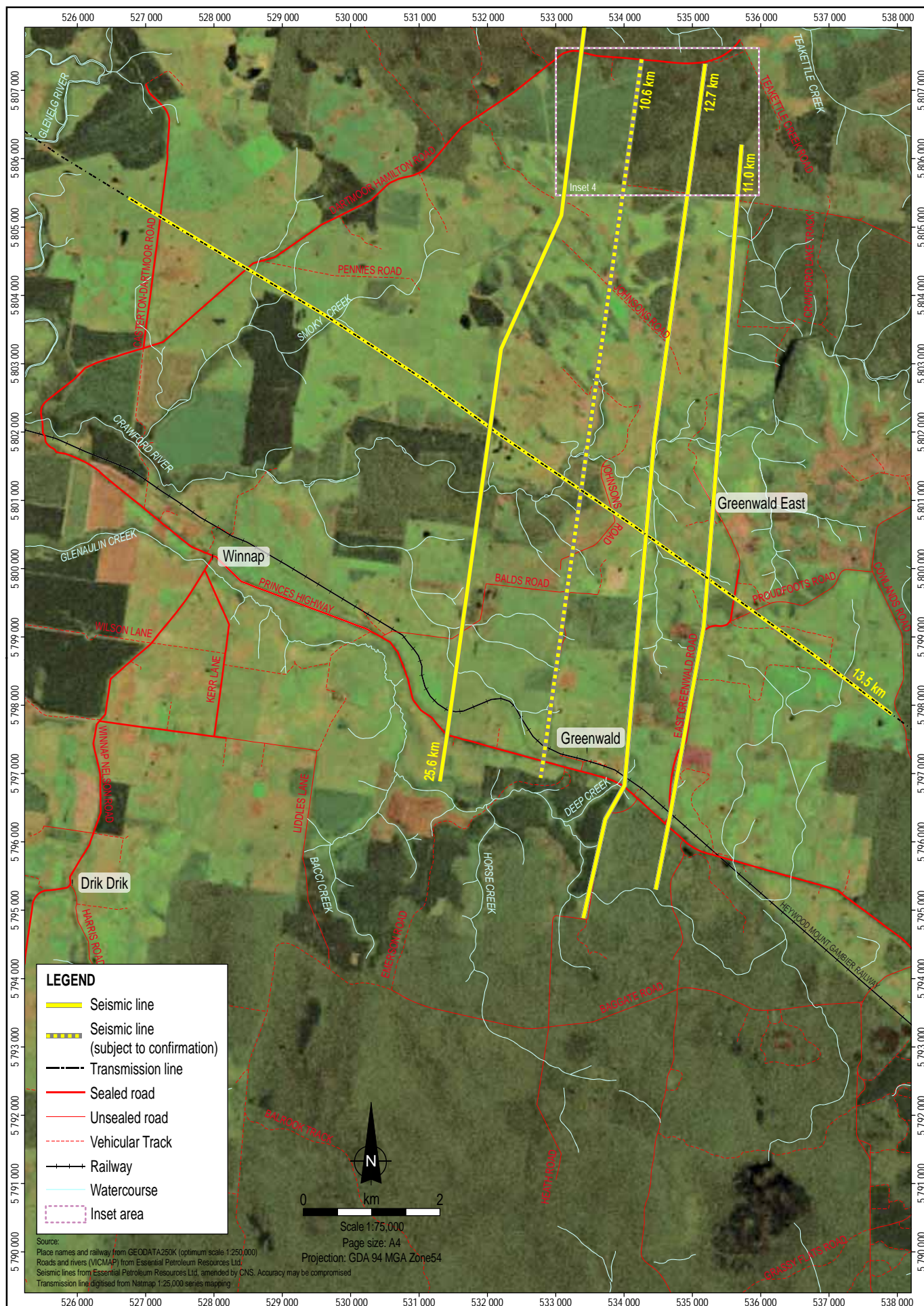
Essential Petroleum is a wholly owned subsidiary of Essential Petroleum Resources Limited, an independent oil and gas explorer, formed in 1999, that focuses exclusively on the Otway Basin in southeastern Australia, both onshore and offshore. The Company was listed on the Australian Stock Exchange in 2001.

The strategy to focus exclusively on the increasingly prospective Otway Basin is based on:

- Essential Petroleum's previous experience in the region.
- Strong prospects for oil and gas discoveries in the Otway Basin.
- Strategic importance of Otway Basin in meeting the needs of energy markets in southeastern Australia.
- Close proximity to infrastructure.
- The simplicity of a one-basin exploration and development program.







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Essential Petroleum's commercial office is located at Level 2, 226 Albert Road, South Melbourne, Victoria, 3205.

Additional information regarding Essential Petroleum can be obtained from its website at www.essentialpetroleum.com.au

1.2.1 Project Contractor

The seismic survey will be undertaken by Terrex Seismic, and site preparation and rehabilitation are expected to be undertaken by Chris Annear of Petroleum Support Services (Table 1.1). Terrex Seismic were selected by Essential Petroleum based on their experience and competency to perform the seismic program in a safe and environmentally responsible manner.

Table 1.1 Project contractors

Seismic Survey Contractor	Preparation and Rehabilitation Contractor
Terrex Seismic	Petroleum Support Services
Steve Tobin	Chris Annear
2/37 Howson Way Bibra Lake Western Australia, 6163	PO Box 1981 Mount Gambier South Australia, 5290

1.3 Environmental Commitment

Essential Petroleum is committed to ensuring that the impacts of its operations are minimal and of a transient nature, particularly when operating in environmentally sensitive areas. Essential Petroleum's Environmental Policy (Appendix A) outlines the Company's intention to apply best practice management of environmental aspects to all projects, through which all potential adverse environmental effects can be effectively managed. The Company also has a cultural heritage policy, which will be applied to this project. Essential Petroleum operates in accordance with the guidelines of the APPEA Code of Environmental Practice – 1996 and the key elements of the internationally recognised Coalition for Environmentally Responsible Economies (CERES) Principles.

1.4 Project Purpose

The purpose of Essential Petroleum's Onshore Otway Basin 2008 Seismic Survey Program is to explore prospective hydrocarbon bearing formations and discover commercially viable hydrocarbon resources, thereby increasing Essential Petroleum's hydrocarbon reserves in the region. The seismic program also aim to fulfil commitments under the licence conditions (PEP 151) and expand the geophysical knowledge of prospective strata in the region.

If the results of the seismic program indicate a potential hydrocarbon trap of sufficient size to be economic, drill testing may be conducted.

1.5 Seismic Survey Timeframe

The survey is expected to commence in late February 2008 and will take approximately 12 days to complete. Preparatory works such as line surveying, and vegetation clearing (where necessary for access tracks) will be undertaken prior to the commencement of the survey. Precise commencement

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(and therefore completion) dates for the project are also dependent on equipment, machinery and personnel availability.

1.6 Project Alternatives

Seismic operations are undertaken for exploration, appraisal and development purposes. No commercially viable alternative to exploration seismic surveys is known.

The proposed seismic survey operations are located within private freehold properties, plantations and native vegetation (including State Forest). While the lines have been chosen relative to the subsurface geological areas of interest, the locations and orientations of the lines substantially reflect surface features including practicalities of access, use of existing tracks and minimisation of vegetation clearance.

1.7 Stakeholder Consultation

In the course of planning the seismic program, Essential Petroleum has undertaken consultation with relevant stakeholders, land managers and other relevant authorities to identify regulatory processes, potential environmental issues, management requirements and the use and maintenance of infrastructure (i.e., water sources and roads). The government departments consulted to date include:

- Victorian Department of Primary Industries (DPI):
 - Minerals and Petroleum Division (Melbourne).
- Victorian Department of Sustainability and Environment (DSE):
 - Flora and Fauna, Threatened Species Projects (Casterton).

There are approximately nine address points identified as being within or in close proximity to properties intersected by the proposed Digby seismic lines, and 26 address points identified as being within or in close proximity to properties intersected by the proposed Dartmoor seismic lines. Essential Petroleum has undertaken consultation with the landowners/residents of these locations to inform them of the proposed seismic program and to discuss/manage any concerns they may have regarding the project. All such owners/residents will be further consulted prior to actual access onto the land.

Appendix B provides a summary of the consultation undertaken to date with the landowners/residents, land managers, traffic and fire authorities, Glenelg Shire Council and government departments.

Ongoing consultation between Essential Petroleum and relevant stakeholders/land managers will take place as necessary up to and during the conduct of the survey.

Further consultation regarding project activity will include:

- Notification in the local newspaper of project activities to inform landholders in the wider vicinity of the project area.
- Notification of Vic Roads for traffic management requirements and other requirements.
- Notification to CFA for areas of operation.
- Continued regular consultation with DPI to inform them of project progress.

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1.8 Purpose Of This Document

Coffey Natural Systems Pty Ltd was commissioned by Essential Petroleum to prepare an Environmental Management Plan (EMP) for the Digby Dartmoor Seismic Program as part of the Essential Petroleum Onshore Otway Basin 2008 Seismic Survey Program. This EMP aims to identify and assess the potential environmental impacts and constraints associated with the proposed seismic program and to recommend suitable measures to mitigate identified impacts. This document has been produced to fulfil the environment-related requirements of the Operation Plan for the sites, as required under the Victorian *Petroleum Act 1998* and associated regulations (see Section 2).

This EMP is prepared in advance of a detailed survey of the locations of the seismic lines, in particular, those areas of native vegetation through which the lines will pass, as access to properties has yet to be agreed. However, no line preparation work will be undertaken without a prior survey (by qualified fauna/flora specialists) of the sensitivities of any areas to be traversed and to advise of specific line deviations and any other measures as necessary to avoid specific sites or protected flora (see Section 2.2.2). If cutting of native vegetation is required for access, a permit under the *Flora and Fauna Guarantee Act 1988* may also be required. If the timing of the program is such that Essential Petroleum wishes to commence the seismic program as soon as permission is received from DPI, but prior to a permit being received to cut native vegetation, the areas that require a permit will be surveyed last (and after a permit is received)

Specifically, this EMP contains:

- A description of the proposed seismic survey operation.
- A description of the legislative framework.
- A description of the existing environment.
- A description and assessment of potential environmental risks.
- Management and mitigation measures for potential environmental risks.
- A description of the environmental management systems for the operation.

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2 LEGISLATIVE FRAMEWORK

2.1 Approvals Process

The Victorian Government, through the *Petroleum Act 1998*, has regulatory jurisdiction for exploration and development of onshore petroleum resources. Prior to commencement of any petroleum operations the following requirements (under section 147, *Petroleum Act 1998*) must be complied with:

- (a) Any petroleum operation on any land:
 - (i) The written consent of the Minister in accordance with section 138.
 - (ii) Reasonable steps take to ensure non-contravention of legislation referred to in section 146.
 - (iii) 21 days (or any shorter period that is agreed) written notice given to owner, occupier or person or body responsible for management of the land in accordance with section 128.
- (b) Any petroleum operation on private land or native title land, except land owned by that person:
 - (i) An operation plan accepted by the Minister in accordance with section 161 (of which this document forms part of).
 - (ii) Insurance obtained and maintained, as directed by the Minister, in accordance with section 171.
 - (iii) A rehabilitation bond acceptable to the Minister obtained in accordance with section 173.
 - (iv) Consent of owners and occupiers of land; or compensation agreement entered into with owners and occupiers; or amount of compensation payable to owners and occupiers determined in accordance with section 128.

2.1.1 Operation Plan

In accordance with the *Petroleum Act 1998* an operation plan must be submitted to the relevant government Minister (currently the Hon. Peter Bachelor MP) for acceptance. According to section 161 of the *Petroleum Act 1998*, the operation plan must contain information:

- (a) That identifies the risks of injury or damage that the operation may pose to the environment, to any community, person, land user, land or property in the vicinity of the operations and to any petroleum, source of petroleum or reservoir that the operation might affect; and
- (b) That specifies what the holder of the authority will do to eliminate or minimise those risks; and
- (c) That specifies what the holder will do to rehabilitate the land that will be affected by the operation; and
- (d) That sets out any other matters required by the regulations.

Section 5 of the *Petroleum Regulations 2000* states that for geophysical and geochemical operations, the operation plan must include:

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- (a) Details of the operation, including any equipment or facilities to be used;
- (b) An environment and safety assessment which:
 - (i) Identifies the environment, health and safety hazards and risks associated with the operation; and
 - (ii) Provides an assessment of the risks; and
 - (iii) Identifies the measures to be used to eliminate the hazards and to minimise the risks so far as is practicable;
- (c) A description of the management systems required by Regulation 4.

As stated in Section 1.8, this document has been produced to fulfil the environmental related requirements of the operation plan for Essential Petroleum, as required under the Victorian *Petroleum Act 1998* and associated regulations.

2.2 Applicable Legislation and Industry Standards

A variety of Australian Government and State environment-related legislation, industry procedures and guidelines may apply in relation to environmental considerations of the proposed seismic program. Key legislation, and the statutory approvals processes governed by each, is discussed in this section.

2.2.1 Australian Government Legislation

Environmental Protection and Biodiversity Conservation Act 1999

The Australian Government *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) regulates actions that may have a significant impact on a matter of national environmental significance.

Matters defined as nationally significant include:

- World Heritage properties.
- National Heritage places.
- Wetlands of international importance (Ramsar-listed sites).
- Nationally listed threatened species and ecological communities.
- Internationally listed migratory species.
- Commonwealth land and marine areas.
- Nuclear actions.

A referral and assessment process determines the application of the EPBC Act. Where activities are deemed by the Minister to have a potential for significant impacts on matters of national environmental significance, the project is deemed to be a controlled action and assessment under the EPBC Act is triggered.

A search of the Department of the Environment, Water, Heritage and the Arts (DEWHA) EPBC Act protected matters website (Appendix C) list all threatened, migratory, and marine-protected species that may occur within a 1-km radius of the proposed seismic program. The search found ten threatened flora species, 16 threatened fauna species, 13 migratory (terrestrial, wetland and marine) bird species, and 12 listed marine bird species (DEWHA, 2008). Tables 4.1 and 4.2 of this document list these species.

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The EPBC Act website also revealed that no other matters of national environmental significance relate to the proposed seismic lines as there are no nearby national conservation reserves or threatened ecological communities.

Therefore, no significant impact to matters of national environmental significance is anticipated as a result of the project; there being minimal ground disturbance and transient activities in any one area. This assessment is based on a number of factors, including management and mitigation measures to ensure that the project has no off-site impacts, the very low likelihood that threatened species occur at or near the seismic lines, the short time frame of operations and the small footprint of the seismic lines. Potential impacts to flora and fauna species are assessed in more detail in sections 4.4.2 and 4.5.2.

DEH (now DEWHA) considers that 'other geophysical surveys that include seismic surveys would not normally be expected to have a significant impact on matters of national environmental significance. However, an action involving seismic surveys (shot hole method or vibroseis) may have a significant impact on an endangered or critically endangered species if, for example it is likely to damage habitat critical to the survival of the species or disrupt the breeding cycle of a population of the species. Such an action may also have a significant impact on listed threatened ecological communities where, for example, it adversely impacts on habitat' (DEH, 2006).

On the basis of the above information it is concluded that significant impacts to matters of national environmental significance will not result from the seismic program and therefore the project is not a 'controlled action'. Consequently, submission of a referral to DEWHA under the EPBC Act is not warranted.

Native Title Act 1993

The Australian Government *Native Title Act 1993* applies indigenous land rights to Crown land, but not to freehold land, road reserves and forestry lands in Victoria.

Petroleum Exploration Permit 151 was awarded subject to native title agreement with the Gunditj Mara Registered Aboriginal Party under Section 31 of the Act. This process has been completed without issue and requires only prior informing of the Gunditj Mara of the location and timing of the survey.

2.2.2 Victorian Legislation and Policies

By complying with this EMP, Essential Petroleum will be meeting the requirements of relevant Victorian legislation, including:

- *Archaeological and Aboriginal Relics Preservation Act 1972.*
- *Catchment and Land Protection Act 1994.*
- *Country Fire Act 1958.*
- *Dangerous Goods Act 1985.*
- *Environment Protection Act 1992.*
- *Flora and Fauna Guarantee Act 1988.*
- *Heritage Act 1995.*
- *Petroleum Act 1998.*
- *Water Act 1989.*
- *Wildlife Act 1975.*

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Fauna and Flora Guarantee Act 1988

Protected flora are native plants or communities of native plants that have legal protection under the *Flora and Fauna Guarantee Act 1988*. The Protected Flora List includes plants from three sources:

- Plant taxa (species, subspecies or varieties) listed as threatened under the *Flora and Fauna Guarantee Act 1988*.
- Plant taxa belonging to communities listed as threatened under the *Flora and Fauna Guarantee Act 1988*.
- Plant taxa which are not threatened but require protection for other reasons.

Some species, which are attractive or highly sought after, such as orchids and grass trees, are protected so that the removal of these species from the wild can be controlled. The handling of protected flora is regulated by the Department of Sustainability and Environment (DSE) to ensure that any harvesting or loss is ecologically sustainable.

A Protected Flora Licence or Permit may be required for works or other activities on public land which might kill, injure or disturb protected native plants. In most cases a Permit for works or activities on private land, is not necessary, subject to the extent of disturbance, however, given the length of the seismic lines, a permit planning scheme from the Glenelg Shire Council for removing native vegetation may be required, which will also trigger offsets and net gain. The State Planning Policy states that native vegetation must be managed in accordance with Victoria Native Vegetation - A Framework for Action i.e., the Net Gain policy (Clause 15.09 of every planning scheme). Clause 52.17 of the Glenelg Planning Scheme sets out the requirements for dealing with native vegetation. It states that a planning permit is required to remove, destroy or lop native vegetation unless the schedule to the clause states otherwise. There are no exemptions, so a planning permit will most likely be required to clear or lop or trim native vegetation wherever this is unavoidable. However, the details and permit applications will be lodged once fauna/flora expert has visited each of the areas and assessed the extent of clearance required after all efforts to minimize have been determined.

Environment Protection Act 1970

The *Environment Protection Act 1970* establishes the Victorian EPA as the statutory body empowered to control discharges of waste to the environment. The principles of the Act reflect the biodiversity conservation and ecologically sustainable development goals of the State of Victoria.

Subordinate legislation made under the provisions of the *Environment Protection Act 1970* are State Environment Protection Policies (SEPPs), which provide more detailed requirements and guidance for the application of the Act to Victoria. Under the Act, the requirements in environmental regulations, including works approvals and licences, must be consistent with SEPPs. The SEPPs relevant to this project concern air and water emissions from the proposed project, and the prevention of contaminated land.

As yet, there has been no SEPP published dealing with the issue of noise from industry in country Victoria. Consequently, the Interim Guidelines for the Control of Noise from Industry in Country Victoria (N3/89) are the most relevant guidelines for noise emissions from the seismic surveys, given the 12-hour-per-day nature of the seismic operations proposed.

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Environment Effects Act 1978

The *Environment Effects Act 1978* provides for assessment of proposed projects in Victoria that are capable of having a significant effect on the environment. The ministerial guidelines for assessment of environmental effects (DSE, 2006) provide guidance for determining whether a project requires referral under the Environment Effects Act. The guidelines state, 'a project with potential adverse environmental effects that, individually or in combination, could be significant in a regional or State context should be referred'.

The guidelines provide criteria that indicate what type of potential environmental effects are considered significant at a regional or State level. In summary, these criteria are:

- Clearing of 10 ha or more of native vegetation from an area of conservation significance.
- Long-term loss of a significant proportion of known remaining habitat or population of a threatened species within Victoria.
- Long-term change to the ecological character of an important wetland.
- Extensive or major effects on aquatic, estuarine or marine ecosystems, over the long term.
- Extensive or major effects on the health, safety or well-being of a human community.
- Greenhouse gas emissions exceeding 200,000 tonnes of carbon dioxide equivalent per annum, directly attributable to the operation of the facility.

The guidelines also list criteria for potential environmental effects that, when occurring in combination, are considered significant at a regional or State level. In summary, these criteria are:

- Clearing of 10 ha or more of native vegetation, unless authorised under an approved Forest Management Plan or Fire Protection Plan.
- Significant effects on matters listed under the Flora and Fauna Guarantee Act.
- Extensive or major effects on landscape values of regional importance.
- Extensive or major effects on land stability, acid sulphate soils or highly erodible soils.
- Extensive or major effects on beneficial uses of waterbodies over the long term.
- Extensive or major effects on social or economic well-being due to direct or indirect displacement of non-residential land use activities.
- Extensive displacement of residences or severance of residential access to community resources due to infrastructure development.
- Effects on the amenity of a substantial number of residents, due to extensive or major, long-term changes in visual, noise and traffic conditions.
- Exposure of a human community to severe or chronic health or safety hazards.
- Extensive or major effects on Aboriginal cultural heritage.
- Extensive or major effects on registered cultural heritage places.

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On the basis of the above-listed criteria, the proposed seismic program is not expected to cause any environmental effects that are significant at a regional or State level. Consequently, a referral has not been made under the Environment Effects Act.

2.2.3 Industry Codes of Practice and Guidelines

The petroleum exploration and production industry operates within the following industry codes of practice:

- Australian Petroleum Production and Exploration Association (APPEA) Code of Environmental Practice 1996.
- International Association of Geophysical Contractors (IAGC) Environmental Manual for Worldwide Geophysical Operations 2001.

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3 PROJECT DESCRIPTION

3.1 Location

The proposed area of operations is located on freehold private grazing farming property (Plate 3.1) plantation (Plate 3.2) and native vegetation (Plate 3.3). The location of the lines reflects practicalities of access and use of existing disturbed track, with deviations to minimise the extent of native vegetation transited. The seismic program consists of eight seismic lines totalling approximately 105 km, broadly located into two locations – the Digby site located to the north of the Dartmoor Hamilton Road and the Dartmoor site located to the south of the Dartmoor Hamilton Road (see Figure 1). The Digby and Dartmoor sites are located approximately 56 km and 41 km respectively north-northwest from Portland. One line crosses over the Dartmoor Hamilton Road, and four lines cross over the Princes Highway.

Remnant vegetation and also pasture grasses are present in some areas of both the Digby and Dartmoor sites.

3.2 Footprint

The project footprint will only comprise slashed and/or cleared areas along the seismic lines.

3.3 Site Preparation

Preparation for the seismic program predominantly involves slashing and clearing vegetation for the seismic lines (see Section 4.4.2).

The expected duration of the Digby and Dartmoor mobilisation, construction, seismic survey and site rehabilitation works are outlined in Table 3.1.

Table 3.1 Seismic survey duration

Activity	Digby site
Mobilisation and set up	1 days
Trucks on location	10 days
Site rehabilitation	1 days
Total	12 days

3.4 Seismic Method

Seismic operations allow the identification of areas below the surface of the earth where oil and gas may have accumulated. Vibroseis trucks are used as the source of vibrations (sound waves), which travel into the earth and are reflected from subsurface geological structures. The seismic signal is then detected with the use of geophones. The Digby Dartmoor Seismic Program will involve the use of three to four vibroseis trucks, and three light cable trucks for laying out the geophone lines during this operation.

Plate 3.1
Typical grazing farming property
in the Digby Dartmoor area.



Plate 3.2
Typical *Pinus radiata* plantation
in the Digby Dartmoor area.



Plate 3.3
Typical native vegetation
in the Digby Dartmoor area.



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A summary of the operation is provided in Table 3.2.

Table 3.2 Description of seismic operation

Feature	Description
Location	12 km west of Digby extending south and east of Dartmoor
Exploration Licence No.	PEP 151
Boundary coordinates (GDA 94)	As used in the EPBC search (Appendix C). Starting top left and moving clockwise: 141 15 30, -37 45 00 141 27 30, -37 45 00 141 27 30, -38 02 30 141 15 30, -38 02 20
Timing of seismic operation	End of February 2008 for 10 days
Length and width of seismic survey	Approximately 105 km long by 5 m wide
Accommodation	Hotel in Mt Gambier
Proposed machinery mobilisation route	Princes Highway, then Dartmoor-Hamilton Road

3.4.1 Planning and Permitting

The locations of the proposed vibroseis and geophone lines have been plotted onto detailed topographic and cadastral maps. In the field, seismic lines are approximately 5 m wide and are carefully laid out considering environmentally sensitivity areas as well as other cultural features such as buildings, dams and water wells. Existing roads and tracks will be used as far as practicable.

Insets 1 to 4 show examples of how the seismic lines have been aligned to minimise vegetation disturbance, through the utilisation of existing areas of disturbance (e.g., roads, tracks, transmission lines), and deviations to avoid areas of bush wherever possible.

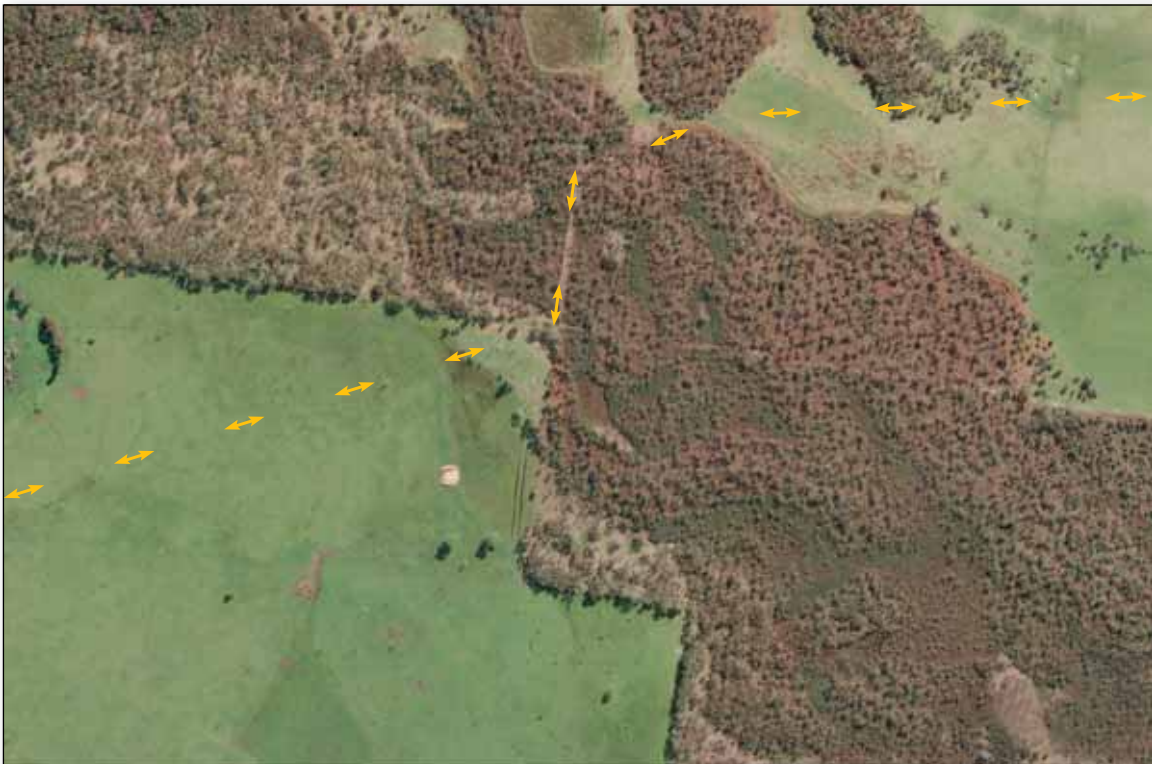
Permitting involves discussions with landowners and land managers whose land may be traversed by a seismic line to explain the seismic program, to gain access to land and to identify other relevant issues. Essential Petroleum is committed to respecting the rights and desires of all individuals who are directly affected by the project and to abide by all relevant legislation. Written advice of the project is currently being delivered to all landowners who adjoin the key areas of interest to the company (see Appendix B). Essential Petroleum has commenced consultation with landowners and will continue to discuss issues with any of the property owners who make contact and all reasonable conditions requested by landowners will be respected. Seismic crews are made fully aware of the environmental requirements and the need to respect the rights and interests of landowners and land users.

Timing

The exact timing of the seismic operation will be such that it will avoid or take special precautions during important agricultural or pastoral seasons, known significant wildlife breeding or other natural cycles, known bushfire seasons, and other periods of significance. The timing will also ensure minimal disruption in any one area during the surveys and where possible, avoidance of extended operations. Sufficient notification will also be given to the relevant stakeholders.




Inset 1



Inset 2

Source: Imagery from Google Earth.

LEGEND	
	Proposed seismic line alignment




Inset 3



Inset 4

Source: Imagery from Google Earth.

LEGEND	
	Proposed seismic line alignment

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3.4.2 Surveying and Line Preparation

Once the location of seismic lines is established, surveyors peg out the location of each line by placing markers at an interval of 20 m along the lines. Line length will vary from approximately 4.3 to 25.6 km. Fencing crews construct temporary gates and fence crossings along the lines wherever this may be necessary. Surveying is also required to determine the locations of the geophones, and to identify what vegetation needs to be cleared. A GPS will be used to accurately locate the positions of tracks and seismic lines.

Minimal preparation is required on cleared land to accommodate the line for the seismic crew. An agricultural slasher or roller may be used to cut the pasture grasses for track widths of approximately 5 m and to a height of approximately 5 cm above the ground, (except in areas where greater height is advised to minimise damage to protected flora) but otherwise the only signs left of the operation are the temporary wheel tracks along the line.

Some native vegetation will need to be removed where it is not possible for the trucks to manoeuvre around vegetation. In this instance, vegetation will be cleared to approximately 5 m width. Where vegetation is particularly dense or sensitive, the cable, where possible, will be laid by hand, and trucks will drive around the area either on nearby roads, or in less densely vegetated or sensitive areas. The vegetation will be mulched to reduce the possibility of tyre punctures, and retained on site. It will not be stockpiled, but instead laid out along the seismic line to reduce fire hazards.

Fences may need to be removed to allow the trucks to pass through an area.

Where creek or river crossings are encountered, the trucks will not cross unless there is an established crossing. If this is not present, the trucks will come as close to the watercourse as the gradient will allow, and the cable will then be laid by hand, with the trucks finding an alternative route (i.e., bridge or ford) to cross.

Where plantations are encountered, the line will be placed either along existing tracks, e.g. fire tracks or between rows of trees, therefore reducing the need for tree removal.

The seismic lines will avoid sensitive areas (e.g., Aboriginal heritage sites, large trees, steep slopes, wildlife nesting sites, crops, waterholes), and existing access roads, tracks and gates will be used where possible. Turning circles and detours will also be avoided where possible.

Of the eight seismic lines that are proposed, some lines, or sections of lines, are subject to confirmation (see Figures 2 and 3). It is not known at this stage if these lines will be surveyed, as it will depend on the success of the other seismic lines, and degree of accessibility, particularly the eastern extremities of the East-west line in the Digby survey area. The exact extent of surveying will be determined once the seismic program is underway.

3.4.3 Recording

Once lines are prepared, the seismic crew, consisting of cable laying trucks, line crews, vibroseis trucks, and a recording truck move onto the line.

The vibroseis trucks each have a vibrator pad that is lowered to the ground at each energy source position and vibrated with a range of low to medium frequencies in the range of 5 to 100 Hz.

Geophones, which detect the seismic signal, are placed at 20 m intervals along the recording line. There are 10 to 15 geophones used in the one location, the spacing of which depends upon local

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condition (e.g., soil type and slope). The electrical signals generated by the geophones are converted to digital signals and transmitted along a cable to the recording truck. The energy source is systematically applied along the line every 50 m. Once a section of the line is completed, the geophones and cables are picked up and moved to the next section of the line.

Operations are undertaken during daytime only. At night, operators return to accommodation in Mt. Gambier and return the following morning.

3.4.4 Uphole Survey

Accurate processing of seismic data requires characterisation of the weathered, near-surface geological formations. A crew, using a truck-mounted drilling rig, associated water truck and support vehicle, will drill holes of approximately 20 cm diameter to a depth of 20 to 40 m (average 30 m depth). Explosives will not be used in this process. A special geophone is lowered into the hole and records the seismic waves created with a weight drop impact at the surface. This provides information on the weathering layer. Approximately 15 holes located mostly at seismic line intersections will be drilled, using air drilling process, such that no drilling fluids are used. A cap is placed in the hole below the surface and holes are then backfilled with the original drill cuttings allowing natural recovery of the disturbed area. Any cuttings not used as backfill into the drill hole will be removed and disposed of in accordance with Council requirements.

3.4.5 Accommodation

A seismic crew generally varies between 30 to 50 people. It is likely that the seismic crew personnel will be accommodated in local motels and other rental accommodation in Mt Gambier.

3.4.6 Line Checking

Whilst a small number of permanent markers will be left along some fence lines at the end of the seismic program, the survey pegs and all other equipment are removed from the line. Any temporary fencing set up by the seismic crew will be removed and permanent fencing re-instated.

Landowners will be contacted at the end of the process to ensure that operational objectives and other specific agreements have been met. Once requirements are satisfied, Essential Petroleum will obtain a release form signed by the landowner to demonstrate satisfaction with the outcome of the survey.

3.5 Landowner Agreements

Essential Petroleum is currently consulting with the landowners of the affected properties and will establish an agreement for access, seismic operations, rehabilitation and compensation for the proposed seismic program. Copies of the agreements with all landowners/residents and other agencies is attached as Appendix B.

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4 EXISTING ENVIRONMENT AND IMPACT ASSESSMENT

This chapter provides a description of the existing environment, and identifies the potential impacts associated with particular environmental aspects of the seismic survey.

4.1 Regional Description

The proposed seismic survey area is located near the towns of Digby and Dartmoor, within the Glenelg Shire. The region's primary industries sector is dominated by agriculture, which consists of extensive grazing industries such as sheep, beef and dairy cattle. Broadacre cropping also makes a significant contribution, as does forestry (DPI, 2007a).

The region has a temperate climate with warm, dry summers and cool, wet winters. The mean annual rainfall for Casterton (the closest town with climate recordings) is 655 mm, with a mean maximum temperature of 19.9°C and mean minimum temperature of 8.3°C. The period from December to March has the lowest mean rainfall totals (between 24.6 mm in February to 39.4 mm in December) and fewest number of rain days (BoM, 2008).

4.2 Geology and Soils

4.2.1 Existing Environment

Geomorphology

The seismic survey is located within the Western Plains geomorphic region of Victoria (DPI, 2007b). This region is an erosional landscape of low relief, derived from scoria and basalt (Walker et al., 1983).

Geology

The landforms of the area are classified as 'plain above flood level (relative relief <9 m)', 'low hill (relative relief 90 to 300 m)' and 'plains complex' (DPI, 2007c).

In the seismic survey region the basic formation is the Miocene Glenelg group limestones, a part of the broader Heytsbury Group (Port Campbell) limestones (DCE, 1991). This geomorphic region features broadly spaced northwest trending dune limestone ridges of the Bridgewater Formation, interspersed with Aeolian Dune and sandsheets. The Glenelg River is the prominent meandering drainage system that incises the plain (LLC 1981 in NSR 2002). The Glenelg River gorge is a major landscape feature and exemplifies the limestone character of the area (DCE, 1991). During the last Ice Age the Glenelg River changed course several times as the sea level fell and rose, leaving behind abandoned channels leaving behind submarine valleys found offshore from Millicent, Nelson and Kentbruck (DCE, 1991).

The seismic program is in an area with the following geological formations:

- Gambier Limestone: marine calcarenite.
- Bridgewater Formation: calcarenite.
- Alluvium, colluvium: sand, silt, clay.
- Beach deposits, coastal and inland dunes and swamps, lunettes: sand, silt, clay, gypsum deposits, calcarenite.

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Soils

Chromosols and tenosols are the predominant soil types in the seismic survey region. Red chromosols (with deep sandy surface horizons – Nelson plains and dunes) are widespread in the survey area and associated with sandy tenosols. Chromosols are the most widespread soils used for agriculture, particularly those with red subsoils (CSIRO, 2003). Tenosols are weakly developed soils that have a low water holding capacity and fertility. They are orange sands and occur mainly on sand dunes and rises. Tenosols are common in the Nelson Dunes and Plains as well as in the granite areas around the Glenelg River (NRE, 2003b).

4.2.2 Potential Impacts

Compaction

Compaction can be caused by the following activities:

- Wheel tracks of the various vehicles used in the seismic survey can form ruts and cause soil compaction.
- Operation of vibrator trucks can form 'pad marks' where the vibrator pad is pressed into the soil contributing to the compaction of soil.
- Localised compaction can be caused by the process of drilling upholes.
- Boggling of vehicles during wet weather may also cause disturbance to soils particularly if the survey is taken into farmland and if there are areas of significant roadside vegetation along the proposed survey route.

Compaction varies with soil types and can be deeper in sandy soils and wetter areas. Conducting the survey during periods of heavy rain is usually avoided for the above reason. Compaction outside the defined survey area can be avoided by restricting equipment to designated work areas and ensuring all personnel are aware of these constraints.

Contamination

Contamination of soils can occur due to fuel or oil leaks from vehicles or machinery.

4.3 Hydrology

4.3.1 Existing Environment

Surface Water

The Glenelg River is the main river basin in the area where the seismic program is being undertaken and is mainly used for rural water supply and recreation. Other river systems in the area include the Stokes River, Morgan Creek, and Crawford River.

Groundwater

Groundwater is an important source of potable water in the Glenelg-Hopkins Catchment Management Region due to the high level of salinity in the surrounding waterways and poor rainfall over recent years (NRE, 2003c). The Dilwyn Formation aquifer forms the most significant groundwater resource in the

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southern part of the Glenelg-Hopkins Region (NRE, 2003c). In the survey area the Dilwyn Formation aquifer is at depths of 700-1000 m. The Bridgewater Formation aquifer forms an important shallow groundwater resource in the western section of the Glenelg region (depth is at 20-100 m), and is developed for urban supply and irrigation along the Victorian - South Australian border, to the north of the survey area.

4.3.2 Potential Impacts

Surface Water

During the seismic survey, vehicles and machinery will only be crossing river systems at constructed crossings. They will not, therefore drive directly through river systems as the vehicles will only drive as close to the river edge as the gradient allows. Cable laying will be done on foot in areas close to river banks and crossing of rivers will use wireless laser technology to avoid disturbance to rivers. Operations will therefore not impact watercourses.

The possibility of spills during refuelling of vehicles is one of the main potential risks to watercourses. To minimise risks of surface water contamination refuelling will not take place within 50 m of a waterway (according to the *Water Act 1989*).

Hydraulic oils and drilling muds used routinely for vehicle maintenance and drilling of upholes pose a low risk as very low volumes are used.

Groundwater

The risks of contaminating groundwater aquifer from leaching of contaminated soils will be prevented by containment and/or removal of any contaminated soils according to Essential Petroleum's operating procedures. The possibility of contamination of the aquifer following uphole drilling will be avoided by use of air drilling techniques. In the event that any aquifers are intersected, appropriate cement sealing of boreholes will apply.

4.4 Flora

4.4.1 Existing Environment

Nationally Significant Flora

Ten nationally threatened plant species may occur within the broader seismic area (Table 4.1), as listed on the DEWHA EPBC Act protected matters website (DEWHA, 2008).

Table 4.1 Nationally threatened plant species potentially present in the seismic survey area

Scientific Name	Common Name	Status	Type of Presence
<i>Amphibromus fluitans</i>	River Swamp Wallaby-grass	Vulnerable	Species or species habitat may occur within area
<i>Carex tasmanica</i>	Curly Sedge	Vulnerable	Species or species habitat likely to occur within area
<i>Glycine latrobeana</i>	Purple Clover, Clover Glycine	Vulnerable	Species or species habitat likely to occur within area
<i>Haloragis exalata</i> subsp. <i>exalata</i>	Wingless Raspwort, Square Raspwort	Vulnerable	Species or species habitat likely to occur within area

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Table 4.1 Nationally threatened plant species potentially present in the seismic survey area (cont'd)

Scientific Name	Common Name	Status	Type of Presence
<i>Pterostylis cucullata</i>	Leafy Greenhood	Vulnerable	Species or species habitat likely to occur within area
<i>Senecio psilocarpus</i>	Swamp Fireweed, Smooth-fruited Groundsel	Vulnerable	Species or species habitat likely to occur within area
<i>Taraxacum cygnorum</i>	Coast Dandelion	Vulnerable	Species or species habitat likely to occur within area
<i>Thelymitra epipactoides</i>	Metallic Sun-orchid	Endangered	Species or species habitat likely to occur within area
<i>Thelymitra matthewsii</i>	Spiral Sun-orchid	Vulnerable	Species or species habitat likely to occur within area
<i>Xerochrysum palustre</i>	Swamp Everlasting	Vulnerable	Species or species habitat likely to occur within area

The presence (or likely presence) of these species and others listed under the Fauna and Flora Guarantee Act will be assessed by fauna/flora expert prior to any clearance of vegetation.

Previous Survey Work

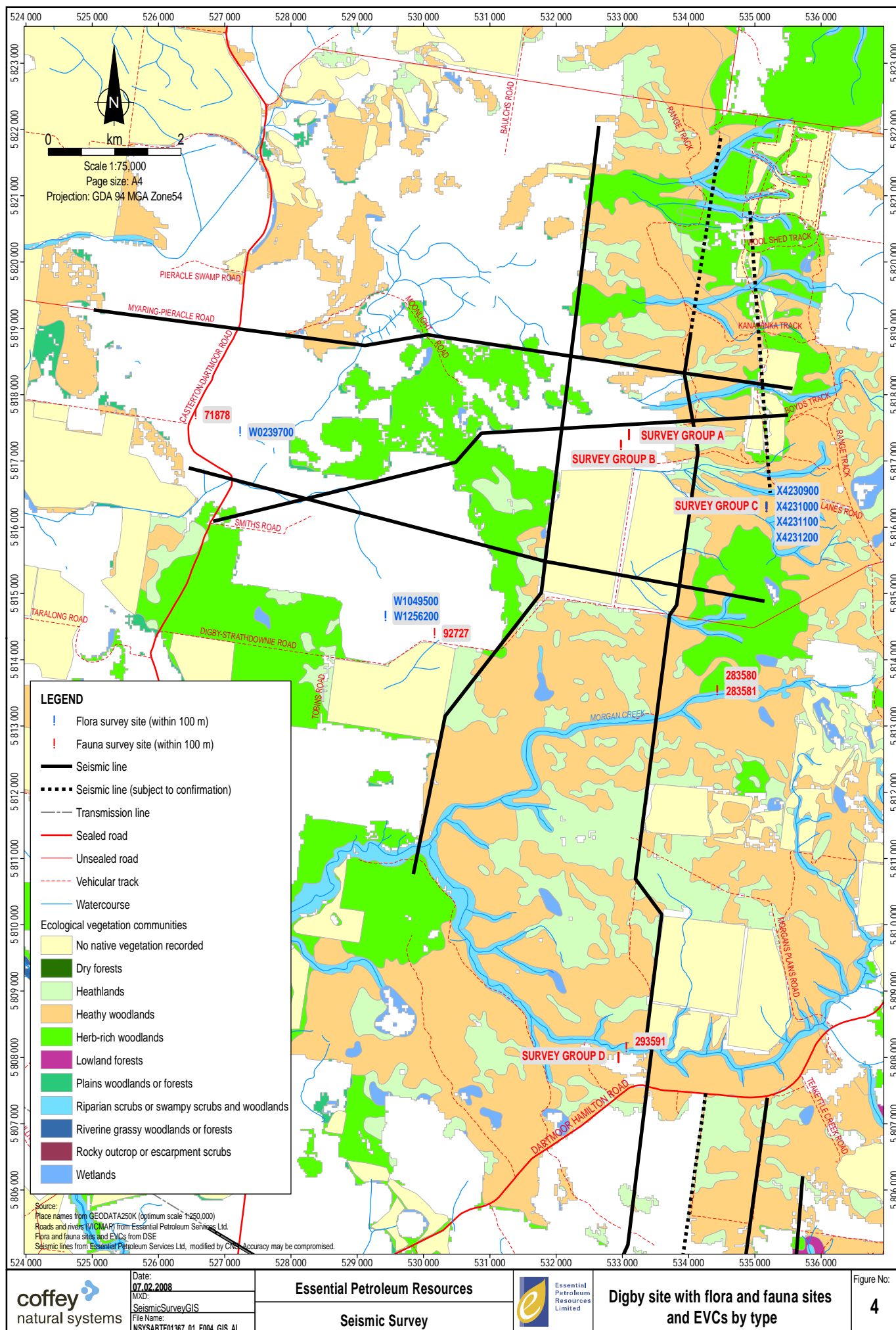
Information contained in the DSE Flora Information System (FIS) has been searched to provide a snapshot of the typical flora in the area. Figures 4 and 5 show the quadrats located within 100 m of the seismic lines in the Digby and Dartmoor areas respectively. A corresponding list of the species found within these quadrats is provided in Appendix D. These figures also show the ecological vegetation classes (EVCs) by type. Figures 6 and 7 show the EVCs by bioregional conservation status for the Digby and Dartmoor areas respectively.

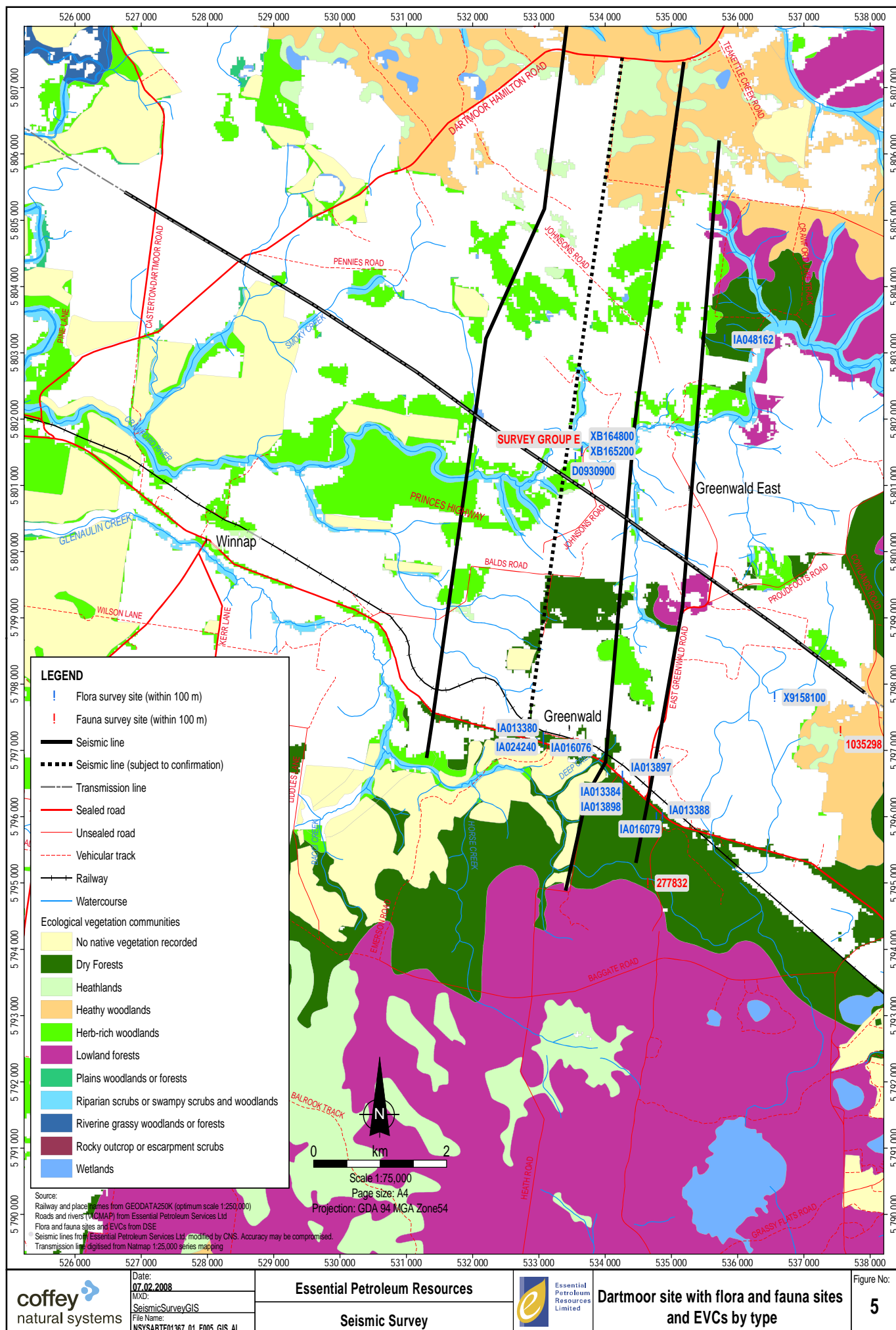
It should be noted that the species recorded at these sites have only been provided to allow a general impression of what species may be found along the seismic survey lines.

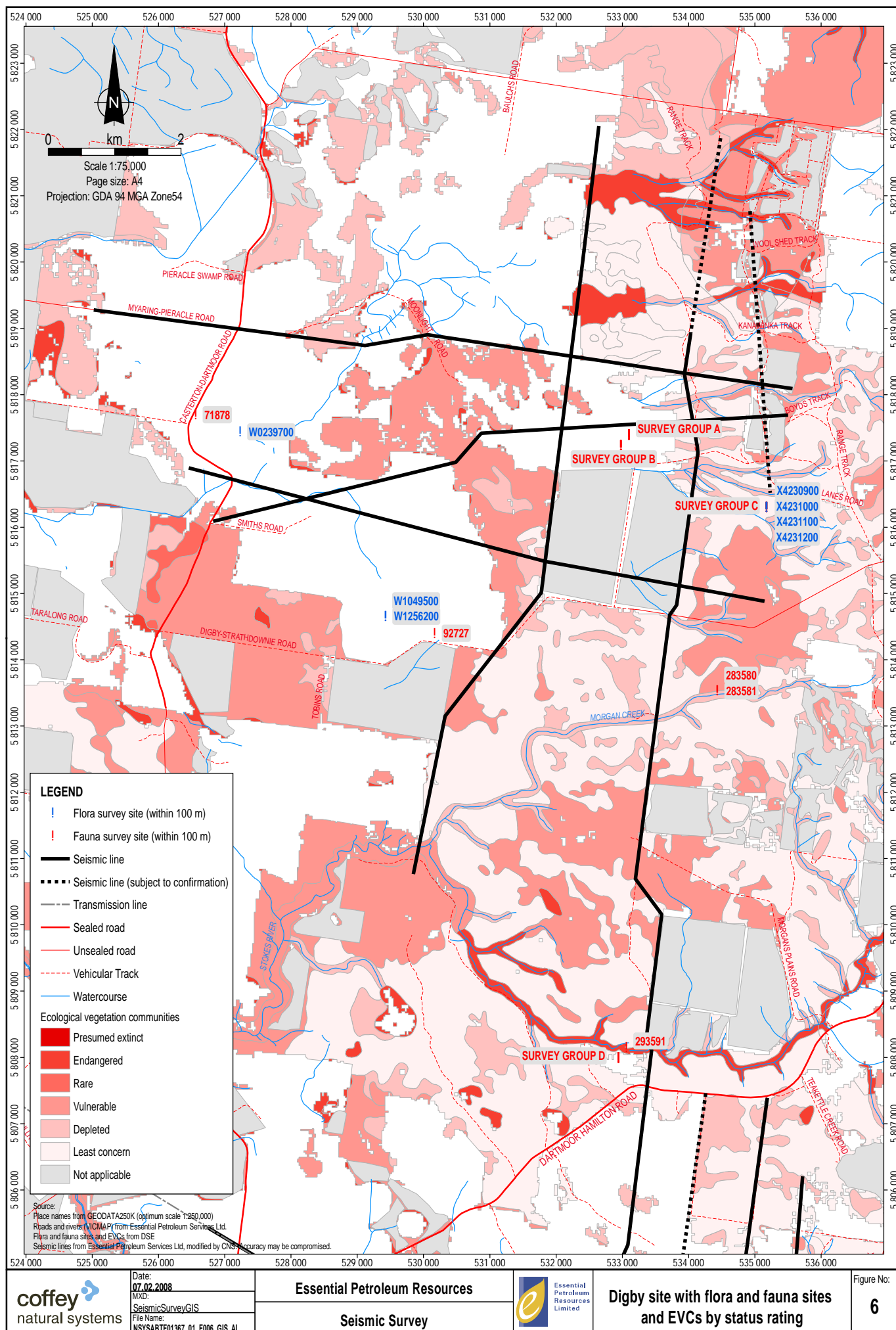
From the species listed in Appendix D, only one species was found to be rare or threatened, and this was *Xanthosia leiophylla* (parsley xanthosia), listed as rare (VROTS). This was identified at site X9158100 near the Dartmoor seismic lines. Introduced species included *Asparagus asparagoides* (bridal creeper), *Rubus fruticosus* spp. agg. (blackberry), *Cerastium fontanum* subsp. *vulgare* (common mouse-ear chickweed), *Aira* spp. (hair grass) and *Hypochoeris radicata* (flatweed).

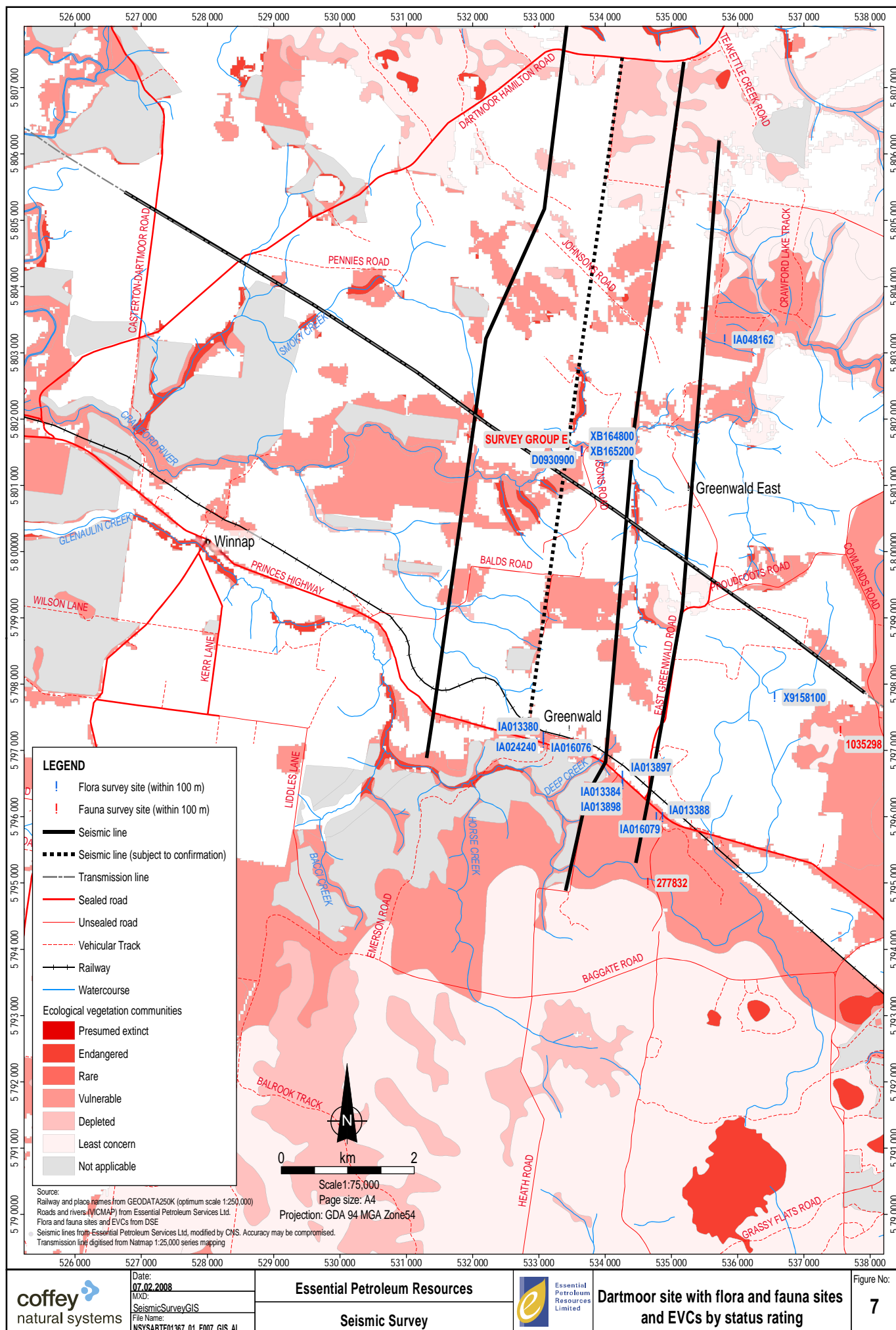
From the EVCs shown in Figures 4 to 7, there are a number of areas where EVCs classified as endangered, rare, vulnerable or depleted are close to the lines or are intersected. The particular EVCs include:

- Dry forests.
- Heathlands.
- Heathy woodlands.
- Plains woodlands or forests.
- Herb-rich woodlands.
- Riparian scrubs or swampy scrubs and woodlands.









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Disturbance through these areas will be minimised where possible, with deviations to tracks as indicated in Insets 1 to 4.

4.4.2 Potential Impacts

The majority of lines pass through farmland, a large proportion of which is already highly disturbed due to grazing activities. It is possible that some species of conservation significance, including the nationally threatened flora species listed in Table 4.1 may exist in the vicinity of the project site.

Although slashing (to a maximum of 5 cm to ensure the seismic cable remains visible at all times) and clearing of some vegetation is required to allow vehicles to access the seismic line, a flora survey will be done before activities take place to ensure any threatened flora are avoided. Slashing heights above ground may be raised in critical areas or lines deviated to avoid disturbance to areas where threatened flora (e.g. metallic sun orchids) occur or may occur according to the advice of the flora specialists. All clearing will be in accordance with Council and DSE requirements.

The seismic activity has the potential to result in the introduction of weeds, pathogens and other exotic threats to areas of natural vegetation and farmland. Essential Petroleum will determine the existing presence of any declared weed or pathogen zones in the seismic survey area. If any are identified, appropriate actions, which may include the washing of trucks, or other cleaning of clothing or equipment will be implemented. Otherwise, vehicle cleaning will be undertaken to meet any specified requirements of landowners and areas of significant vegetation change.

The removal of vegetation, particularly large trees, slow-growing, rare or otherwise significant vegetation will be avoided where possible, following the advice of fauna/flora specialist.

4.5 Fauna

4.5.1 Existing Environment

Nationally Significant Fauna

Sixteen nationally threatened fauna species and 13 migratory species may occur within the broader project area (Table 4.2) (DEWHA, 2008). The EPBC Act Protected Matters report is provided in Appendix C.

Table 4.2 Nationally threatened fauna species potentially present in the seismic survey area

Scientific Name	Common Name	Status	Likelihood of Occurrence
Birds			
<i>Calyptorhynchus banksii graptogyne</i>	Red-tailed Black-Cockatoo (south-eastern)	Endangered, Migratory Terrestrial Species	Breeding likely to occur within area
<i>Lathamus discolor</i>	Swift Parrot	Endangered	Species or species habitat may occur within area
<i>Rostratula australis</i>	Australian Painted Snipe	Vulnerable	Species or species habitat may occur within area
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	Migratory Terrestrial Species	Species or species habitat likely to occur within area
<i>Hirundapus caudacutus</i>	White-throated Needletail	Migratory Terrestrial Species	Species or species habitat may occur within area

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Table 4.2 Nationally threatened fauna species potentially present in the seismic survey area

Scientific Name	Common Name	Status	Likelihood of Occurrence
Birds (cont'd)			
<i>Merops ornatus</i>	Rainbow Bee-eater	Migratory Terrestrial Species	Species or species habitat may occur within area
<i>Myiagra cyanoleuca</i>	Satin Flycatcher	Migratory Terrestrial Species	Breeding likely to occur within area
<i>Rhipidura rufifrons</i>	Rufous Fantail	Migratory Terrestrial Species	Breeding may occur within area
<i>Ardea alba</i>	Great Egret, White Egret	Migratory Wetland Species, Migratory Marine Bird	Species or species habitat may occur within area
<i>Ardea ibis</i>	Cattle Egret	Migratory Wetland Species, Migratory Marine Bird	Species or species habitat may occur within area
<i>Gallinago hardwickii</i>	Latham's Snipe, Japanese Snipe	Migratory Wetland Species	Species or species habitat may occur within area
<i>Rostratula benghalensis s. lat.</i>	Painted Snipe	Migratory Wetland Species	Species or species habitat may occur within area
<i>Apus pacificus</i>	Fork-tailed Swift	Migratory Marine Bird	Species or species habitat may occur within area
Frogs			
<i>Litoria raniformis</i>	Growling Grass Frog, Southern Bell Frog, Warty Bell Frog, Green and Golden Frog	Vulnerable	Species or species habitat may occur within area
Mammals			
<i>Dasyurus maculatus maculatus</i> (SE mainland population)	Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population)	Endangered	Species or species habitat may occur within area
<i>Isodon obesulus obesulus</i>	Southern Brown Bandicoot	Endangered	Species or species habitat likely to occur within area
<i>Miniopterus schreibersii bassanii</i>	Southern Bent-wing Bat	Conservation Dependent	Species or species habitat may occur within area
<i>Potorous tridactylus tridactylus</i>	Long-nosed Potoroo (SE mainland)	Vulnerable	Species or species habitat may occur within area
<i>Pseudomys fumeus</i>	Koonoom, Smoky Mouse	Endangered	Species or species habitat may occur within area
<i>Pseudomys shortridgei</i>	Dayang, Heath Rat	Vulnerable	Species or species habitat likely to occur within area
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	Vulnerable	Species or species habitat may occur within area
Ray-finned Fishes			
<i>Galaxiella pusilla</i>	Dwarf Galaxias	Vulnerable	Species or species habitat likely to occur within area
<i>Nannoperca obscura</i>	Yarra Pygmy Perch	Vulnerable	Species or species habitat likely to occur within area

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Table 4.2 Nationally threatened fauna species potentially present in the seismic survey area

Scientific Name	Common Name	Status	Likelihood of Occurrence
Ray-finned Fishes (cont'd)			
<i>Nannoperca variegata</i>	Ewens Pygmy Perch, Golden Pygmy Perch, Variegated Pygmy Perch	Vulnerable	Species or species habitat likely to occur within area
<i>Prototroctes maraena</i>	Australian Grayling	Vulnerable	Species or species habitat likely to occur within area
Reptiles			
<i>Delma impar</i>	Striped Legless Lizard	Vulnerable	Species or species habitat likely to occur within area

The presence (or likely presence) of these species and others listed under the Fauna and Flora Guarantee Act will be assessed by fauna/flora expert prior to any clearance of vegetation.

Previous Survey Work

Information contained in the DSE Atlas of Victorian Wildlife (AVW) has been searched to provide a snapshot of the typical fauna in the area. Figures 4 and 5 show the survey locations located within 100 m of the seismic lines in the Digby and Dartmoor areas respectively. A corresponding list of the species recorded for these sites is provided in Appendix E.

It should be noted that the species recorded at these sites have only been provided to allow a general impression of what species may be found along the seismic survey lines.

However, the species identified that were rare or threatened near the sites included:

- *Grus rubicunda* (brolga). Listed on the FFG Act and as vulnerable (VROTS).
- *Antechinus minimus* (swamp antechinus). Listed on the FFG Act and as near threatened (VROTS).
- *Sminthopsis leucopus* (white-footed dunnart). Listed on the FFG Act and as near threatened (VROTS).
- *Cinclosoma punctatum* (spotted quail-thrush). Listed as near threatened (VROTS).
- *Alcedo azurea* (Azure kingfisher). Listed as near threatened (VROTS).

Introduced species included *Sturnus vulgaris* (common starling), *Carduelis carduelis* (European goldfinch) and *Oryctolagus cuniculus* (European rabbit).

4.5.2 Potential Impacts

Potential impacts to native fauna may include:

- Limited short-term noise or vibration disturbance caused by the vibroseis trucks.
- There is a risk that subsidence from the process of drilling upholes could lead to traps being formed from which small animals may not escape or larger animals (including agricultural stock) may be injured if they stumble into an open hole.
- Trimming of tree branches or removal of vegetation to access the survey lines may cause loss of potential habitat.

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Mitigation measures adopted to minimise impacts include:

- Prior survey by fauna/flora expert to identify any rare or threatened native fauna/flora and advise means to avoid areas where these may occur.
- Backfilling of upholes to minimise potential risks to fauna. This is normally managed by placing plastic inserts into the hole, backfilling and compacting, which minimises the potential for subsidence.
- Before trimming of tree branches or removal of vegetation, an assessment for tree hollows will be undertaken.
- Implementing special procedures such as stop work procedures in particular circumstances, and spotting reports of endangered species, and avoiding operations during critical periods of migration and breeding.

4.6 Heritage

4.6.1 Existing Environment

The assessment and preparation of any necessary plans for the protection of Aboriginal sites and European historic sites is the subject of a separate study, undertaken by Andrew Long and Associates (Appendix 8 of the Operation Plan) as a desktop study.

A summary of the report is presented below.

Existing Heritage Listings

In completing the desktop assessment, register sources (e.g., Register of the National Estate, National Heritage List, Victorian Aboriginal Heritage Inventory System (VAHIS), Victorian Heritage Inventory etc.) were checked for existing heritage listings (both statutory and non-statutory) and the only listing identified was on the VAHIS. This site is a diffuse artefact scatter located close to the Crawford River, near the survey area (Figure 8). This site will not be affected by the seismic program.

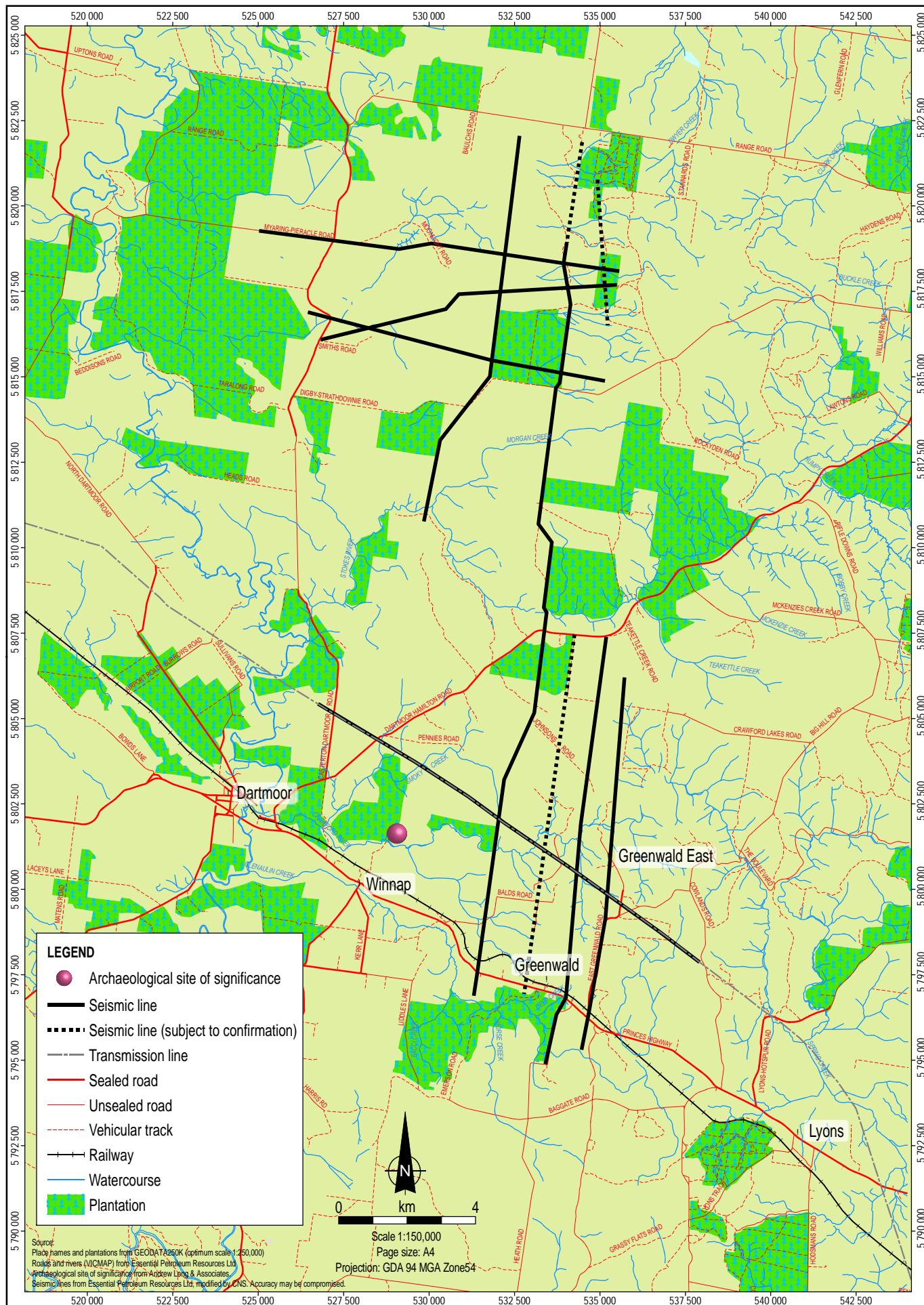
Predicted Aboriginal Heritage Issues

Although limited in number and scope, previous research projects in the region have determined that Aboriginal heritage sites occur in close proximity to significant waterways, in particular the Crawford River and its tributaries.

There has been no previous field evaluation or research undertaken in the vicinity of the seismic program, although a diffuse scatter of quartz artefacts was identified 5 km to the north. This isolated find was located on a flat plain, at a distance from a water source, indicating that the drainage pattern does not entirely dominate the distribution of Aboriginal heritage sites.

There is therefore little conclusive information about the location, extent and significance of Aboriginal heritage sites within the area of the proposed seismic program, although it has been demonstrated that artefact scatters and scarred trees do occur in the landscape.

The potential for human burials within the proposed seismic lines is a low, but will however be considered in the management procedures.



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Predicted European Heritage Issues

The historical archaeological potential of the proposed seismic program area is considered to be limited, although there is very limited information available. There are no known nodes of early pastoral activity within the seismic program area, and the agricultural development of the region is likely to have occurred at a later stage (c.f., post World War 1). Therefore the risk to significant historical sites is very low.

Aboriginal Stakeholders

The Gunditj Mara is the approved Registered Aboriginal Party (RAP) in relation to the seismic program area.

4.6.2 Potential Impacts

Given the nature of the survey, i.e. slashing but limited ground disturbance, the project overall would be considered a low impact activity covering a wide area, however with the potential for localised disturbance to the ground and/or Aboriginal heritage values at limited locations. These consist of:

- The 'upholes', which involve drilling into the ground surface and may impact on archaeological deposits.
- Vehicle crossings of creek banks, which may unintentionally create disturbance to creek banks and any archaeological deposits they may contain.
- Impacts to any trees with cultural scars that may potentially obstruct the survey in forested areas.

The potential for impact by the vibroseis trucks is likely to be slight given the nature of the activity involving some localised compaction but no soil disturbance.

The following mitigation measures will be followed during the survey to avoid any possible disturbance to culturally sensitive sites, so that a CHMP is not expected to be necessary:

- Survey activities will avoid areas of known cultural heritage sites (see Figure 8).
- Creeks are to be crossed with no ground disturbance within 200 m of the water course.
- Upholes are not to be drilled in the areas of cultural heritage sensitivity, or within 200m of water courses (50m may apply in areas where grazed land is adjacent to the water courses).

The policy is for no trees to be removed with exception of young trees or samplings where unavoidable. Hence, no mature native trees need to be removed and therefore there will be no risk of damaging trees bearing evidence of Aboriginal scarring. No Aboriginal scarred trees will be removed and hence, no application will be made for cultural heritage permit (CHP), as per Section 36 of the *Aboriginal Heritage Act 2006*. In the event that any such trees with scars are observed, the locations will be recorded and information passed on the appropriate authorities.

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4.7 Land Use

4.7.1 Existing Environment

Agriculture

A large proportion of the survey area will be conducted in areas of dryland pastures. These are mainly used for cattle and sheep grazing.

Forestry

The southwest region of Victoria supports extensive private and state commercial wood production, including some of the area where the seismic program is proposed to take place (see Figure 8). The distinction between a forest and a plantation is that a forest is a naturally occurring area of vegetation that can be used for forestry purposes, whereas a plantation is an area planted specifically for wood production. A substantial portion of the proposed seismic survey occurs through plantation areas characterised by the following:

- Remnant native vegetation.
- Forestry – private softwood.
- Forestry – public softwood.
- Softwood plantation.

Several of the softwood plantations are privately owned and managed (DCE, 1991). They are located partly on freehold land and partly on public land on long-term lease. These plantations are concentrated south of the Portland-Nelson Road, with large areas also west of the Bulley Ranges, in Hurdle Flats and north of Keegans Bend. Smaller private plantations occur around the Lower Glenelg National Park (DCE, 1991).

Reserves

Reserves encompass Crown land either temporarily or permanently reserved under the Victorian *Crown Land (Reserves) Act 1978* or the Victorian *National Parks Act 1975*. These acts are administered by DSE, while the reserves are managed by Parks Victoria, a division of DSE. The types of reserves that occur in the region of the seismic survey include Glenelg stream-side Reserve and a scenic reserve area. However, the survey activities will not occur within any of the reserves.

State Parks

State parks complement national parks and provide a representative of major land types of Victoria. They are also established to conserve native flora and fauna, protect water catchments and provide areas for nature conservation and education. There are no state parks in close proximity to the survey area.

State Forests

State forests are extensive areas of land supporting native forests and other native vegetation, which contain a mosaic of land types, diverse conservation and recreation values, and a range of resources needed to supply community demands. State forests are managed for a diverse array of uses, including the provision of timber and other forest products on a sustainable basis, protection of water catchments

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and the protection and conservation of native flora and fauna, heritage and other values (NRE, 2001d). These forests are managed by DSE through Forest Management Plans prepared under the *Forests Act 1958*. The seismic lines will intersect some areas of State Forest (see Figure 1).

Planning Scheme Zones and Overlays

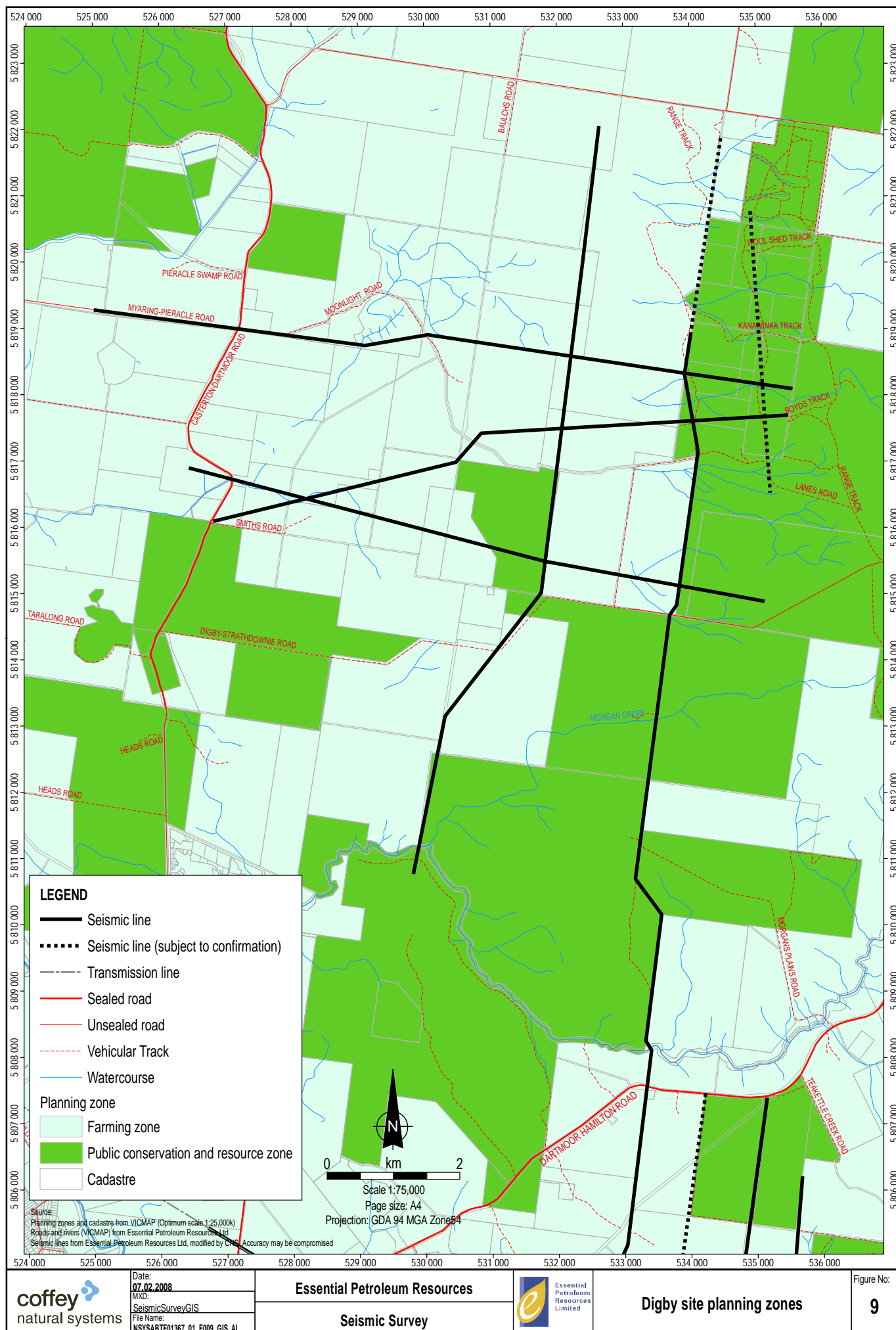
The seismic survey area at PEP 151 lies within the Glenelg Shire council in Victoria, in which land is zoned for various uses. Areas of special significance, such as those with environmental or heritage value, can be subject to special planning controls and appear as planning scheme overlays, which are superimposed over the zoning.

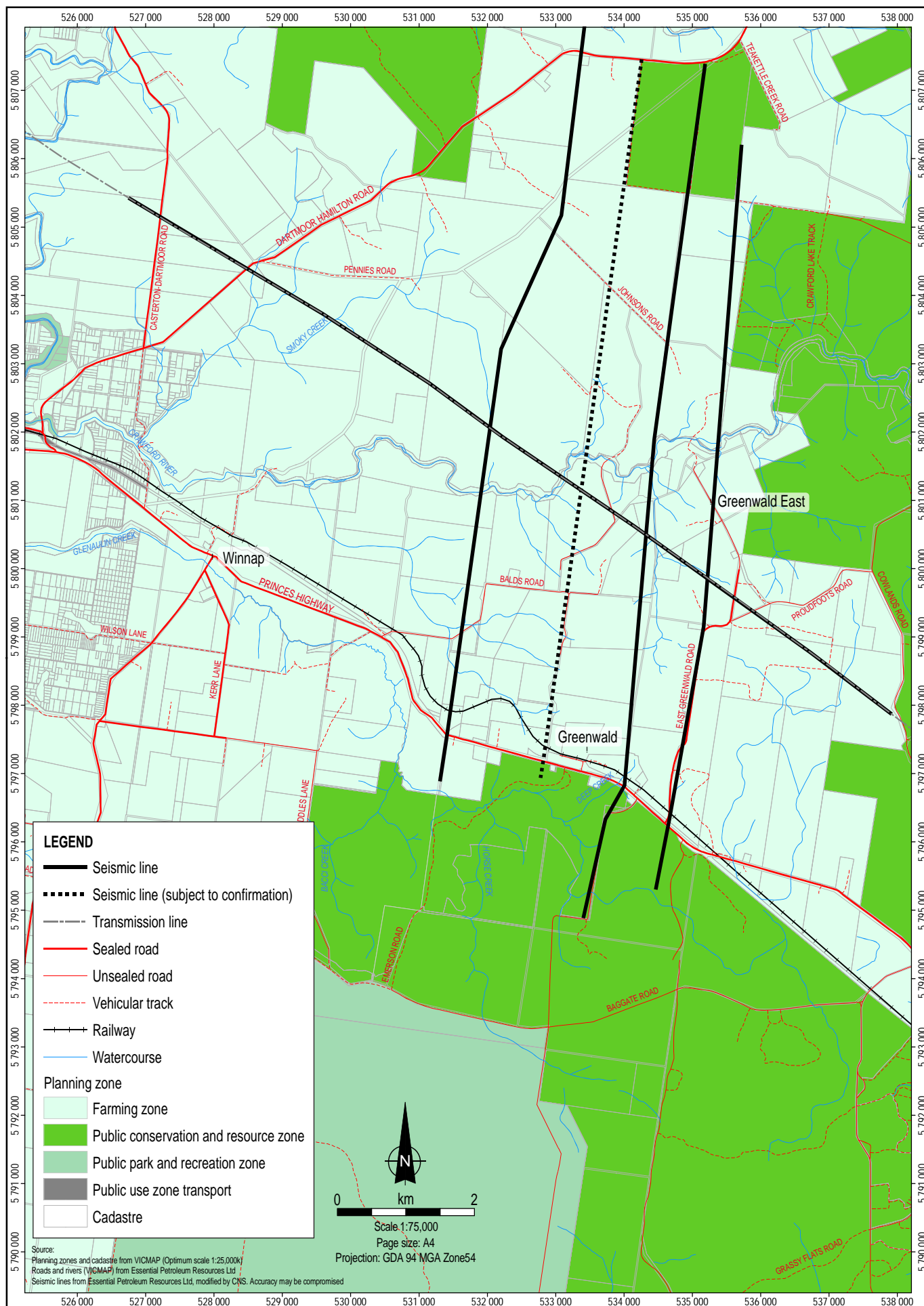
Figures 9 and 10 and Table 4.3 outline the various planning scheme zones and overlays in the seismic survey area.

Table 4.3 Glenelg Shire council planning schemes relevant to the seismic survey area

Planning Scheme		Purpose *	Comments
Code	Name		
FZ	Farming Zone	<p>To implement the State Planning Policy Framework and the Local Planning Policy Framework, including the Municipal Strategic Statement and local planning policies.</p> <p>To provide for the use of land for agriculture.</p> <p>To encourage the retention of productive agricultural land.</p> <p>To ensure that non-agricultural uses, particularly dwellings, do not adversely affect the use of land for agriculture</p> <p>To encourage use and development of land based on comprehensive and sustainable land management practices and infrastructure provision.</p> <p>To protect and enhance natural resources and the biodiversity of the area.</p>	A significant proportion of the proposed seismic program is located within this zone
PCRZ	Public Conservation and Resource Zone	<p>To implement the State Planning Policy Framework and the Local Planning Policy Framework, including the Municipal Strategic Statement and local planning policies.</p> <p>To protect and conserve the natural environment and natural processes for their historic, scientific, landscape, habitat or cultural values.</p> <p>To provide facilities which assist in public education and interpretation of the natural environment with minimal degradation of the natural environment or natural processes.</p> <p>To provide for appropriate resource based uses.</p>	A significant proportion of the proposed seismic program is located within this zone

* Extracted from DPCD, 2008.





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4.7.2 Potential Impacts

Long-term impacts of seismic surveys are generally negligible but short-term impacts may include:

- Damage to agricultural crops as a result of vibroseis vehicles having to move into farmland properties to conduct the survey.
- Movement of stock and damage to property as a result of similar activities.
- Introduction of weeds and pathogens to properties.

The impact to crop varies with season and cycle of crop and will be considered before the survey begins. Adequate compensation will be provided if a seismic line passes through a growing crop and there is a loss of production. Appropriate weed and pathogen hygiene procedures are proposed to minimise risk of spread or introduction of these to the area.

4.8 Vibration, Air and Noise

4.8.1 Existing Environment

The air quality of the local area is expected to be good, given the lack of heavy industry, sparse population and low level of air polluting emissions. The nearby coast at Nelson experiences strong onshore south westerly winds from the Southern Ocean. The winds from the ocean are a contributing factor to the region's clean air quality. Regional sources of air emissions are from local dairy operations and vehicle and machinery use.

No surveys of noise have been conducted in the area. However, sources of existing noise in the local region are dominated by natural noise such as wind and fauna (i.e., birds, insects and livestock). Vehicle noise from local roads and farm machinery is also a primary source of noise. While noise in the area can be highly variable, it is likely to be in the range of 25 dBa, which is typical of the quiet rural areas (NSR, 2003). This level of noise is considered low when compared to a metropolitan area.

4.8.2 Potential Impacts

Vibroseis trucks cause light vibrations, potential dust and noise.

The primary impact on the air quality during seismic operations is typically related to dust generated during survey activities, such as the operation of the vibroseis trucks particularly on un-sealed roads. Given the small scale and temporary nature of the work, the potential dust impacts are unlikely to cause a significant long-term nuisance or result in a sustained deterioration in the local air quality. Vibroseis trucks also move very slowly and frequently stop, therefore dust impacts will be minimal.

Emissions of nitrous oxides, sulfur oxides and carbon monoxides associated with the exhaust of the machinery, vibroseis trucks and support vehicles will occur. However, emissions are minor and are not likely to result in significant air quality impacts.

Drilling of upholes will give rise to a temporary increase in ambient noise levels within the immediate vicinity of the seismic area. The noise levels generated by the vibroseis trucks and other survey vehicles will vary in intensity depending upon the combination of equipment in operation at any one time, the location and duration of the individual activities. Vibroseis trucks and other survey vehicles however would produce similar noise levels to that of other trucks that may operate in the area.

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Residents will be notified ahead of potentially noisy events and consultation with residents will identify the need for specific mitigating actions (if any). In general, effects of noise will be minimised by keeping to specified distances from residences (100 m) to avoid any vibration effect as well as limiting survey activities to daylight hours.

4.9 Visual Amenity

4.9.1 Existing Environment

The local area is a rural landscape with expanses of pasture divided by paddock boundaries and roadways, and areas of softwood and hardwood forests. The area is generally considered picturesque due to natural features and forest areas.

4.9.2 Potential Impacts

Visual impact will be minor due to the temporary and mobile nature of the operation. It is therefore not considered necessary that particular procedures be implemented to screen activities near residential areas or near roads.

4.10 Infrastructure

4.10.1 Existing Environment

The seismic survey area is served by a network of sealed and unsealed roads. Existing regional roads in the area include the Princes Highway and the Dartmoor Hamilton Road (see Figure 1).

The Heywood-Mount Gambier Railway roughly runs parallel to the Princes Highway and therefore intersects the southern section of the Dartmoor site. Also, in the area of interest, a transmission line runs approximately parallel, and to the north of the Princes Highway. It is proposed to run one of the seismic lines (located in the middle of the Dartmoor site) adjacent to a section of this transmission line (see Figure 1).

Infrastructure on private property includes houses and sheds and agricultural facilities such as milking sheds, hay barns, irrigation pipes, fences and gates (electrified and non-electrified). Above and below ground power and telecommunication cables may also occur along the roadside and within property boundaries.

4.10.2 Potential Impacts

Potential impacts to existing infrastructure include the disturbance and damage to third party private property and service utilities. Disturbances of this nature can lead to disruption of services such as electricity and telephone networks and general land use practices of landholders. Essential Petroleum will consult with Council to identify locations of buried services to avoid damage during the survey and associated activities.

Temporary fencing will be installed at any location where it is necessary to remove fences or gates to facilitate movement of seismic trucks. This represents only a very short-term impact to the area. All fences and farm infrastructure will be returned to pre-survey conditions as agreed with the relevant landowners and appropriate compensation agreements will be negotiated.

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Consultation with relevant utility authorities and site inspection will be followed for the early identification of the locations of existing overhead and buried cables, lines, pipes, water mains and other potentially affected infrastructure. Measures to avoid the potential impacts will be determined and agreed as appropriate in each case and will include appropriate buffer distances from infrastructure such as drains and culverts.

In particular, near residential areas or near public facilities (e.g., roads), warning posts will be installed for speed control and protective covers (e.g., cable mats) will be used to cover the cable at road crossings.

Also, where the seismic line intersects an existing road, a kink will be placed at the start of the line so that the entire length of the seismic line is not visible from the road and subsequently used as an additional road e.g., for offroad use.

4.11 Traffic

4.11.1 Existing Environment

Traffic in the area of the seismic survey comprises predominantly local traffic, however the Princes Highway, which is a major road is intersected by the Dartmoor survey lines. Traffic along the minor roads consists of private cars and light and heavy vehicles, such as forestry- and farming-related trucks.

4.11.2 Potential Impacts

Impacts to traffic in the area as a result of seismic survey operations include:

- Seismic crew vehicles will add to local traffic conditions.
- Where seismic lines cross roads there is a requirement for warning signs and cable mats to minimise damage to the cable and to third-party vehicles (as developed with Vicroads).
- Risks to public and crew safety will be managed.
- Signs to ensure slowing down of passing traffic due to the large vibroseis trucks.
- Temporary and minor interruption to traffic movements particularly where traffic flows at relatively high speeds.

Traffic management procedures are being developed by Essential Petroleum in consultation with Vicroads, forest managers and the Glenelg Shire Council. The plan will include appropriate safety measures, hazard warning signs and traffic control (as necessary) for the areas of operation.

4.12 Management of Variation of Seismic Lines

The seismic lines represented in the figures, have been set out to minimise environmental impacts as much as possible. Some sections of the lines have yet to be explored fully, and may not be surveyed if accessibility proves unsuitable, or if extensive vegetation clearing would be required.

A flora and fauna survey will be conducted along the seismic lines during, or after, the surveying has been done. It will however occur before any vegetation disturbance occurs. The findings of the survey may lead to minor modifications to the seismic lines for environmental or practical reasons. If any such modifications are made, the management and mitigation measures as described in this document will

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be reassessed, and if necessary, reapplied to the changed location. Where there is a significant change, DPI will be informed.

In most cases, any changes to the alignment will be done to reduce the environmental impacts, or to accommodate final landowner requests. Following consultation on site with DSE Officer Richard Hill on 5th February 2008, some minor modifications were suggested with respect to minimising disturbance to vegetation and in gullies etc. These are not necessarily able to be reflected on the lines as shown in Figures 1 and 2 but nevertheless, will be accommodated according to the principles within this EMP.

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5 ENVIRONMENTAL HAZARD AND RISK ANALYSIS

A scenario-based assessment of environmental risk has been conducted for the proposed seismic program, using the general approach to risk management described in the Australian Standard for Risk Management (AS/NZS 4360:2004). The purpose of the assessment was to identify, analyse, evaluate and treat the environmental risks associated with the proposed seismic program.

The following definitions (reproduced from AS/NZS 4360:2004) assist in describing the approach to risk assessment that was taken:

- *Hazard*: A source of potential harm.
- *Event*: Occurrence of a particular set of circumstances.
- *Likelihood*: Used as a general description of probability or frequency.
- *Consequence*: Outcome or impact of an event.
- *Risk*: The chance of something happening that will have an impact on objectives.
- *Risk identification*: the process of determining what, where, when, why and how something could happen.
- *Risk analysis*: systematic process to understand the nature of and to deduce the level of risk.
- *Risk evaluation*: process of comparing the level of risk against risk criteria.
- *Risk treatment*: process of selection and implementation of measures to modify risk.
- *Risk reduction*: actions taken to lessen the likelihood, negative consequences, or both, associated with a risk.
- *Residual risk*: risk remaining after implementation of risk treatment.

5.1 Risk Identification and Analysis

General risk issues and specific potential environmental impacts related to each issue were identified. The risks were then analysed through qualitative estimation of the likelihood and consequence of each potential impact. Risk reduction measures (i.e., mitigation and management measures) that were currently in place or were standard measures were considered when analysing the risks. Likelihood and consequence ratings were determined on the basis of the qualitative measures described in Tables 5.1 and 5.2.

Table 5.1 Qualitative measures of likelihood

Level	Descriptor	Description
A	Almost certain	Is expected to occur in most circumstances
B	Likely	Will probably occur in most circumstances
C	Possible	Might occur at some time
D	Unlikely	May occur in exceptional circumstances
E	Rare	Not known within industry

Source: Based on AS/NZS 4360:1999.

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Table 5.2 Qualitative measures of consequence

Level	Descriptor	Example Detail Description (Environmental)
1	Insignificant	Alteration/disturbance within the limits of natural variability; effects not transmitted or accumulating; resources not impaired.
2	Minor	Temporary alteration/disturbance beyond natural variability effects confined to site and not accumulating resources temporarily affected.
3	Moderate	Alteration/disturbance of a component of an ecosystem; effects not transmitted or accumulating; potential resource loss, but sustainability unaffected.
4	Major	Alteration to one or more ecosystems or component levels, but which are recoverable; effects can be transmitted/accumulating.
5	Catastrophic	Irreversible alteration to one or more ecosystems or several components levels; effects can be transmitted/accumulating; lost sustainability of most resources.

Source: Based on AS/NZS 4360:1999.

5.2 Risk Evaluation

Risk for each potential impact was evaluated using a risk matrix (Table 5.3). Risk estimates were made on the basis of the likelihood of the consequence occurring. Estimates of risk were made on the basis of operational and environmental judgment, and are shown in Table 5.5 (as residual risks following risk treatment).

Table 5.3 Qualitative risk analysis matrix

Likelihood	Consequence				
	Insignificant 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
	Level of Risk				
A (almost certain)	M	H	E	E	E
B (likely)	L	M	H	E	E
C (possible)	L	L	M	H	E
D (unlikely)	L	L	L	M	H
E (rare)	L	L	L	L	M

Legend	
E	Extreme/intolerable risk; immediate action required.
H	High/undesirable risk; senior management attention needed.
M	Moderate/undesirable risk; management responsibility must be specified.
L	Low/tolerable risk; manage by routine procedures.

5.3 Risk Treatment

Where residual risks following mitigation and management measures were assessed as being either 'High' or 'Extreme', additional risk reduction measures were applied and the level of risk reassessed. No risks unable to be reduced to an acceptable level were identified.

The risk reduction philosophy taken during the risk assessment is shown in Table 5.4.

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Table 5.4 Risk reduction philosophy

Level of Risk	Philosophy
Extreme/intolerable risk	Unacceptable risk that will not be tolerated by Essential Petroleum under any conditions and must be engineered down to a lower risk level. The amount by which such risks can be reduced will depend on the control that the project has over the factors involved in the hazardous event. For example, where a major risk-producing factor is the project's interface with the general public, fewer options are available to reduce that risk than in cases where the general public are not involved.
High/undesirable risk	High/undesirable risks require that the engineering design or method should be altered to remove the hazardous event or to reduce the associated frequency or consequence severity so as to place the risk in a lower risk level.
Moderate/undesirable risk	Moderate/undesirable risks require that a management plan be determined for the hazardous event to prevent its occurrence and to monitor changes that could place the risk in a higher level. The management responsibility must be specified.
Low/tolerable risk	Low/tolerable risks require no further treatment other than monitoring as the project progresses to ensure that there is no potential for the risk level to increase with time. These risks can be managed by routine procedures.

5.4 Environmental Risk Assessment

Table 5.5 presents the environmental risk assessment for the proposed seismic program. The likelihood and consequence ratings draw from the definitions of likelihood in Table 5.1 and consequence in Table 5.2. The estimates of risk draw from the matrix in Table 5.3. The risk estimates presented are the residual risk after consideration of the mitigation and management measures presented in Table 5.5.

There are no activities assessed as being of 'High' or 'Extreme' risk for the proposed seismic program. This reflects the temporary and moderate-impact nature of the activity, and the application of appropriate mitigation and management measures.

Should any significant changes to the seismic program be required after approval of this EMP, DPI will be consulted and the environmental risk assessment will be reviewed. Should any risks be assessed as having increased, or should any new risks be identified, appropriate additional risk reduction measures will be developed in consultation with DPI.

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Table 5.5 Environmental risk assessment and mitigation measures

Activity	Task	Potential Impacts	Ref	Mitigation and Management Measures	Residual Risk		
					Likelihood	Consequence	Risk Rating
1. Survey and line preparation	Removal of vegetation	Loss of habitat and significant flora	1.1	<ul style="list-style-type: none"> • Arrange land access through prior consultation with landowners and relevant authorities; comply with all landowner conditions. • Engage competent ecologists to conduct pre-clearance flora and fauna survey in identified areas of native / remnant vegetation (including roadsides where necessary). • Review lines and areas of activity for native vegetation and fauna and flora species of listed conservation significance. • Revise alignment if necessary to protect sensitive flora and fauna. • Avoid areas of native vegetation where possible by using existing cleared areas of roadside, tracks and firebreaks. • Minimal trimming of overhanging branches. • Where dense or sensitive vegetation is present, vehicles to drive around the particular area. • Vegetation removal if required, will be done in accordance with a Protected Flora Licence or Permit from DSE. • Where endangered species (e.g. sun orchids) occur or are likely to occur, slashing to maintain at least 20 cm height above ground. 	Likely	Minor	Moderate

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Table 5.5 Environmental risk assessment and mitigation measures (cont'd)

Activity	Task	Potential Impacts	Ref	Mitigation and Management Measures	Residual Risk		
					Likelihood	Consequence	Risk Rating
1. Survey and line preparation (cont'd)	Construction of temporary gates and fence crossings along seismic lines	Disturbance to land uses and farm infrastructure.	1.2	<ul style="list-style-type: none"> Liaison with landholders prior to, during and on completion of seismic program. Compliance with all prior agreed landowner conditions. Temporary fencing removed and permanent fencing re-instated. 	Possible	Minor	Low
	Cable laying	Disturbance to native vegetation and introduction of weeds.	1.3	<ul style="list-style-type: none"> Determine presence of any declared weed and pathogen zones in survey area and area of preceding survey. Cable laying is done on foot therefore disturbance to native and other vegetation will be minimal. Ensure clothing and equipment is clean so as to prevent introduction of weeds and pathogens to new areas. 	Possible	Minor	Low
		Disturbance to creeks or rivers.	1.4	<ul style="list-style-type: none"> Avoidance of driving vehicles through creeks or rivers unless there is an existing and appropriate crossing. Vehicles to only go as close to the creek or river as the gradient allows. Cable to be laid by hand or by use of wireless (laser) river crossing where trucks must go round river or creek. 	Rare	Minor	Low

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Table 5.5 Environmental risk assessment and mitigation measures (cont'd)

Activity	Task	Potential Impacts	Ref	Mitigation and Management Measures	Residual Risk		
					Likelihood	Consequence	Risk Rating
1. Survey and line preparation (cont'd)		Disturbance to Aboriginal and European heritage sites	1.5	<ul style="list-style-type: none"> Completion of a desktop assessment (Appendix 8 in Operation Plan). Implementation of avoidance and mitigation measures as described in Section 4.6.2. Inform Gunditj Mirring Aboriginal landowners of the survey program. No disturbance within 200 m of river bank in areas of undisturbed native vegetation; 50 m in other grazed areas. Route selected to minimise vegetation disturbance. Policy to avoid cutting of trees (small trees/saplings where unavoidable). No cutting of mature trees will occur hence no risk of damage to scar trees. Reporting of any potential scar trees if observed. The known site (Figure 8) is remote from all survey activities. 	Unlikely	Major	Moderate
2. Seismic acquisition	Operation of vibroseis trucks	Soil compaction by trafficking and 'pad marks'.	2.1	<ul style="list-style-type: none"> Minimised through use of roads tracks and verges where possible. 	Likely	Insignificant	Low
		Soil disturbance (e.g. wheel ruts) from vehicle access during wet weather	2.2	<ul style="list-style-type: none"> Limit access in wet ground conditions. Avoid conducting survey in periods of heavy rain. 	Possible	Insignificant	Low

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Table 5.5 Environmental risk assessment and mitigation measures (cont'd)

Activity	Task	Potential Impacts	Ref	Mitigation and Management Measures	Residual Risk		
					Likelihood	Consequence	Risk Rating
2. Seismic acquisition (cont'd)		Introduction of weeds and other exotic threats to areas of natural vegetation and farmland	2.3	<ul style="list-style-type: none"> Essential Petroleum will determine if there are any declared weed or pathogen zones in the survey area and areas of prior operation of equipment. At the commencement of work on the Digby Dartmoor seismic program, all vehicles and equipment shall be washed down and inspected prior to arriving on-site. At property boundaries, or where there are significant vegetation changes, vehicles will be inspected for weed seeds and mud and wash down or other appropriate means used as necessary or to meet landowner requirements. Washdown of vehicles when entering or leaving weed / pathogen zones. 	Unlikely	Moderate	Low
		Damage to agricultural crops	2.4	<ul style="list-style-type: none"> Consider the timing cycle of crops in the survey region to minimise impacts if possible. Appropriate compensation for loss of crops. 	Possible	Minor	Low
		Movement of stock and damage to property	2.5	<ul style="list-style-type: none"> Liaise with the landholder to make appropriate arrangements to minimise disruption. 	Possible	Insignificant	Low

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Table 5.5 Environmental risk assessment and mitigation measures (cont'd)

Activity	Task	Potential Impacts	Ref	Mitigation and Management Measures	Residual Risk		
					Likelihood	Consequence	Risk Rating
2. Seismic acquisition (cont'd)		Vibrations, dust, noise	2.6	<ul style="list-style-type: none"> Vibroseis trucks move slowly and stop frequently therefore generate minimal dust. Dust suppression measures will be applied (e.g., water truck) if dust levels are unacceptable. Surveys will be limited to daylight hours and a 100 m buffer in place on seismic vibration near residences. Residents will be notified ahead of potentially noisy events and consultation with residents will identify the need for any specific mitigating actions. 	Unlikely	Minor	Low
		Air quality / exhaust emissions	2.7	<ul style="list-style-type: none"> Ensure vehicles have standard emission control devices fitted and maintained. 	Likely	Insignificant	Low
	Facilitate movement of seismic trucks.	Disturbance and damage to third party private property and service utilities	2.8	<ul style="list-style-type: none"> Temporary fencing/gates will be installed at any location where it is necessary to remove fences or gates. All fences and farm infrastructure will be returned to pre-survey conditions as agreed with the relevant landowners and appropriate compensation agreements will be negotiated. Consultation with relevant utility authorities and site inspection will be followed for the early identification of the locations of existing buried cables, pipes, water mains and other potentially affected infrastructure. 	Rare	Moderate	Low

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Table 5.5 Environmental risk assessment and mitigation measures (cont'd)

Activity	Task	Potential Impacts	Ref	Mitigation and Management Measures	Residual Risk		
					Likelihood	Consequence	Risk Rating
2. Seismic acquisition (cont'd)	Refuelling vehicles	Contamination of nearby watercourses	2.9	<ul style="list-style-type: none"> Refuelling will not take place within 50 m of a waterway. Non-return valves will be used. Use of spill/drip collection equipment. 	Rare	Moderate	Low
		Hazard to passing traffic and land use operations	2.10	<ul style="list-style-type: none"> Traffic management procedures to be developed by Essential Petroleum in consultation with Vicroads, forest managers, Parks Victoria (where relevant) and the local Council. The plan will include all appropriate safety measures and traffic control. 	Rare	Moderate	Low
		Adding to local traffic	2.11	<ul style="list-style-type: none"> Traffic management procedures have been developed by Essential Petroleum in consultation with Vicroads, forest managers, Parks Victoria and the local Council. The plan includes appropriate safety measures and traffic control. 	Possible	Insignificant	Low
3. Uphole survey	Operation of drilling equipment	Compaction of soils	3.1	<ul style="list-style-type: none"> Minimised through use of roads and verges where possible. 	Likely	Insignificant	Low
		Injury to native animals or livestock if holes subside.	3.2	<ul style="list-style-type: none"> Upholes plugged and backfilled to an appropriate depth to prevent collapse and avoid hazard to fauna. Consultation with landowners and application of all agreements. Appropriate compensation for any loss. 	Rare	Minor	Low

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Table 5.5 Environmental risk assessment and mitigation measures (cont'd)

Activity	Task	Potential Impacts	Ref	Mitigation and Management Measures	Residual Risk		
					Likelihood	Consequence	Risk Rating
3. Uphole survey (cont'd)		Contamination to resources.	3.3	<ul style="list-style-type: none"> Drilling a minimum of 200 m from water courses (50 m where land is already disturbed). Air drilling of all upholes to avoid risk of aquifer contamination. No drilling fluids or chemical additives used. Procedures for the maintenance of equipment must ensure that the risk of spills is minimised and clean up response is rapid if it does occur. 	Rare	Minor	Low
		Disturbance to groundwater aquifers.	3.4	<ul style="list-style-type: none"> Holes backfilled and cement-sealed if aquifer is intersected. 	Rare	Minor	Low
		Temporary increase in ambient noise levels	3.5	<ul style="list-style-type: none"> Drilling will be limited to daylight hours and a 100 m buffer in place from residences. Residents will be notified ahead of potentially noisy events and consultation with residents will identify the need for specific mitigating actions (if any). 	Possible	Insignificant	Low
		Dust generation during drilling	3.6	<ul style="list-style-type: none"> All traffic to drive at speed to minimise dust nuisance to adjacent sensitive receptors (residences, occupied buildings etc.). 	Unlikely	Insignificant	Low

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Table 5.5 Environmental risk assessment and mitigation measures (cont'd)

Activity	Task	Potential Impacts	Ref	Mitigation and Management Measures	Residual Risk		
					Likelihood	Consequence	Risk Rating
4. Site activities; and lay down area.	Site selection	Visual impact	4.1	<ul style="list-style-type: none"> Laydown areas will be located out of public view, where practicable. No campsites - motels in Mount Gambier will be used by seismic personnel. 	Unlikely	Insignificant	Low
		Vegetation clearance	4.2	<ul style="list-style-type: none"> Flora and fauna survey of areas of native vegetation (and other potentially sensitive areas of presence of significant species such as sun orchids) to be conducted prior to disturbance to advise on final route and deviations to protect sensitive flora and fauna. Native vegetation will only be cleared where necessary and will be in accordance with a Protected Flora Licence or Permit from DSE. Where significant vegetation exists, vegetation shall not be cleared, and the trucks will instead drive around this area. Specified distances to be maintained from sensitive flora (e.g., at least 20 cm height where from orchids may be present. 	Likely	Minor	Moderate
		Noise	4.3	<ul style="list-style-type: none"> Prior information provided to residences to minimise noise nuisance from traffic, generators or general noise. Daytime activities only. 	Unlikely	Insignificant	Low

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Table 5.5 Environmental risk assessment and mitigation measures (cont'd)

Activity	Task	Potential Impacts	Ref	Mitigation and Management Measures	Residual Risk		
					Likelihood	Consequence	Risk Rating
4. Site activities; and lay down area. (cont'd)	Waste and chemical handling	Soil or water contamination.	4.4	<ul style="list-style-type: none"> • Appropriate waste management including: <ul style="list-style-type: none"> - Segregation of recyclable material. - Putrescible wastes contained and regularly disposed to a licensed landfill. - Survey crew personnel to avail themselves of public toilet amenities. • No hazardous chemicals used. 	Unlikely	Moderate	Low
5 Management of line variation	Minor line changes from EP; e.g., for technical or environmental practicalities	Impacts to fauna/flora; heritage areas not previously assessed	5.1	<ul style="list-style-type: none"> • Review new alignment conditions in light of EMP. • If no material change, no action necessary. • If material change, application of EMP principles to new location. 	Unlikely (any changes likely to reduce environmental impacts)	Minor	Low
6 Fire suppression management	Accidental fires associated with activities (refuelling, use of any hot work equipment (welding etc)	Fire related injury to personnel; damage to property, loss of livestock, crops, fauna and flora	6.1	<ul style="list-style-type: none"> • Ensure all personnel are inducted in risks of fire, fire prevention, fire suppression and emergency evacuation. • Adherence to refuelling procedures. • Use of diesel vehicles. • Equip vehicles with appropriate fire extinguishers, water knapsacks and personnel trained in their use. • Implement extra precautions during any hot work activities (if any) and during periods of high fire risk. • Liaise with local fire authorities in regard to fire danger ratings; permits for work on fire ban days as necessary. • No lighting of fires; no discarding of cigarette ends etc. 	Unlikely	Minor	Low

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Table 5.5 Environmental risk assessment and mitigation measures (cont'd)

Activity	Task	Potential Impacts	Ref	Mitigation and Management Measures	Residual Risk		
					Likelihood	Consequence	Risk Rating
7. Complaints management	Stakeholders may be sufficiently concerned to raise complaints to operator and/or authorities	Enquiries / complaints may indicate environmental harm or harm to property / personnel	7.1	<ul style="list-style-type: none"> Establish agreements and conditions prior to access to land. Establish 24-hr telephone contact number for ongoing contact and prompt response. Establish / maintain a complaints register to record all details of the nature of the complaint, and actions taken to resolve. Deal with all complaints in a timely and courteous manner. Rapid response times (<1 hr) for matters such as gates left open/stock on road; unauthorised clearance of vegetation; biosecurity hygiene not being followed; fuel spills. 	Likely	Moderate	Moderate
8. Environmental Incident Reporting	Unplanned incidents during the survey	Adverse impacts to environment	8.1	<ul style="list-style-type: none"> Establish and maintain an Incident Register to record date, location; type of incident; description; person reporting; person responsible; remedial actions taken. 	Possible	Moderate	Moderate

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6 ENVIRONMENTAL MANAGEMENT

6.1 Environmental Policy

The Essential Petroleum Environmental Policy describes the company's commitment to managing its environmental responsibilities, and is provided in Appendix A. The policy commits Essential Petroleum to comply with the *Petroleum Act 1967* and any other statutory environmental requirements applicable to the seismic project.

6.2 Environmental Objective

The overall environmental objective of the proposed seismic program is to plan and conduct the activities in such a way that environmental impacts are avoided, or where this is not possible, minimised.

This objective will be achieved by implementing the mitigation and management measures described in Section 6.3.

6.3 Mitigation and Management Measures

Site-specific mitigation and management measures have been developed for the seismic program to minimise disturbance to the environment and third parties (Table 5.5). The mitigation and management measures are based on the APPEA (1996) Code of Environmental Practice and the combined experience of Essential Petroleum and Coffey Natural Systems in developing environmental management measures for similar projects.

6.4 Roles and Responsibilities

The responsibilities for the various personnel involved in the seismic program are outlined in Table 6.1.

Table 6.1 Environmental management responsibilities

Personnel	Responsibilities
Operations Manager (Essential Petroleum)	<ul style="list-style-type: none">• Ensures that seismic field supervisor has resources to carry out requirements of EMP.
Seismic Field Supervisor/Bird Dog (Essential Petroleum)	<ul style="list-style-type: none">• Ensures all aspects of this EMP are carried out.• Conducts a site-specific induction with the seismic team and third party service contractors prior to project commencement.• Ensures a site-specific induction is conducted prior to any contractors commencing work on site.• Ensures that appropriate communications are in place between seismic contractor, Essential Petroleum, landowners and other local stakeholders to keep them informed of project issues and developments that may affect their day to day activities.
Party Manager (Terrex)	<ul style="list-style-type: none">• Ensures compliance with this EMP for all aspects of the seismic operations.

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Table 6.1 Environmental management responsibilities (cont'd)

Personnel	Responsibilities
Third Party Contractors	<ul style="list-style-type: none">• Ensures compliance with this EMP for all aspects of the work they are responsible for.
Landholder liaison (Essential Petroleum)	<ul style="list-style-type: none">• Establishes landowner relationships for those affected by project operation, and organises land access for project personnel to these properties.• Ensures that Essential Petroleum, the property owners and other local stakeholders are kept informed of project issues and developments that may affect their day-to-day activities.• Ensures compliance with this EMP for all aspects of the work they are responsible for.
Consulting Environmental Specialist (Coffey Natural Systems)	<ul style="list-style-type: none">• Provides specialist advice to the Seismic Field Supervisor on environmental matters, as required.

6.5 Environmental Quality Control

6.5.1 Inductions

The seismic workforce will undergo environmental and safety inductions prior to the commencement of site works. The environmental and safety inductions will inform the workforce of their obligations and project-specific environmental management procedures, including responsibilities and lines of communication. Inductions will cover the issues addressed in Table 5.5, including:

- Access and traffic.
- Vegetation protection.
- Soil and water management.
- Land use and infrastructure.
- Aboriginal heritage.
- Protected fauna/flora
- Air and noise emissions.
- Waste and hazardous materials management.
- Visual amenity.
- Weeds.
- Plant and animal pathogens.
- Rehabilitation.
- Incident reporting.
- Fire management.

For efficiency, environmental inductions will be undertaken in conjunction with the safety inductions and any additional training requirements will be undertaken on an as-needs basis.

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6.5.2 Inspections, Monitoring and Checklists

During the seismic program, the Seismic Field Supervisor or nominated delegate will undertake environmental monitoring of the seismic program and associated activities. This will include, but will not be limited to, the checklist provided in Table 6.2.

In the event of a discharge to the environment, the Seismic Field Supervisor will estimate and record the quantity of material lost.

Table 6.2 Environmental Inspection and Monitoring Program

Monitoring Subject	Potential Issue	Corrective Action
Access	Dust	Apply water spray as required.
	Damage to native vegetation	Erect high visibility plastic mesh fencing around protected vegetation to prevent entry if roadside vegetation is damaged.
	Soil erosion	Apply sheeting material in areas where losses have occurred. Install/reinstate erosion control structures where appropriate.
Traffic	Dust	Apply water spray on unsealed roads as required. Minimise vehicle speeds.
Vegetation removal	Dust	Apply water spray as required.
	Soil erosion	Install/reinstate erosion control structures where appropriate. Apply sheeting material in areas where losses have occurred.
	Clearance heights	Clearance heights raised to 20 cm in locations where protected flora (e.g., orchids) are likely and avoidance difficult.
Fauna and flora	Damage or loss	Record any incidents involving fauna or unintended damage to fauna and/or flora.
Existing farm infrastructure	Loss or damage	Install/reinstate temporary fencing or project flagging (for avoidance). Remedial toolbox sessions for all personnel.
Heritage material	Discovery of artefacts/damage to artefacts	Follow measures provided in Table 5.5.
Air quality	Air pollution	Service vehicles and machinery to ensure they are in good working order.
Noise levels	Nuisance to residents	Act on all complaints received from nearby residents by reducing noise levels where possible, or reducing out-of-hours work. Undertake noise monitoring if noise complaints are received. Maintain or repair mufflers on earth-moving and other vehicles.
Waste storage and removal	Spill or leak	Clean up and disposal as necessary
	Litter	Ensure all rubbish receptacles do not overflow, are well contained and regularly collected for disposal. Regularly inspect that all wastes are appropriately separated into their various waste streams in properly labelled receptacles and that any litter on site is collected and appropriately disposed.
	Drill fluids and cuttings	Ensure all drilling fluids are contained for removal offsite Removal of excess cuttings offsite.
	Fuel and oil	Ensure that all refuelling is conducted without risk of spills to ground; containment and removal of all oil wastes and oil-contaminated material.

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Table 6.2 Environmental Inspection and Monitoring Program (cont'd)

Monitoring Subject	Potential Issue	Corrective Action
Landowners	Access agreements	Adherence to all conditions of agreements Log of any complaints received (from landowners or others) and how these have been addressed.

6.5.3 Environmental Reporting

The DPI considers an environmental incident to be an unplanned departure from work procedures that causes or has the potential to cause an environmental impact. For management purposes, incidents are categorised as either high-level or low-level incidents. Personnel will be inducted in environmental incident reporting procedures.

High-level Incidents

High-level incidents, which will be reported to the DPI as soon as is practicable (within two hours if possible) after the incident occurs, are:

- On-site release or a release that moves off-site and has a major negative environmental impact.
- Breach of environmental approval with the potential for prosecution.
- Incident with the potential to cause regional or widespread negative publicity.
- Injury to, or impact on, endangered species; interference with items of cultural or heritage significance.
- Spread of declared weed or animal or plant pathogen as a direct result of the seismic program.

Part 2, section 4 (8) of the Petroleum Regulations states that the holder of an authority must submit to the Minister a report of an incident that:

- Causes, or has the potential to cause, death, serious injury or significant environmental or property damage; or
- Involves the release or spill of more than 80 litres of petroleum; or
- Involves a petroleum emulsion in which the petroleum concentration is greater than 30 milligrams per litre; or
- Involves any uncontrolled escape by ignition of flammable or combustible material.

All other events by exclusion are considered to be low-level incidents that will be reported, though do not require immediate reporting to DPI.

In the event of high-level incidents, the following responsibilities are assigned:

- Party Manager/Third Party Contractor are responsible for:
 - Informing the Seismic Field Supervisor.
 - Undertaking any immediate actions to contain or control the incident.
- The Seismic Field Supervisor is responsible for:

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- Reporting the incident to the DPI (verbally as soon as possible and in written report form within three days, reporting the details listed under ‘Low-level Incidents’ below).
- Implementing the recommended corrective actions(s) within the required time frame (usually immediately).
- Investigating the incident.
- Reporting on the cause of the incident and necessary corrective actions(s).
- Recommendations for changes or modifications required to avoid the incident re-occurring.
- Any changes in written procedures required.
- Implementing or modifying controls necessary to avoid repetition.
- Recording incident details in a report as described below for low-level incidents.

Low-Level Incidents

Any member of the seismic crew or third party contractor will inform the Party Manager of a low-level incident, who in turn will report the incident to the Seismic Field Supervisor. An investigation will be undertaken by the Seismic Field Supervisor or delegate, who will then implement corrective actions to prevent a similar occurrence from happening. The Seismic Field Supervisor will be responsible for closing out the report and submitting the details to the DPI.

The report to DPI (for both High-level and Low-level incidents) will typically include:

- A description of the incident (including date, time, location and extent of the impact).
- The probable cause(s) of the incident.
- Personnel involved.
- Any actions taken in response to the incident.
- Any changes required to the EMP to limit the probability of the incident re-occurring.
- Any other details relevant to the incident specifically requested by DPI.

Regular Reporting to DPI

Essential Petroleum will submit weekly reports outlining the status of the program including any relevant environmental and safety issues to DPI. A seismic program completion record will be submitted within six months of completion of the program. At this time, Essential Petroleum will also submit a closeout report to the DPI that summarises all environmental audits, incidents, complaints, non-conformances, quantitative records of emissions and discharges, status of rehabilitation and any other relevant environmental performance measures.

6.5.4 Environmental Response Planning

An emergency response plan has been prepared for the seismic activities as part of the Operations Plan (OP). In the event of an environmental emergency, the response will follow the procedures set out in the emergency response plan.

Potential environmental emergencies resulting from the seismic program include:

- Fuel or oil spill in watercourses.

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- Uncontrolled fire in adjacent farmland.

Spill containment and clean-up materials will be kept on site. Personnel will be inducted in spill management, use of equipment and reporting requirements.

6.6 Complaint Management

Essential Petroleum will establish complaints management procedures to follow in the event of a complaint from a landholder, third-party asset owner or member of the public. This is designed to ensure a timely, effective and co-ordinated response to a complaint. General enquiries regarding the seismic program will be directed to the Landholder Liaison or Seismic Supervisor. Complaint management will include:

- All complaints are to be recorded in a Complaints Register, which is to be maintained by the Landholder Liaison Officer or Seismic Field Supervisor.
- The Complaints Register will record:
 - Who made the complaint.
 - Who was affected, if the complainant is representing another person or body.
 - The date and time of the incident or alleged incident.
 - The nature and details of the complaint.
 - The Essential Petroleum employee responsible for resolving the complaint.
 - The actions taken to resolve the complaint.
 - The date on which the complaint was resolved.
- All complaints will be dealt with in timely and courteous manner.
- Where relevant, Essential Petroleum will notify DPI, DSE and/or EPA in the event of a serious complaint from a landholder, third-party asset owner or member of the public.

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Appendix A

Essential Petroleum Environmental Policy

Essential Petroleum Environmental Policy

Essential Petroleum Resources Limited is committed to protecting the environment and safeguarding public and employee health in all aspects of its operations. Environmental protection and safe conduct are the responsibilities of Essential Petroleum, its employees, its alliance partners and suppliers of goods and services.

Specifically Essential Petroleum will:

- Comply with the intent and provision of all applicable laws, regulations and standards,
- Minimise environmental impact,
- Ensure that employees, partners, suppliers and the public are made fully aware of Essential Petroleum's responsibilities for the effects of its operations on the environment,
- Ensure adequate management systems and procedures are in place to manage and mitigate the risks to the environment from Essential Petroleum's operations,
- Commit to continual improvement in environmental management performance.

Essential Petroleum's business ethos is to operate in a manner that addresses three fundamental principles to achieve balanced outcomes. These fundamental principles are:

- Social Acceptability,
- Economic Viability, and
- Environmental Responsibility.

Essential Petroleum is committed to meeting these objectives, to monitoring the meeting of these objectives and to amending its approach if it proves to be inadequate. Essential Petroleum is also committed to continual assessment and auditing to ensure that its activities are complying with its stated intentions and plans. In addition, Essential Petroleum is committed to the public dissemination of this information.

Appendix B

Summary of Consultation Undertaken

Appendix B Details of Stakeholder Consultation

LANDOWNER / OCCUPIER, Property Name Hd. Sect. No	SPI (s)	CONTACTS Phone, Mob., Fax, U.H.F.	Date(s) Contacted	Land Access Notification Letter Delivered	Access Agreement Status	PADLOCKS	TIME CONSTRAINTS	HAZARDS Diseases	SPECIFIC REQUESTS	Post Survey Visit Date(s)	Landowner rehabilitation requirements	Landowner signed off on rehabilitation
BALKIN Andrew and Leanne, Box 203 Casterton 3311		0355811661 0427811661 UHF 12	Jan-08									
EDGE Edwin, "Myaring" MANAGED by RON KERMEN, 86 Jackson St Casterton 3311		0355811048 0419376084 UHF 17	Jan-08			Put ours on			Wants uphole info. Uphole water from tanks. Can temp electric or may move cattle.			
CLEARY Phillip, "KANNAWINKA", Box 44 Casterton 3311, Lines 2 & 4		355753214 040902557 fax 0355812114	*									
Glenelg Hopkins Catchment Management Authority, Marcus Little		0355712526 0428105355							Is writing a letter saying that we don't need a permit to work on waterway. (ASSUMING that LASER LINK will be available as Terrex has suggested).			
MACKLIN Ross (Manager), "MANAROO"		0355284251 0411628149 0355284271 fax							WASHDOWN of vehicles, footwear and spread.			
MCKINNON Ken and Gloria, "Moonlight"		0355281320 0428281320							Uphole water from concrete tank. Can temporary electric fence cattle. Interested in uphole info.			
NORTH Sally Louise, "Erinmore"		355284223							Bull paddock.			
PERKINS Dale and Heather		355701444							Notify manager, deal direct with Dale if manager in hospital.			
POPE Mrs. Tennant in house on East Greenwald road (Nth end)		429956197							Courtesy call required. Already complaining about too man people using this dead-end road and condition of road. Shire have got signs in wrong place etc etc.			
SHORT Eric, "Curramulka", MANAGED by Ron KERMEN, 86 Jackson St Casterton 3311		0355811048 0419376084				Put ours on			Wants uphole info.			
SULLIVAN Dale, Box 110 Casterton 3311		0355847238 0427847238				Put ours on			May not be able to move cattle.			

Appendix B Details of Stakeholder Consultation

LANDOWNER / OCCUPIER, Property Name Hd. Sect. No	SPI (s)	CONTACTS Phone, Mob., Fax, U.H.F.	Date(s) Contacted	Land Access Notification Letter Delivered	Access Agreement Status	PADLOCKS	TIME CONSTRAINTS	HAZARDS Diseases	SPECIFIC REQUESTS	Post Survey Visit Date(s)	Landowner rehabilitation requirements	Landowner signed off on rehabilitation
Timbercorp. "Northcott", Line 5, "Balds" Lines 9 & 6, David Patience, Box 45 Hamilton.		35572390 0437076598										
ITC "McDONALD", Line 4, "Greenwald" Line 7, Tony Walsh		429920273							Gates are locked off Range Road.			
Great Southern, "Gembrook", Line 4, "Johnsons" Line 9, "Emu Flats", Lines 8 & 9, Mick Underdown, line 4												
Fairthorne Fred, "Saunders", Line 4, Richard Synnot		417855340										
GPFL, "Brolga", Line 9, "Greenwald east", Lines 6 & 7, Dereck Bristow		417334245										
CFA REGION 4, HQ, Steve Cooper or Malcolm Anderson		0355811114 0355812277 fax							Want fire unit with slasher.			
CFA DRIK DRIK, Peter Holmes		355281314							Want fire unit with slasher.			
CFA DIGBY, Colin Rice		355793285							Want fire unit with slasher.			
CFA HOTSPUR, Greg Storer		355785502							Want fire unit with slasher.			
CFA DARTMOOR, Robert McDonald		355281238							Want fire unit with slasher.			
KERR Neil, Nelson Road, Drik Drik		0355281325 0355281307 fax							Put our padlock on. No CUTTING FENCES.			
COWLAND Greg, 5058 Prices Highway, Greenwald via Heywood 3304		0355284203 0409284203	Feb-08									
EMERSON Neale and Fiona, 121 Emerson Rd Drik Drik 3304		355281285										
JOHNSTON David, 297 Digby Road Dartmoor 3304		0355281211 0428286211							Will move cattle where he can if notify. Use temp electrics if want. ROUGH SLIPP TERRAIN north of Crawford river.			
KERR Ian & Vivienne, Balds Road, Greenwald		355281216										

Appendix B Details of Stakeholder Consultation

LANDOWNER / OCCUPIER, Property Name Hd. Sect. No	SPI (s)	CONTACTS Phone, Mob., Fax, U.I.F.	Date(s) Contacted	Land Access Notification Letter Delivered	Access Agreement Status	PADLOCKS	TIME CONSTRAINTS	HAZARDS Diseases	SPECIFIC REQUESTS	Post Survey Visit Date(s)	Landowner rehabilitation requirements	Landowner signed off on rehabilitation
DSE FOREST MANAGEMENT, Casterton, Richard Hill		035554230 04288 12489 0355812600 fax	Feb-08						Has visited site with me. Recommendations discussed with Gordon and with Coffey (Sturt Jones).			
WOODALL Tony and Julie		0355281490 04 3828 1492	Feb-08									
Vicroads: Peter Hill		03 5561 9215	Jan-08						Email instructions from Vicroads on requirements for traffic management (in Safety Management Plan). Paperwork and initial maps provided.			
Glenelg Shire Casterton Branch			7-Jan									
Glenelg Shire: Peter Gall			31-Jan						Update paperwork and maps.			

Appendix C

DEWHA EPBC Act Search

Protected Matters Search Tool

You are here: [Environment Home](#) > [EPBC Act](#) > [Search](#)

8 January 2008 17:37

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Information on the coverage of this report and qualifications on data supporting this report are contained in the [caveat](#) at the end of the report.

You may wish to print this report for reference before moving to other pages or websites.

The Australian Natural Resources Atlas at <http://www.environment.gov.au/atlas> may provide further environmental information relevant to your selected area. Information about the EPBC Act including significance guidelines, forms and application process details can be found at <http://www.environment.gov.au/epbc/assessmentsapprovals/index.html>

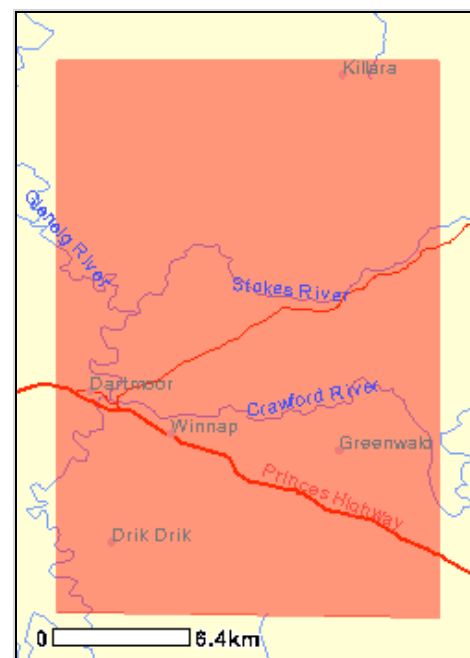
Search Type: Area
Buffer: 1 km
Coordinates: -37.75,141.2583, -37.75,141.4583, -38.04166,141.4583, -38.03888,141.2583



Report Contents: [Summary](#)
[Details](#)

- [Matters of NES](#)
- [Other matters protected by the EPBC Act](#)
- [Extra Information](#)

[Caveat](#)
[Acknowledgments](#)



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Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance - see <http://www.environment.gov.au/epbc/assessmentsapprovals/guidelines/index.html>.

World Heritage Properties:

None

National Heritage Places:	None
Wetlands of International Significance: (Ramsar Sites)	None
Commonwealth Marine Areas:	None
Threatened Ecological Communities:	None
<u>Threatened Species:</u>	26
<u>Migratory Species:</u>	13

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage/index.html>.

Please note that the current dataset on Commonwealth land is not complete. Further information on Commonwealth land would need to be obtained from relevant sources including Commonwealth agencies, local agencies, and land tenure maps.

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species. Information on EPBC Act permit requirements and application forms can be found at <http://www.environment.gov.au/epbc/permits/index.html>.

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
<u>Places on the RNE:</u>	1
<u>Listed Marine Species:</u>	12
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

<u>State and Territory Reserves:</u>	17
Other Commonwealth Reserves:	None
<u>Regional Forest Agreements:</u>	1

Details

Matters of National Environmental Significance

Threatened Species [Dataset Information]	Status	Type of Presence
--	--------	------------------

Birds

[*Calyptrorhynchus banksii graptogyne*](#) *
Red-tailed Black-Cockatoo (south-eastern)

Endangered Breeding likely to occur within area

[*Lathamus discolor*](#) *
Swift Parrot

Endangered Species or species habitat may occur within area

[*Rostratula australis*](#) *
Australian Painted Snipe

Vulnerable Species or species habitat may occur within area

Frogs

[*Litoria raniformis*](#) *
Growling Grass Frog, Southern Bell Frog, Warty Bell Frog, Green and Golden Frog

Vulnerable Species or species habitat may occur within area

Mammals

[*Dasyurus maculatus maculatus \(SE mainland population\)*](#) *
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population)

Endangered Species or species habitat may occur within area

[*Isoodon obesulus obesulus*](#) *
Southern Brown Bandicoot

Endangered Species or species habitat likely to occur within area

[*Miniopterus schreibersii bassanii*](#) *
Southern Bent-wing Bat

Conservation Dependent Species or species habitat may occur within area

[*Potorous tridactylus tridactylus*](#) *
Long-nosed Potoroo (SE mainland)

Vulnerable Species or species habitat may occur within area

[*Pseudomys fumeus*](#) *
Konoom, Smoky Mouse

Endangered Species or species habitat may occur within area

[*Pseudomys shortridgei*](#) *
Dayang, Heath Rat

Vulnerable Species or species habitat likely to occur within area

[*Pteropus poliocephalus*](#) *
Grey-headed Flying-fox

Vulnerable Species or species habitat may occur within area

Ray-finned fishes

[*Galaxiella pusilla*](#) *
Dwarf Galaxias

Vulnerable Species or species habitat likely to occur within area

[*Nannoperca obscura*](#) *
Yarra Pygmy Perch

Vulnerable Species or species habitat likely to occur within area

[*Nannoperca variegata*](#) *
Ewens Pygmy Perch, Golden Pygmy Perch, Variegated Pygmy Perch

Vulnerable Species or species habitat likely to occur within area

[*Prototroctes maraena*](#) *
Australian Grayling

Vulnerable Species or species habitat likely to occur within area

Reptiles

[*Delma impar*](#) *
Striped Legless Lizard

Vulnerable Species or species habitat likely to occur within area

Plants

[*Amphibromus fluitans*](#) *
River Swamp Wallaby-grass

Vulnerable Species or species habitat may occur within area

[*Carex tasmanica*](#) *
Curly Sedge

Vulnerable Species or species habitat likely to occur within area

[*Glycine latrobeana*](#) *
Purple Clover, Clover Glycine

Vulnerable Species or species habitat likely to occur within area

[*Haloragis exalata subsp. exalata*](#) *
Wingless Raspwort, Square Raspwort

Vulnerable Species or species habitat likely to occur within area

[*Pterostylis cucullata*](#) *

Leafy Greenhood

Vulnerable Species or species habitat likely to occur within area

[*Senecio psilocarpus*](#) *

Swamp Fireweed, Smooth-fruited Groundsel

Vulnerable Species or species habitat likely to occur within area

[*Taraxacum cygnorum*](#) *

Coast Dandelion

Vulnerable Species or species habitat likely to occur within area

[*Thelymitra epipactoides*](#) *

Metallic Sun-orchid

Endangered Species or species habitat likely to occur within area

[*Thelymitra matthewsii*](#) *

Spiral Sun-orchid

Vulnerable Species or species habitat likely to occur within area

[*Xerochrysum palustre*](#) *

Swamp Everlasting

Vulnerable Species or species habitat likely to occur within area

Migratory Species [[Dataset Information](#)]

Status Type of Presence

Migratory Terrestrial Species**Birds**[*Calyptorhynchus banksii graptogyne*](#)

Red-tailed Black-Cockatoo (south-eastern)

Migratory Breeding likely to occur within area

[*Haliaeetus leucogaster*](#)

White-bellied Sea-Eagle

Migratory Species or species habitat likely to occur within area

[*Hirundapus caudacutus*](#)

White-throated Needletail

Migratory Species or species habitat may occur within area

[*Merops ornatus*](#) *

Rainbow Bee-eater

Migratory Species or species habitat may occur within area

[*Myiagra cyanoleuca*](#)

Satin Flycatcher

Migratory Breeding likely to occur within area

[*Rhipidura rufifrons*](#)

Rufous Fantail

Migratory Breeding may occur within area

Migratory Wetland Species**Birds**[*Ardea alba*](#)

Great Egret, White Egret

Migratory Species or species habitat may occur within area

[*Ardea ibis*](#)

Cattle Egret

Migratory Species or species habitat may occur within area

[*Gallinago hardwickii*](#) *

Latham's Snipe, Japanese Snipe

Migratory Species or species habitat may occur within area

[*Rostratula benghalensis s. lat.*](#)

Painted Snipe

Migratory Species or species habitat may occur within area

Migratory Marine Birds[*Apus pacificus*](#)

Fork-tailed Swift

Migratory Species or species habitat may occur within area

[*Ardea alba*](#)

Great Egret, White Egret

Migratory Species or species habitat may occur within area

[*Ardea ibis*](#)

Cattle Egret

Migratory Species or species habitat may occur within area

Other Matters Protected by the EPBC ActListed Marine Species [[Dataset Information](#)]

Status Type of Presence

Birds[*Anseranas semipalmata*](#)

Magpie Goose

Listed - overfly Species or species habitat may occur within area

[Apus pacificus](#)

Fork-tailed Swift

marine
areaListed -
overfly
marine
areaSpecies or species habitat may occur within
area[Ardea alba](#)

Great Egret, White Egret

Listed -
overfly
marine
areaSpecies or species habitat may occur within
area[Ardea ibis](#)

Cattle Egret

Listed -
overfly
marine
areaSpecies or species habitat may occur within
area[Gallinago hardwickii](#) *

Latham's Snipe, Japanese Snipe

Listed -
overfly
marine
areaSpecies or species habitat may occur within
area[Haliaeetus leucogaster](#)

White-bellied Sea-Eagle

Listed

Species or species habitat likely to occur
within area[Hirundapus caudacutus](#)

White-throated Needletail

Listed -
overfly
marine
areaSpecies or species habitat may occur within
area[Lathamus discolor](#) *

Swift Parrot

Listed -
overfly
marine
areaSpecies or species habitat may occur within
area[Merops ornatus](#) *

Rainbow Bee-eater

Listed -
overfly
marine
areaSpecies or species habitat may occur within
area[Myiagra cyanoleuca](#)

Satin Flycatcher

Listed -
overfly
marine
area

Breeding likely to occur within area

[Rhipidura rufifrons](#)

Rufous Fantail

Listed -
overfly
marine
area

Breeding may occur within area

[Rostratula benghalensis s. lat.](#)

Painted Snipe

Listed -
overfly
marine
areaSpecies or species habitat may occur within
areaPlaces on the RNE [[Dataset Information](#)]

Note that not all Indigenous sites may be listed.

Natural[Lower Glenelg National Park VIC](#)**Extra Information**State and Territory Reserves [[Dataset Information](#)]

Balrook Natural Features Reserve - Bushland Reserve, VIC

Barry's Swamp Natural Features Reserve - Bushland Reserve, VIC

Burgess Swamp Nature Conservation Reserve - Wildlife Reserve (no hunt), VIC

Drik Drik H51 Natural Features Reserve - Bushland Reserve, VIC
Drik Drik H9 Natural Features Reserve - Bushland Reserve, VIC
Glenelg River (3) Natural Features Reserve - Streamside Reserve, VIC
Glenelg River (4) Natural Features Reserve - Streamside Reserve, VIC
Glenelg River (5) Natural Features Reserve - Streamside Reserve, VIC
Grassy Flats Natural Features Reserve - Wildlife Reserve (hunting), VIC
Lower Glenelg National Park, VIC
Mumbannar Natural Features Reserve - Bushland Reserve, VIC
Pieracle Swamp Natural Features Reserve - Wildlife Reserve (hunting), VIC
Red Hill Swamp Natural Features Reserve - Wildlife Reserve (hunting), VIC
Stokes River (1) Natural Features Reserve - Streamside Reserve, VIC
Stokes River (2) Natural Features Reserve - Streamside Reserve, VIC
Stokes River (4) Natural Features Reserve - Streamside Reserve, VIC
Stokes River (5) Natural Features Reserve - Streamside Reserve, VIC
Regional Forest Agreements [[Dataset Information](#)]
Note that all RFA areas including those still under consideration have been included.
West Victoria RFA, Victoria

Caveat

The information presented in this report has been provided by a range of data sources as [acknowledged](#) at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the *Environment Protection and Biodiversity Conservation Act 1999*. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under "type of presence". For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the [migratory](#) and [marine](#) provisions of the Act have been mapped.

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as [extinct or considered as vagrants](#)
- some species and ecological communities that have only recently been listed
- [some terrestrial species](#) that overfly the Commonwealth marine area
- migratory species that are very [widespread, vagrant, or only occur in small numbers](#).

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites;
- seals which have only been mapped for breeding sites near the Australian continent.

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Acknowledgments

This database has been compiled from a range of data sources. The Department acknowledges the following custodians who have contributed valuable data and advice:

- [New South Wales National Parks and Wildlife Service](#)
- [Department of Sustainability and Environment, Victoria](#)
- [Department of Primary Industries, Water and Environment, Tasmania](#)
- [Department of Environment and Heritage, South Australia Planning SA](#)
- [Parks and Wildlife Commission of the Northern Territory](#)
- [Environmental Protection Agency, Queensland](#)
- [Birds Australia](#)
- [Australian Bird and Bat Banding Scheme](#)
- [Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [Queensland Herbarium](#)
- [National Herbarium of NSW](#)
- [Royal Botanic Gardens and National Herbarium of Victoria](#)
- [Tasmanian Herbarium](#)
- [State Herbarium of South Australia](#)
- [Northern Territory Herbarium](#)
- [Western Australian Herbarium](#)
- [Australian National Herbarium, Atherton and Canberra](#)
- [University of New England](#)
- Other groups and individuals

[ANUcliM Version 1.8, Centre for Resource and Environmental Studies, Australian National University](#) was used extensively for the production of draft maps of species distribution. Environment Australia is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

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Last updated:

Appendix D

Flora Information System species list

Appendix D Floristic data from the DSE FIS dataset sampled within 100 m of the seismic lines

Quadrat ID	Botanical Name	Common Name	Origin	AROTS	VROTS	FFG	EPBC
Digby Site							
W0239700	<i>Juncus procerus</i>	Tall Rush					
W1049500	<i>Allittia cardiocarpa</i>	Swamp Daisy					
W1256200	<i>Melaleuca squarrosa</i>	Scented Paperbark					
X4230900	<i>Kennedia prostrata</i>	Running Postman					
X4231000	<i>Goodenia geniculata</i>	Bent Goodenia					
X4231100	<i>Pultenaea stricta</i>	Rigid Bush-pea					
X4231200	<i>Acacia verticillata</i> subsp. <i>verticillata</i>	Prickly Moses					
Dartmoor Site							
D0930900	<i>Poa morrisii</i>	Soft Tussock-grass					
D0930900	<i>Pimelea humilis</i>	Common Rice-flower					
D0930900	<i>Ophioglossum lusitanicum</i>	Austral Adder's-tongue					
D0930900	<i>Oxalis exilis</i>	Shady Wood-sorrel					
D0930900	<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass					
D0930900	<i>Microtis unifolia</i>	Common Onion-orchid					
D0930900	<i>Opercularia varia</i>	Variable Stinkweed					
D0930900	<i>Pyrorchis nigricans</i>	Red-beaks					
D0930900	<i>Pteridium esculentum</i>	Austral Bracken					
D0930900	<i>Leptospermum continentale</i>	Prickly Tea-tree					
D0930900	<i>Senecio</i> spp.	Groundsel					
D0930900	<i>Luzula meridionalis</i> var. <i>densiflora</i>	Common Woodrush					

Appendix D Floristic data from the DSE FIS dataset sampled within 100 m of the seismic lines (cont'd)

Quadrat ID	Botanical Name	Common Name	Origin	AROTS	VROTS	FFG	EPBC
Dartmoor Site (cont'd)							
D0930900	<i>Pterostylis nutans</i>	Nodding Greenhood					
D0930900	<i>Schoenus apogon</i>	Common Bog-sedge					
D0930900	<i>Stellaria pungens</i>	Prickly Starwort					
D0930900	<i>Tetrarrhena distichophylla</i>	Hairy Rice-grass					
D0930900	<i>Xanthorrhoea minor subsp. lutea</i>	Small Grass-tree					
D0930900	<i>Thysanotus patersonii</i>	Twining Fringe-lily					
D0930900	<i>Wahlenbergia stricta subsp. stricta</i>	Tall Bluebell					
D0930900	<i>Thelymitra ixioides s.l.</i>	Spotted Sun-orchid					
D0930900	<i>Eucalyptus viminalis subsp. cygnetensis</i>	Rough-barked Manna-gum					
D0930900	<i>Deyeuxia spp.</i>	Bent-grass					
D0930900	<i>Lagenophora stipitata</i>	Common Bottle-daisy					
D0930900	<i>Aira spp.</i>	Hair Grass	*				
D0930900	<i>Hypericum gramineum</i>	Small St John's Wort					
D0930900	<i>Amyema pendula</i>	Drooping Mistletoe					
D0930900	<i>Acianthus caudatus</i>	Mayfly Orchid					
D0930900	<i>Acacia mearnsii</i>	Black Wattle					
D0930900	<i>Acianthus exsertus s.l.</i>	Gnat Orchid					
D0930900	<i>Hypolaena fastigiata</i>	Tassel Rope-rush					
D0930900	<i>Astroloma humifusum</i>	Cranberry Heath					
D0930900	<i>Acrotriche serrulata</i>	Honey-pots					
D0930900	<i>Boronia nana</i>	Dwarf Boronia					

Appendix D Floristic data from the DSE FIS dataset sampled within 100 m of the seismic lines (cont'd)

Quadrat ID	Botanical Name	Common Name	Origin	AROTS	VROTS	FFG	EPBC
Dartmoor Site (cont'd)							
D0930900	<i>Burchardia umbellata</i>	Milkmaids					
D0930900	<i>Cerastium fontanum subsp. vulgare</i>	Common Mouse-ear Chickweed	*				
D0930900	<i>Craspedia glauca spp. agg.</i>	Common Billy-buttons					
D0930900	<i>Chamaescilla corymbosa var. corymbosa</i>	Blue Stars					
D0930900	<i>Hibbertia riparia</i>	Erect Guinea-flower					
D0930900	<i>Dichondra repens</i>	Kidney-weed					
D0930900	<i>Cyrtostylis reniformis</i>	Small Gnat-orchid					
D0930900	<i>Hypochoeris radicata</i>	Flatweed	*				
D0930900	<i>Hydrocotyle laxiflora</i>	Stinking Pennywort					
D0930900	<i>Hibbertia fasciculata var. prostrata</i>	Bundled Guinea-flower					
D0930900	<i>Helichrysum scorpioides</i>	Button Everlasting					
D0930900	<i>Gahnia radula</i>	Thatch Saw-sedge					
D0930900	<i>Eucalyptus baxteri s.l.</i>	Brown Stringybark					
D0930900	<i>Epacris impressa</i>	Common Heath					
D0930900	<i>Drosera whittakeri subsp. aberrans</i>	Scented Sundew					
D0930900	<i>Arthropodium strictum s.l.</i>	Chocolate Lily					
IA013380	<i>Rubus fruticosus spp. agg.</i>	Blackberry	*				
IA013384	<i>Rubus fruticosus spp. agg.</i>	Blackberry	*				

Appendix D Floristic data from the DSE FIS dataset sampled within 100 m of the seismic lines (cont'd)

Quadrat ID	Botanical Name	Common Name	Origin	AROTS	VROTS	FFG	EPBC
Dartmoor Site (cont'd)							
IA013388	<i>Rubus fruticosus</i> spp. agg.	Blackberry	*				
IA013897	<i>Rubus fruticosus</i> spp. agg.	Blackberry	*				
IA013898	<i>Rubus fruticosus</i> spp. agg.	Blackberry	*				
IA016076	<i>Pittosporum undulatum</i>	Sweet Pittosporum	#				
IA016079	<i>Rubus fruticosus</i> spp. agg.	Blackberry	*				
IA024240	<i>Rubus fruticosus</i> spp. agg.	Blackberry	*				
IA048162	<i>Asparagus asparagoides</i>	Bridal Creeper	*				
XB164800	<i>Orthodontium lineare</i>	Cape Thread-moss					
XB165200	<i>Achrophyllum dentatum</i>	Toothed Mitre-moss					
X9158100	<i>Xanthosia leiophylla</i>	Parsley Xanthosia			r		

Note: Data based on December 2007 data received from DSE. This data has yet to undergo thorough quality assessment and DSE suggest caution when using this data.

AROTS = Australian Rare or Threatened Species

VROTS = Victorian Rare or Threatened Species

FFG = *Flora and Fauna Guarantee Act 1988* listed species

EPBC = *Environment, Protection and Biodiversity Conservation Act 1999* listed species

* = Introduced species

= Australian native species outside of its natural range

r = Rare

Appendix E

Atlas of Victorian Wildlife species list

Appendix E Fauna data from the DSE AVW dataset surveyed within 100 m of the seismic lines

Survey ID	Survey Group	Scientific Name	Common Name	Group Description	Origin	AROTS	VROTS	FFG	EPBC
Digby Site									
71878	N/A	<i>Haliastur sphenurus</i>	Whistling Kite	Birds					
71878	N/A	<i>Calyptorhynchus funereus</i>	Yellow-tailed Black-Cockatoo	Birds					
71878	N/A	<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	Birds					
71878	N/A	<i>Psephotus haematonotus</i>	Red-rumped Parrot	Birds					
71878	N/A	<i>Myiagra inquieta</i>	Restless Flycatcher	Birds					
71878	N/A	<i>Microeca fascians</i>	Jacky Winter	Birds					
71878	N/A	<i>Grallina cyanoleuca</i>	Magpie-lark	Birds					
71878	N/A	<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	Birds					
71878	N/A	<i>Lichenostomus penicillatus</i>	White-plumed Honeyeater	Birds					
71878	N/A	<i>Gymnorhina tibicen</i>	Australian Magpie	Birds					
71878	N/A	<i>Sturnus vulgaris</i>	Common Starling	Birds	*				
92727	N/A	<i>Grus rubicunda</i>	Brolga	Birds			VU	L	
150703	A	<i>Tiliqua rugosa</i>	Stumpy-tailed Lizard	Reptiles					
211697	A	<i>Rhipidura leucophrys</i>	Willie Wagtail	Birds					
212080	A	<i>Colluricincla harmonica</i>	Grey Shrike-thrush	Birds					
212200	A	<i>Pachycephala rufiventris</i>	Rufous Whistler	Birds					
212479	A	<i>Microeca fascians</i>	Jacky Winter	Birds					

Appendix E Fauna data from the DSE AVW dataset surveyed within 100 m of the seismic lines

Survey ID	Survey Group	Scientific Name	Common Name	Group Description	Origin	AROTS	VROTS	FFG	EPBC
<i>Digby Site (cont'd)</i>									
212550	A	<i>Eopsaltria australis</i>	Eastern Yellow Robin	Birds					
212849	A	<i>Lalage sueurii</i>	White-winged Triller	Birds					
213010	A	<i>Anthus novaeseelandiae</i>	Australasian Pipit	Birds					
214036	A	<i>Neophema chrysostoma</i>	Blue-winged Parrot	Birds					
215171	A	<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	Birds					
215915	A	<i>Vanellus miles</i>	Masked Lapwing	Birds					
216004	A	<i>Grus rubicunda</i>	Brolga	Birds			VU	L	
216030	A	<i>Grus rubicunda</i>	Brolga	Birds			VU	L	
216319	A	<i>Falco cenchroides</i>	Nankeen Kestrel	Birds					
216495	A	<i>Falco peregrinus</i>	Peregrine Falcon	Birds					
216676	A	<i>Aquila audax</i>	Wedge-tailed Eagle	Birds					
217267	A	<i>Tadorna tadornoides</i>	Australian Shelduck	Birds					
217626	A	<i>Threskiornis spinicollis</i>	Straw-necked Ibis	Birds					
217740	A	<i>Threskiornis molucca</i>	Australian White Ibis	Birds					
218001	A	<i>Egretta novae-hollandiae</i>	White-faced Heron	Birds					
218039	A	<i>Ardea pacifica</i>	White-necked Heron	Birds					
218774	A	<i>Dromaius novaehollandiae</i>	Emu	Birds					
222836	A	<i>Strepera versicolor</i>	Grey Currawong	Birds					

Appendix E Fauna data from the DSE AVW dataset surveyed within 100 m of the seismic lines

Survey ID	Survey Group	Scientific Name	Common Name	Group Description	Origin	AROTS	VROTS	FFG	EPBC
<i>Digby Site (cont'd)</i>									
223481	A	<i>Grallina cyanoleuca</i>	Magpie-lark	Birds					
223928	A	<i>Carduelis carduelis</i>	European Goldfinch	Birds	*				
224755	A	<i>Melithreptus lunatus</i>	White-naped Honeyeater	Birds					
224899	A	<i>Lichenostomus penicillatus</i>	White-plumed Honeyeater	Birds					
225185	A	<i>Lichenostomus chrysops</i>	Yellow-faced Honeyeater	Birds					
225459	A	<i>Anthochaera carunculata</i>	Red Wattlebird	Birds					
225656	A	<i>Cormobates leucophaeus</i>	White-throated Treecreeper	Birds					
225844	A	<i>Acanthiza lineata</i>	Striated Thornbill	Birds					
225962	A	<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill	Birds					
226490	A	<i>Stipiturus malachurus</i>	Southern Emu-wren	Birds					
286453	B	<i>Antechinus minimus</i>	Swamp Antechinus	Mammals			NT	L	
295315	B	<i>Macropus rufogriseus</i>	Red-necked Wallaby	Mammals					
295356	B	<i>Macropus rufogriseus</i>	Red-necked Wallaby	Mammals					
302537	B	<i>Rattus lutreolus</i>	Swamp Rat	Mammals					
303564	B	<i>Oryctolagus cuniculus</i>	European Rabbit	Mammals	*				
720594	B	<i>Threskiornis spinicollis</i>	Straw-necked Ibis	Birds					

Appendix E Fauna data from the DSE AVW dataset surveyed within 100 m of the seismic lines

Survey ID	Survey Group	Scientific Name	Common Name	Group Description	Origin	AROTS	VROTS	FFG	EPBC
Digby Site (cont'd)									
283580	N/A	<i>Sminthopsis leucopus</i>	White-footed Dunnart	Mammals			NT	L	
283580	N/A	<i>Rattus lutreolus</i>	Swamp Rat	Mammals					
283580	N/A	<i>Rattus lutreolus</i>	Swamp Rat	Mammals					
283580	N/A	<i>Rattus lutreolus</i>	Swamp Rat	Mammals					
283581	N/A	<i>Antechinus minimus</i>	Swamp Antechinus	Mammals			NT	L	
283581	N/A	<i>Antechinus minimus</i>	Swamp Antechinus	Mammals			NT	L	
283581	N/A	<i>Antechinus minimus</i>	Swamp Antechinus	Mammals			NT	L	
283581	N/A	<i>Rattus lutreolus</i>	Swamp Rat	Mammals					
283581	N/A	<i>Rattus lutreolus</i>	Swamp Rat	Mammals					
283581	N/A	<i>Rattus lutreolus</i>	Swamp Rat	Mammals					
128198	C	<i>Litoria ewingii</i>	Southern Brown Tree Frog	Amphibians					
128204	C	<i>Litoria ewingii</i>	Southern Brown Tree Frog	Amphibians					
128205	C	<i>Litoria ewingii</i>	Southern Brown Tree Frog	Amphibians					
128206	C	<i>Litoria ewingii</i>	Southern Brown Tree Frog	Amphibians					
128207	C	<i>Litoria ewingii</i>	Southern Brown Tree Frog	Amphibians					
128208	C	<i>Litoria ewingii</i>	Southern Brown Tree Frog	Amphibians					
128209	C	<i>Litoria ewingii</i>	Southern Brown Tree Frog	Amphibians					

Appendix E Fauna data from the DSE AVW dataset surveyed within 100 m of the seismic lines

Survey ID	Survey Group	Scientific Name	Common Name	Group Description	Origin	AROTS	VROTS	FFG	EPBC
Digby Site (cont'd)									
128210	C	<i>Litoria ewingii</i>	Southern Brown Tree Frog	Amphibians					
211610	D	<i>Cinclosoma punctatum</i>	Spotted Quail-thrush	Birds			NT		
211696	D	<i>Rhipidura leucophrys</i>	Willie Wagtail	Birds					
211713	D	<i>Rhipidura leucophrys</i>	Willie Wagtail	Birds					
212341	D	<i>Falcunculus frontatus</i>	Crested Shrike-tit	Birds					
212662	D	<i>Petroica boodang</i>	Scarlet Robin	Birds					
212737	D	<i>Petroica rodinogaster</i>	Pink Robin	Birds					
212819	D	<i>Zoothera lunulata</i>	Bassian Thrush	Birds					
212852	D	<i>Lalage sueurii</i>	White-winged Triller	Birds					
213056	D	<i>Anthus novaeseelandiae</i>	Australasian Pipit	Birds					
213131	D	<i>Hirundo nigricans</i>	Tree Martin	Birds					
213470	D	<i>Todiramphus sanctus</i>	Sacred Kingfisher	Birds					
213648	D	<i>Dacelo novaeguineae</i>	Laughing Kookaburra	Birds					
213697	D	<i>Alcedo azurea</i>	Azure Kingfisher	Birds			NT		
214055	D	<i>Neophema chrysostoma</i>	Blue-winged Parrot	Birds					
214397	D	<i>Platycercus elegans</i>	Crimson Rosella	Birds					
214442	D	<i>Melopsittacus undulatus</i>	Budgerigar	Birds					
214604	D	<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	Birds					
215205	D	<i>Calyptorhynchus funereus</i>	Yellow-tailed Black-Cockatoo	Birds					

Appendix E Fauna data from the DSE AVW dataset surveyed within 100 m of the seismic lines

Survey ID	Survey Group	Scientific Name	Common Name	Group Description	Origin	AROTS	VROTS	FFG	EPBC
<i>Digby Site (cont'd)</i>									
215338	D	<i>Phaps chalcoptera</i>	Common Bronzewing	Birds					
216012	D	<i>Grus rubicunda</i>	Brolga	Birds			VU	L	
216031	D	<i>Grus rubicunda</i>	Brolga	Birds			VU	L	
216037	D	<i>Fulica atra</i>	Eurasian Coot	Birds					
216424	D	<i>Falco berigora</i>	Brown Falcon	Birds					
216588	D	<i>Hieraaetus morphnoides</i>	Little Eagle	Birds					
216674	D	<i>Aquila audax</i>	Wedge-tailed Eagle	Birds					
216919	D	<i>Chenonetta jubata</i>	Australian Wood Duck	Birds					
217186	D	<i>Anas superciliosa</i>	Pacific Black Duck	Birds					
218772	D	<i>Dromaius novaehollandiae</i>	Emu	Birds					
223143	D	<i>Gymnorhina tibicen</i>	Australian Magpie	Birds					
223147	D	<i>Gymnorhina tibicen</i>	Australian Magpie	Birds					
223233	D	<i>Artamus cyanopterus</i>	Dusky Woodswallow	Birds					
223661	D	<i>Sturnus vulgaris</i>	Common Starling	Birds	*				
223679	D	<i>Sturnus vulgaris</i>	Common Starling	Birds	*				
223769	D	<i>Neochmia temporalis</i>	Red-browed Finch	Birds					
224104	D	<i>Pardalotus striatus</i>	Striated Pardalote	Birds					
224249	D	<i>Pardalotus punctatus</i>	Spotted Pardalote	Birds					

Appendix E Fauna data from the DSE AVW dataset surveyed within 100 m of the seismic lines

Survey ID	Survey Group	Scientific Name	Common Name	Group Description	Origin	AROTS	VROTS	FFG	EPBC
Digby Site (cont'd)									
225373	D	<i>Anthochaera chrysoptera</i>	Little Wattlebird	Birds					
225733	D	<i>Daphoenositta chrysoptera</i>	Varied Sittella	Birds					
294172	D	<i>Macropus fuliginosus</i>	Western Grey Kangaroo	Mammals					
294184	D	<i>Macropus fuliginosus</i>	Western Grey Kangaroo	Mammals					
303563	D	<i>Oryctolagus cuniculus</i>	European Rabbit	Mammals	*				
293591	N/A	<i>Pseudocheirus peregrinus</i>	Common Ringtail Possum	Mammals					
Dartmoor site									
141893	E	<i>Geocrinia laevis</i>	Southern Smooth Froglet	Amphibians					
141894	E	<i>Geocrinia laevis</i>	Southern Smooth Froglet	Amphibians					
141895	E	<i>Geocrinia laevis</i>	Southern Smooth Froglet	Amphibians					
141896	E	<i>Geocrinia laevis</i>	Southern Smooth Froglet	Amphibians					
141897	E	<i>Geocrinia laevis</i>	Southern Smooth Froglet	Amphibians					
141898	E	<i>Geocrinia laevis</i>	Southern Smooth Froglet	Amphibians					
141899	E	<i>Geocrinia laevis</i>	Southern Smooth Froglet	Amphibians					
141900	E	<i>Geocrinia laevis</i>	Southern Smooth Froglet	Amphibians					

Appendix E Fauna data from the DSE AVW dataset surveyed within 100 m of the seismic lines

Survey ID	Survey Group	Scientific Name	Common Name	Group Description	Origin	AROTS	VROTS	FFG	EPBC
Dartmoor Site (cont'd)									
141901	E	<i>Geocrinia laevis</i>	Southern Smooth Froglet	Amphibians					
141902	E	<i>Geocrinia laevis</i>	Southern Smooth Froglet	Amphibians					
141903	E	<i>Geocrinia laevis</i>	Southern Smooth Froglet	Amphibians					
141904	E	<i>Geocrinia laevis</i>	Southern Smooth Froglet	Amphibians					
141905	E	<i>Geocrinia laevis</i>	Southern Smooth Froglet	Amphibians					
141906	E	<i>Geocrinia laevis</i>	Southern Smooth Froglet	Amphibians					
141907	E	<i>Geocrinia laevis</i>	Southern Smooth Froglet	Amphibians					
141908	E	<i>Geocrinia laevis</i>	Southern Smooth Froglet	Amphibians					
141909	E	<i>Geocrinia laevis</i>	Southern Smooth Froglet	Amphibians					
141910	E	<i>Geocrinia laevis</i>	Southern Smooth Froglet	Amphibians					
141911	E	<i>Geocrinia laevis</i>	Southern Smooth Froglet	Amphibians					
141912	E	<i>Geocrinia laevis</i>	Southern Smooth Froglet	Amphibians					
277832	N/A	no fish	no fish						
1035298	N/A	<i>Tadorna tadornoides</i>	Australian Shelduck	Birds					
1035298	N/A	<i>Aquila audax</i>	Wedge-tailed Eagle	Birds					

Appendix E Fauna data from the DSE AVW dataset surveyed within 100 m of the seismic lines

Survey ID	Survey Group	Scientific Name	Common Name	Group Description	Origin	AROTS	VROTS	FFG	EPBC
Dartmoor Site (cont'd)									
1035298	N/A	<i>Platycercus elegans</i>	Crimson Rosella	Birds					
1035298	N/A	<i>Dacelo novaeguineae</i>	Laughing Kookaburra	Birds					
1035298	N/A	<i>Rhipidura albiscarpa</i>	Grey Fantail	Birds					
1035298	N/A	<i>Eopsaltria australis</i>	Eastern Yellow Robin	Birds					
1035298	N/A	<i>Colluricincla harmonica</i>	Grey Shrike-thrush	Birds					
1035298	N/A	<i>Acanthiza lineata</i>	Striated Thornbill	Birds					
1035298	N/A	<i>Acanthiza pusilla</i>	Brown Thornbill	Birds					
1035298	N/A	<i>Seicornis frontalis</i>	White-browed Scrubwren	Birds					
1035298	N/A	<i>Malurus cyaneus</i>	Superb Fairy-wren	Birds					
1035298	N/A	<i>Cormobates leucophaeus</i>	White-throated Treecreeper	Birds					
1035298	N/A	<i>Acanthorhynchus tenuirostris</i>	Eastern Spinebill	Birds					
1035298	N/A	<i>Lichenostomus chrysops</i>	Yellow-faced Honeyeater	Birds					
1035298	N/A	<i>Corcorax melanorhamphos</i>	White-winged Chough	Birds					
1035298	N/A	<i>Gymnorhina tibicen</i>	Australian Magpie	Birds					
1035298	N/A	<i>Corvus tasmanicus</i>	Forest Raven	Birds					

Note: Data based on December 2007 data received from DSE. This data has yet to undergo thorough quality assessment and DSE suggest caution when using this data.

AROTS = Australian Rare or Threatened Species

VROTS = Victorian Rare or Threatened Species

FFG = *Flora and Fauna Guarantee Act 1988* listed species

EPBC = *Environment, Protection and Biodiversity Conservation Act 1999* listed species

* = Introduced species

VU = vulnerable

L = listed

NT = near threatened