Environmental Impact Report

for

Drilling Pad and Access Road Construction

on Private Land

Otway Basin – South Australia

Origin Energy Resources Limited
A.B.N. 66 007 845 338
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1 PROPOSED ACTIVITIES

1.1 INTRODUCTION

Origin Energy Resources Limited (OERL) is the operator of Petroleum Exploration Licences (PELs) 27, 32, 57, 66 and 72 and Petroleum Production Licences (PPLs) 62 and 168 in the Southeast corner of South Australia. OERL plans to drill several petroleum exploration and development wells in order to secure gas supplies with the actual number of wells dictated by market demand, prospects identified and good reservoir management. Drill pad and access track construction on private land will be covered by this Environmental Impact Report but well drilling activities will be performed under an approved Environmental Impact Report and Statement of Environmental Objectives for Drilling and Well Operations. All construction activities will be conducted and managed by a Company with proven experience according to best industry practice and to conform with the relevant State and Federal Government regulations.

Oil Company of Australia Limited "OCA" (ABN. 68 001 646 331) will manage both pre-drill construction activity and the drilling of the proposed wells. OCA is an 85% owned subsidiary company of Origin Energy Limited (OEL) and Origin Energy Resources Limited is a wholly owned subsidiary of the same parent company. OCA will be acting as agent for ORL for the conduct of many activities in South Australia using the benefit of specific expertise based in the OCA company such as drilling. The responsibility for the performance of obligations of the SEO and EIR will at all times remain with the permit holder, and Origin Energy Resources Limited as Operator.

Preparation of a suitable pad and access road for each well precedes the drilling phase. Prevailing weather and soil conditions as well as the landowners' wishes, however, may dictate that such earthworks occur a considerable time before drilling commences. This Environmental Impact Report covers the construction on private land of roads and other infrastructure, specifically, a drilling pad for the purpose of this document, as stipulated as a regulated activity under Part 3, Section 10, Regulated activities, of the *Petroleum Act 2000*, when such activity occurs with the approval of the landowner. OERL will control environmental impact to acceptable levels to minimise inconvenience and risk to the landowner, the local community, Company and rig personnel and third parties in general during the construction of this infrastructure.

1.2 LOCATION AND ACCESS

The proposed drill pad and access road construction covered by this EIR will occur on private land and with the prior approval of the landowner. The Kungari Aboriginal Association will have inspected the site prior to commencement of any activity to determine if any cultural heritage sites are evident. The Department of State Aboriginal Affairs and Department for Environment and Heritage will be consulted if cultural aspects of any area are in doubt. Existing roads will be used where possible to minimise the land area alienated by

the construction activities, especially if the activities precede the drilling phase by a considerable period of time. Alternately access roads will be at the direction of the property owner. The surface location of the well will be governed to a large extent by the position of the sub-surface drilling target but local topography, land use and cultural considerations will determine the actual location of the pad and the access track. Land use in the region includes grazing, vineyards and wood lots. The rig sites are most likely to be on open grazing paddocks with gently undulating relief or on land cleared of native vegetation prior to planting of exotic species.

OERL will take all precautions to ensure that the proposed location will minimise noise and visual impact to the landowner and ensure that potentially fragile landforms are not affected. Pad and access road construction will be carried out with minimal impact on the soil. Origin Energy acknowledges that operation of the drilling rig will focus attention on the region and will take all necessary precautions to protect third parties and restrict unauthorised entry to the well site.

1.3 SITE REQUIREMENTS

1.3.1 Rig Pad

The well site requires a firm and level pad for the positioning of the Drilling Rig. This involves the clearing of an area of 150m x 150m for the drill pad including provision for a 15-20 m perimeter firebreak. The pad will be covered with gravel to a depth of approximately 30 to 50 cm laid directly on the topsoil. Due to the weight of the drill rig structure an area 18 metres by 10 metres will be shimmed to a depth of 70 cm and built up with compacted gravel. In areas of possible subsurface subsidence exploratory site investigation holes may be drilled to confirm the requirement for a competent pad. Construction of the reservoir sump for drilling mud and the flare pit are not covered by this EIR.

1.3.2 Water Supply

Water to control dust and to aid compaction may be taken from local bores or brought in by road tanker.

1.3.3 Construction & Management

OERL employs a local Landman to liaise with property owners and local interest groups and to provide on-site supervision of all site construction and rehabilitation activities. Chris Annear of Petroleum Support Services Mt Gambier will provide this service. Lease and access construction services will be provided by Gambier Earth Movers or Teagles Constructions from Mt Gambier.

1.4 Construction Activities

1.4.1 Traffic Movements

Construction of the drill pad and access track will involve the importation by road of gravel and finer material as well as heavy vehicle movements. The route to be used by construction vehicles will be

specific to the chosen drill sites but a combination of primary and secondary roads will be utilised. The construction period will be in the order of one to two weeks and will be dependent upon the volume of trucked aggregate required to build a competent pad and access track. .

1.4.2 Rehabilitation Management

Rehabilitation of the site at the completion of the well will be covered under the EIR – Drilling and Well Activities for the respective well. The same OERL Landman employed to undertake all site construction would also supervise rehabilitation activities. All rehabilitation activities will meet the satisfaction and approval of the landowner.

2 SUMMARY OF LOCAL ENVIRONMENT

2.1 REGIONAL CHARACTERISTICS

2.1.1 Land Use

2.1.1.1 Agriculture

Almost all the original forest and woodland vegetation in the immediate region has been cleared and replaced with pasture, grape vines and forest plantations. Substantial drainage has enabled the cultivation of pastures in the previously frequently inundated low-lying areas. Grazing is by far the most widespread agricultural activity in the region with beef cattle, sheep and dairy cattle accounting for most livestock.

The Coonawarra Winery Region is located on the northern edge of the likely project area. Most vineyards are located within close proximity of the Riddoch Highway between Penola and Coonawarra.

Wood lots also have been planted in some areas on private land cleared of native vegetation.

2.1.1.2 Nature and Heritage Conservation

In view of the considerable loss of native vegetation and habitat in the Southeast only a relatively small area is devoted to native conservation (1.9% of the total area). The remnant vegetation and swampland is fragmented into small blocks which have assumed great importance in conserving some of the ecological diversity of the region. No areas of significance occur in close proximity to the well sites covered by this EIR for private land but transferred risk in the form of fire or vehicular spill of petroleum approaching or leaving the site is acknowledged and will be minimized. The Kungari Aboriginal Association will be consulted before any activity takes place. The Department of State Aboriginal Affairs and Department for Environment and Heritage will be consulted if cultural aspects of any area are in doubt.

2.1.2 Land form and soils

The area covered by petroleum permits operated by OERL encompasses four distinct environmental regions as defined by Laut *et al* (1977) (refer Figure 1).

- *The South Coast Environmental Region*

  The coastline is characterised by unstable dunes with occasional blowouts and swales. The soils consist largely of calcareous sands. Extensive lagoons with narrow outlets to the sea have developed behind the dunes. In places where calcarenite outcrops occur, sea cliffs are present.

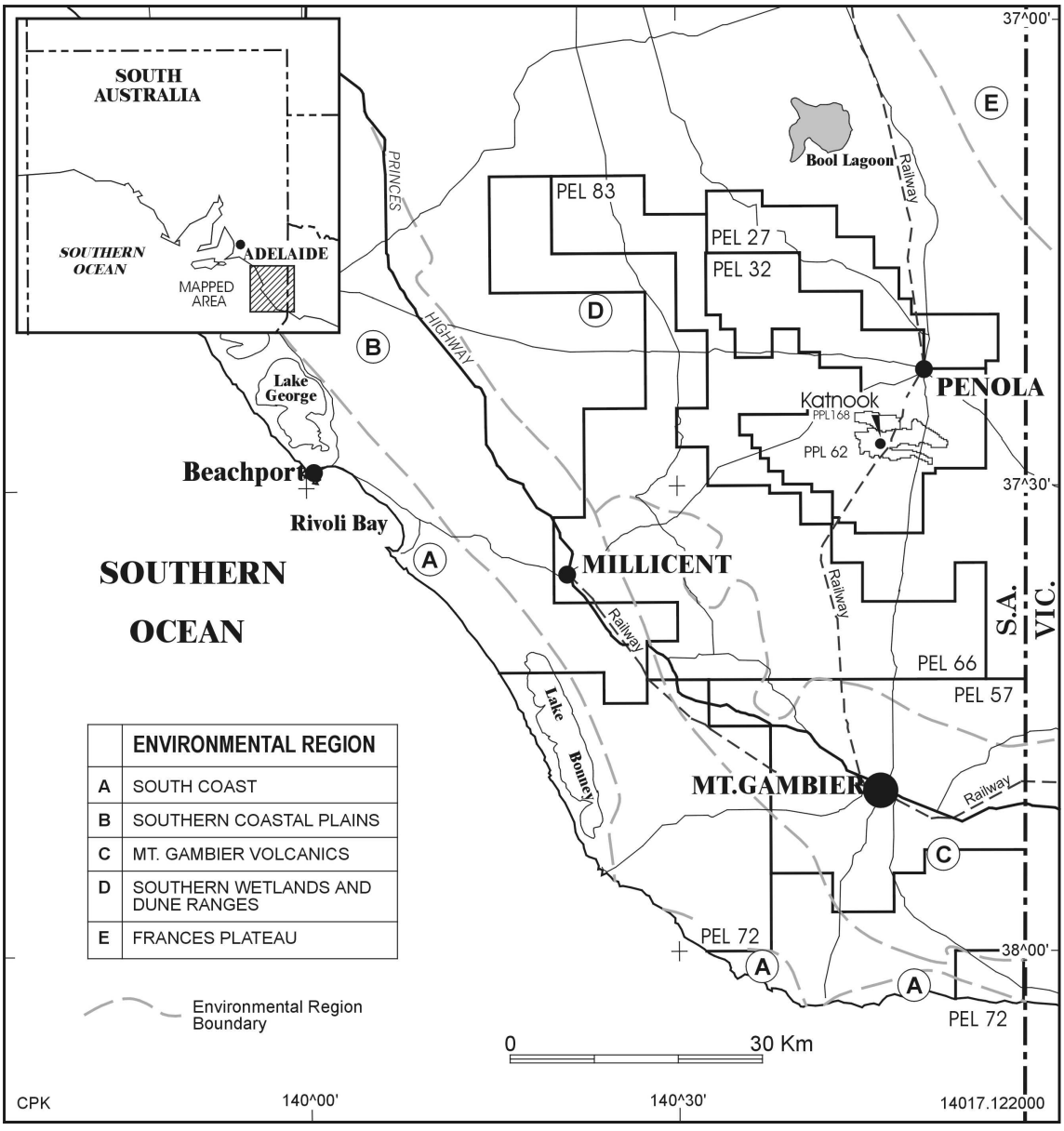

Figure 1: Environmental regions occurring in the Southeast of South Australia

- *The Southern Coastal Plain Environmental Region*

  The coastal plains are dominated by northwesterly trending, mainly consolidated dunes that form low ridges separated by narrow swales. The swales may form swamps or plains which are subject to varying degrees of seasonal flooding. Active dunes overlie the older dune system.

- *The Southern Wetland and Dune Ranges Environmental Region*

  This environmental region comprises a series of northwesterly trending calcarenite ridges, 20 – 50 metres high, which reflect a system of parallel coastal dunes stranded by successive falls in the sea level. These consolidated dune ridges are overlain by younger sands. The intervening plains often lack natural surface drainage resulting in seasonal flooding and the development of extensive lakes and swamps in the region. The soils consist of siliceous sands on the ridges, black loams and duplex soils on the plains and cracking clays and peat soils in the swamps.

- *Mt Gambier Volcanic Environmental Region*

  This environmental region has higher relief and altitude than the surrounding regions. It consists of a limestone platform, honeycombed by caves and sinkholes, above which rise several volcanic cones. Calcarenite dunes overlie some areas. The soils consist of siliceous sands on the hills and fertile ash soils on the slopes and plains.

2.1.3 **Hydrology**

An unusual feature of the Southeast is the lack of surface streams and rivers. The largely flat terrain with its system of parallel dune ridges has resulted in the formation of many interconnected swamps that generally have a slow northwesterly flow. Until the artificial drainage system was constructed there were few outlets to the sea and large areas of the South East were seasonally inundated.

The groundwater hydrology of the region is dominated by two aquifer systems. These are associated with the highly porous Gambier Limestone near the surface and the deeper Dilwyn Formation consisting of sands and gravels.

The Gambier Limestone generally forms a 20 metre thick unconfined aquifer containing good quality water (<500 mg/L total dissolved solids). Since it is recharged directly by rainfall during winter the water table often rises to near the ground surface. This aquifer can be polluted.

The Dilwyn Formation forms a 20 – 100 metres thick confined aquifer and contains water of good quality (600 – 1000 mg/L total dissolved solids). This aquifer is not only used to supply most of the town and city water supplies in the Southeast but is also used for irrigation, watering stock and for industrial purposes.

Springs are a common feature in the region with the largest flows occurring near the southern coastline.

2.1.4 Vegetation and habitat

Most (approximately 90%) of the land in the Southeast has been cleared for pasture and forestry. Only scattered remnants of the original natural vegetation now remain in National and Conservation Parks and as uncleared patches on farmland. All natural vegetation is subject to State Government controls on clearing.

2.1.5 Fauna

The loss of native vegetation in the Southeast since European settlement has resulted in a significant depletion of habitat available to fauna consequently the diversity and abundance of fauna has declined dramatically in the region.

Of the 42 species of mammals that inhabited the Southeast prior to European settlement, 11 are thought to have become regionally extinct, another nine have become very rare and a further five appear to be endangered. Most of the extinct species inhabited the woodlands and grasslands which were the first habitats to be extensively cleared. The surviving mammals inhabit the remnant patches of forest, scrub and swamp that still remain in the region. Examples of mammals that are still reasonably common in the area include the yellow-footed antechinus *Antechinus flavipes*, the western grey kangaroo *Macropus fuliginosus*, the swamp rat *Rattus lutreolus*, the fat-tailed dunnart *Sminthopsis crassicaudata* and several species of bats and possum (Tyler *et al*, 1983). Animals with wide-ranging territories may cross the cleared grazing land likely to be impacted by construction activities but such activity will occur during daylight hours with noise and conspicuous movement serving as a further deterrent.

The loss of habitat has probably greatly affected the abundance of birds inhabiting the Southeast although their diversity is likely to be only slightly lower. The Southeast still supports 74% (319) of the State's bird species and 64% (198) of its native breeding birds. Of the breeding birds 14 are virtually or apparently extinct in the region (Tyler *et al*, 1983). The orange-bellied parrot *Neophema chrysogaster* which inhabits the Southeast coastline in winter is regarded as endangered at the state, national and international level. Flight paths of some species may transgress the construction site but a combination of noise and movement will minimise risk.

Currently, 36 reptile species inhabit the Southeast. Of these 2 are tortoises, 10 are snakes and the remainder are lizards. The three dangerous snakes inhabiting the region are the tiger snake *Notechis*

scutatus, the copperhead *Austrelaps superbus* and the brown snake *Pseudonaya textilis* (Tyler *et al*, 1983). Snakes and lizards are likely to be opportunistic colonisers of artificial habitats but no facilities with the exception of culverts will be available to such fauna.

2.2 WELLSITE AND ACCESS ROUTE CHARACTERISTICS

2.2.1 Land Use

The locations for both pads and access tracks will avoid farm infrastructure, sheds and farmhouses. Some internal property fencing may need to be modified to assist the property owner with management of stock on the property. Existing access tracks will be used if possible with minor widening as required. The landowner will be aware that minor impact to the land is possible during the road construction phase.

2.2.2 Land form and soils

The majority of construction sites are likely to be flat to gently undulating grazing pastures, some of which are susceptible to minor to moderate flooding. The degree to which these areas become inundated will influence the lease and access road construction; the risk of inundation also provides the impetus to perform all construction activities when climatic and soil conditions are dry. Swampy areas will be avoided wherever possible. Vineyards and wood lot sites are likely to have been planted away from areas subject to flooding. In sporadic areas the topography may be "karst" like with shallow soil overlying limestone. Such areas may show evidence of subsurface water activity and surface subsidence of the limestone. A Geo-technical investigation possibly including the drilling of site investigation holes may be performed on the proposed sites in these locales to confirm the absence of caverns and to finalise rig pad construction specifications. Watercourses will be avoided as well as limestone outcrops and remnant sand dunes that may be present in more coastal environmental regions. Landholders are aware of the problems of drifting sand on remnant dunes once the surface is disturbed and construction sites will be located to avoid these areas.

2.2.3 Vegetation and habitat

The construction site and access roads covered by this EIR will be on private land that has been cleared of native vegetation for agriculture. There may be trees near the proposed site but no native vegetation will be removed. Some trees along existing access tracks may require minimal trimming to allow heavy vehicle access. Access roads will always be routed to avoid large trees.

2.2.4 Biophysical significance and sensitivity

The EPBC database will be consulted regarding threatened species but the prior clearance of native scrub and wetlands has eliminated habitats for potentially vulnerable species. The respective well sites and access tracks are very small in area within an extensive land system. In the absence of conservation significance impact management becomes a matter of good house keeping and conformance with established procedures. The transient nature of the construction phase ensures that no long term interruption to migration paths will occur.

2.3 ABORIGINAL HERITAGE

Sand dunes are typically sites of former occupation and the exploration-production permits in the Otway Basin encompass areas with remnant dunes. In general the extent to which the area has been cleared and grazed ensures that no undisturbed sites will be present.

The OERL Landman and representatives of the Kungari Aboriginal Association will inspect the proposed locations and any sites of Aboriginal heritage or cultural significance will be acknowledged. Further inspections will occur once construction commences. The Department of State Aboriginal Affairs and Department for Environment and Heritage will be consulted if cultural aspects of any area are in doubt.

2.4 EUROPEAN HERITAGE

No sites of European heritage will be impacted by the proposed construction activities.

2.5 LOCAL COMMUNITY

The licence areas operated by OERL and concomitant well sites are situated in moderate proximity to the city of Mt Gambier. The well site will be on private property but there will be a short period of relatively high use of public roads during the construction phase. The vehicles to be utilised are conventional and will not require specific permits however general transport activities will be scheduled to avoid conflict with local road usage wherever possible, eg school buses.

A local Landman is employed to handle all liaison with property owners and local interest groups and to provide on site supervision of all site construction activities.

OERL will employ wherever possible local Contractors and Businesses to provide services on the projects.

3 RISKS ARISING FROM PROPOSED ACTIVITIES

Risks arising from the proposed activities in a general sense are tabulated below (Table 1). In most cases the activities will have minimal surface impact due to the cleared nature of the site and being on private land. The greatest risks are therefore associated with spread of weeds and plant pathogens, and supply vehicle accidents/ roll-over in transit to and from the site and fire.

The specific risks, their potential impact and the proposed management strategy pertaining to the construction phase are addressed in Table 2.

Table 1

Potential Significance of Environment Aspects for Drilling Pad and Access Road Construction

Environmental Aspects	Cleared land	Uncleared land			
	Farm or Plantation Forest Land	Plains	Wetlands	Ranges and Hills	Dunes
Cultural Heritage Sites	*				
Introduction of Weeds	♦	♦	♦	♦	♦
Wind Erosion	♦				
Water Erosion	*				
Groundwater Pollution	♦	♦	♦		
Surface Water Pollution	♦	♦	♦		
Visual Impacts	♦				
Vehicular transport	♦	♦	♦	♦	♦
Land Use Conflict	Landowner approval obtained				
Fire	♦	♦	*	♦	♦
Waste Management	♦	♦	♦		
Noise	♦				
Dust	♦	*			

♦ = Major Concern * = Moderate Concern

3.1 Risks to the Natural Environment

3.1.1 Processes creating risks

The main risks to the natural environment concomitant with construction of pads and access tracks arise from;

- The possibility of spills during construction of the drilling pad and along new and existing access roads;
- Construction activities resulting in groundwater and surface water impacts, especially the possibility of run-off of particulate and/or chemical contaminants;
- The introduction of disease or plant pathogens that would have an impact on vegetation or other land users;
- Initiation of fire and subsequent spread to surrounding countryside.

Other risks have been assessed as having very low potential impact due to the ability to quarantine and rehabilitate affected areas while operating on private land and with the consent of the landowner.

3.1.2 Possible impacts on soils

Soil coverage on the site is both shallow and of generally poor quality. Spills of chemicals, diesel fuels and improperly disposed waste materials can contaminate the soil. The level of traffic can detrimentally impact the soil, either by compaction or mobilization to form dust, both of which could increase the risk of erosion or limit the rehabilitation success as well as affecting the landowner.

3.1.3 Possible impacts on vegetation and habitat

Construction of access roads and the drilling pads on private grazing land will not cause significant impact due to the absence of native vegetation and habitat at the chosen sites. Alienation of grazing, vineyard or wood lot vegetation will occur and will be addressed in the access and compensation agreement with the landholder. A search of the EPBC website has not identified species at risk during the transient construction phase. The importation of exotic plant diseases or pathogens has the potential to cause damage to existing grazing fodder or impact other land users. Fences denying access to livestock are not regarded as necessary due to the low relief and level surface of the pad and road however agreement with the landowner may include fencing.

3.1.4 Possible impacts on groundwater

Machinery will remain on-site and could require routine maintenance during the construction phase. The possible presence of vuggy cavities and highly permeable sands in the Gambier Limestone means that there is a risk of contamination by vehicular oil and re-fuelling spills; spills of chemicals and diesel fuels and improper disposal of waste materials can contaminate unconfined aquifers by

percolation but this risk is perceived to be very low. Contaminated gravel is ultimately recovered for treatment and dedicated procedures will be in place for the handling of all fuels, oils and waste products.

Periods of heavy rain could lead to risk of flooding of the lease area and stormwater runoff to grazing land. Pad and access track construction is planned before the rainfall season commences and this risk is minimised.

Rainfall data for the Penola Post Office covering 20 years from 1979 - 1999 show that rain is most likely in the middle of the year. Some exceptions do occur and the March/April period may have moderate to heavy rain e.g. March 1983 - 121mm; April 1980 & 1982 - 100mm. Rainfall distribution throughout the month is the most important consideration and intermittent rain interspersed with dry, windy periods will be easiest to accommodate. Drainage will be maintained via culverts where the tracks cross watercourses.

Vehicular transport of fuel to the construction site poses the risk of mishap along access roads. This risk will be minimised by a programme of driver education, signage and a preferred delivery schedule. In the event of a spill the area will be rehabilitated by a combination of soil removal and on-site bio-remediation.

3.1.5 Possible impacts on surface hydrology

Spills of chemicals, diesel fuels and improperly disposed waste materials can contaminate surface streams and drainage. The construction of the drilling pad and access roads has the potential to impact on surface drainage patterns primarily by the redirection of overland water flows but culverts will be installed where appropriate to minimize this risk.

3.2 Risks to the social and economic environment

3.2.1 Possible impacts on existing land uses.

The importation of exotic plant diseases or pathogens has the potential to cause damage to existing vegetation or land uses. This risk is seen as minimal as the construction plant have previously have been operating in unaffected, local areas. In the event of any introduced weed species being identified on site the area will be treated by the appropriate method and in accordance with the landowner's wishes.

Careless use of welding and grinding equipment during repairs or maintenance on the construction plant could initiate fires. Plant operators and other personnel similarly must be aware of fire risk and extinguish cigarettes prior to disposal.

3.2.2 Possible impacts on local community resources and safety

Mobilization and demobilization of the construction plant may necessitate use of heavy vehicle transporters on generally under-utilized roads. The relevant local authorities will be informed of planned heavy vehicle activity and the necessary approvals gained. Narrow and/ or unsealed roads must be shared with the local community, potentially during periods coinciding with school bus movements, and precautions to avoid accidents must be observed. Dust constitutes a hazard that must be minimized by spraying roads when necessary and drivers must be made aware of general road conditions that may result in loss of transported load. Vehicle movements will be required for site restoration after the rig has been removed.

Fire is a threat because of its potential to spread rapidly from the site of initiation. Construction of the pad and access tracks is desirable in dry, summer/ autumn conditions when soil is firm but this period coincides with increased risk of fire. The region is covered by the Wattle Range CFS.

3.2.3 Possible impacts on European Heritage

In the absence of any particular European heritage items or relationships the activities pose no risk to European Cultural aspects

3.2.4 Possible impacts on Aboriginal heritage

The proposed well sites will be surveyed for cultural relics by the relevant body. The OERL Landman will be available if required for all construction activities on the proposed sites. In the event of the discovery of potential cultural heritage material the Landman will immediately inform the OCA drilling manager. Activities that may lead to damage of a newly discovered heritage artefact/ feature will immediately be suspended within a radius of 100m of the identified site. The State Department of Aboriginal Affairs and any other relevant regulatory authorities will be informed of the discovery so that the material can be evaluated for cultural and heritage value. If the discovery is determined to be of heritage significance, OERL will take the advice of relevant stakeholders with respect to the appropriate course of action.

4 MANAGEMENT OF IMPACTS AND IMPACT RISKS

4.1 Site Planning and Design

The proposed well surface locations will be selected to minimise the amount of cut and fill required in a fairly fragile soil profile and to stay as far as practicable from farming infrastructure on the property. In general the property owners request that the gravel for the rig pad be laid directly on top of the existing soil. OERL have employed this process elsewhere in the Otway basin with greater rehabilitation success than is achieved by removing and stockpiling the soil. No disruption will occur to any remnant sand dunes or limestone outcrops during construction of the rig pads and access tracks. Some internal fencing on the property may need to be moved to make access for plant easier and to assist with management of stock. Some trees along the access roads may require minimal trimming for safety and to avoid excessive damage. Existing access tracks will be used with minor widening. Roads will be sheeted with gravel and kept to a maximum of 5.0 metres wide. If any minor disruption to surface landforms is anticipated with construction of the access track and pad the landowner will be made aware of this risk. All vehicular traffic will be restricted to this road and traffic speed limits will apply. Provision has been made in the Construction Contract for the watering of roads if dust becomes a problem. A Geo-technical investigation including the drilling of site investigation holes may be performed on the proposed site to confirm the absence of caverns and finalise rig pad construction specification.

4.2 Stakeholder Consultation

The property owner will be served Notice of Entry under Part 10, Section 61 of the *Petroleum Act 2000* and will be consulted at all stages in accordance with Regulation 22. OERL will conclude compensation agreements with landowners and no activity will occur under the SEO without agreement from the landowner. Representatives of the Kungari Aboriginal Association will be informed of the proposed activity and will visit the site with the OERL Landman.

4.3 Well Site and Access Road Construction

4.3.1 Creek Crossings

The location and access routes will be selected to minimise the number of creek crossings. Culverts may be installed as appropriate to ensure drainage and minimal interruption to surface drainage patterns.

4.3.2 Connection to Public Road

The rig access road will be on private land and is not for public use. It is unlikely third parties will approach the site prior to the onset of drilling however signs will be placed near the entry to the rig road to discourage public entry and minimise associated risk. The signs will warn against trespassing and warn of dangers associated with truck movements. The OERL Landman or construction supervisor will have the authority to ask uninvited persons to leave.

4.3.3 Fill Material

It may be necessary to perform minor levelling for vehicle access but no excavation will occur under the SEO. Minor quantities of material sourced on-site may be used on the rig pad and will minimise the amount of imported fill required. Imported Gravel Material for the rig pad and access roads is to be taken from pits operating under a current Extractive Mining Lease (EML). The pad will be covered with gravel to a depth of approximately 30 to 50 cm laid directly on the topsoil. Due to the weight of the drill rig structure an area 18 metres by 10 metres will be shimmed to a depth of 70 cm and built up with compacted gravel.

4.3.4 Dust

All vehicular traffic will be restricted to this road and traffic speed limits will apply. Provision has been made in the Construction Contract for the watering of roads if dust becomes a problem.

4.3.5 Noise

Noise is not expected to be an issue during construction as activities will occur during daylight and along routes chosen to minimise impact (e.g. on the opposite side of remnant sand dunes to the nearest dwelling).

4.3.6 Waste

The Construction Contractor is responsible for removal of all waste products generated during construction activities to an approved facility.

4.3.7 Management during Construction

Chris Annear of Petroleum Support Services Mt Gambier on behalf of OERL will provide on site supervision of all site construction and rehabilitation activities. Gambier Earth Movers or Teagles Constructions will provide lease and access construction services from Mt Gambier. Site Construction activities will be performed in accordance with the " Specification for Earthworks Schedule - Otway Basin Campaign 2001".

Table 2

Summary of Possible Environmental Impacts, Management Strategies and Objectives.

Possible Impact	Main Source of risk	Management Strategies (Avoidance, Management, Mitigation)	Environmental Objectives
Macro/ social effects Degradation of Public infrastructure Reduction in aesthetic and recreational value. Operations in relation to land owners and access to the land not conducted according to the Act	Impact on the local community of having construction plant moving through and operating in the area	Consultation with local landholders, local Aboriginal communities and relevant Government departments prior to the commencement of operations Plant mobilisation and demobilisation and general transport activities will be scheduled to avoid conflict with local road usage wherever possible, eg school buses. A local Landman has been employed to liaise with property owners and local interest groups and to provide on site supervision of all site construction and rehabilitation activities. Wherever possible local Contractors and Businesses are employed to provide services on the project. Arrangements have been made to employ the following Contractors on various components of the 2001 Otway Drilling Campaign; Earthmoving – Gambier Earthmoving or Teagles Constructions; Waste Material Transport – Northcott Contracting, Rig transport – Spikens Transport Warrnambool; General freight – K&S Portland; offsite meals and accommodation – various Motels & Lodges in Penola; Landman - Chris Annear of Petroleum Support Services Mt Gambier • The property owners will be served notice of intended entry as required under the *Petroleum Act 2000* • Proposed well sites will be inspected with the landowner. Representatives from the Kungari Aboriginal Association will be in attendance. • Compensation will be negotiated with the property owner and all approvals obtained. • All transport will be normal road going vehicles	Minimise risks to the safety of the public, employees and other third parties Avoid disturbance to known sites of Aboriginal and European heritage significance Conduct all operations relating to land owners and access to the land according to the Act Plan vehicular movements and schedule activities as best as possible to minimise inconvenience to the local community Control noise from road vehicles and machinery Avoid disturbance to rare, vulnerable and endangered flora and fauna species
Physical Damage to soils, vegetation and habitat Increased erosion and potential for the introduction or spread of weeds. Possible disturbance to sites of Aboriginal and	Construction of access road and rig pad. Mobilisation and demobilisation of Earthmoving plant and ancillary equipment Construction Activities	**Site Planning and Design** An understanding of the potential impacts that may occur is gained prior to any activity-taking place by performing a desktop review of environmental, cultural and social issues. Overlapping of the proposed location and possible access route on a Landsat image or aerial photograph will be used to make an initial environmental assessment of the proposed operation and determine if alternative locations are likely to be needed before any data is sent to the field for the initial site reconnaissance. The Location Reconnaissance Report "LRR" will be completed prior to any site preparation activities and sensitive sites/areas will be clearly marked for	Avoid initiating erosion on shallow limestone soil substrates and any area of relief such as palaeo-dunes Minimise impacts to soil. Avoid disturbance to known sites of Aboriginal and European

Possible Impact	Main Source of risk	Management Strategies (Avoidance, Management, Mitigation)	Environmental Objectives
European heritage significance. Reduction in soil fertility Contamination Removal of natural habitat Alteration to surface drainage patterns		avoidance (e.g. protected vegetation, mature trees). The LRR assists in determining the final drilling location. The drill pad and access roads will be located to minimise disturbance to features of natural, scientific, cultural or historical heritage significance and to ensure that the area of disturbance is minimised.	European heritage significance Avoid disturbance to rare, vulnerable and endangered flora and fauna species
Physical Damage to soils, vegetation and habitat Increased erosion Reduction in soil fertility Contamination Removal of Natural habitat Alteration to surface drainage patterns and risk of erosion caused by failure to return all surfaces to original levels and drainage Failure to conduct all activities according to best industry practice and acceptance by landowners and the local community	Construction of access road and drilling pad. Mobilisation and demobilisation of earthmoving plant and ancillary equipment Construction activities	**Construction** This EIR covers construction of drill pads and access roads on private land from which native vegetation clearance has allowed pastoral or agricultural activities to occur. Site clearing will be limited to a maximum area of 150m x 150m for the drill pad, which includes provision for a 15m-perimeter firebreak increasing to 20m behind the area designated for the flare pit. All construction areas will be surveyed and pegged to clearly define site limits with ongoing supervision at all stages by the OERL Landman. Substantial trees will not be affected at the proposed well sites due to the extensive clearing that has occurred previously but minimal trimming of overhanging branches may be required along access roads. Risk to local residents will be increased by the atypical vehicular traffic. Transport activities involving heavy earthmoving equipment and trucks along local roads will be scheduled to avoid times when school buses are active. No topsoil will be permanently removed but the drilling pad site will be shimmed to achieve the necessary strength. Any topsoil and seed/root stock that is temporarily removed will be stockpiled for use during rehabilitation. Stockpiles shall be restricted to 1 to 1.5 m in height so as not to reduce the nutrient value of the soil. Natural surface water drainage will be maintained and kept free of any stockpile soil and fill. Water channelling that could lead to erosion will be avoided. Culverts will be installed where necessary. Off site surface drainage shall be directed away from the drilling pad. Traffic is allowed only on designated access routes as agreed with the property owner. • The topography in isolated instances may be "karst" like with shallow soil overlying limestone. If there is evidence of subsurface	Avoid initiating erosion on shallow limestone soil substrates and any area of relief such as palaeo-dunes Minimise impacts to soil Conduct all operations relating to land owners and access to the land according to the Act Minimise impacts on surface water and its drainage patterns Prevent the introduction and establishment of exotic weed species Avoid spills of oil or hazardous material. Avoid adverse impacts on livestock Avoid disturbance to rare, vulnerable and endangered flora and fauna

Possible Impact	Main Source of risk	Management Strategies (Avoidance, Management, Mitigation)	Environmental Objectives
		water activity and surface subsidence of the limestone the risk for contamination of surface water by spills may be increased. • Gravel Material for the rig pad and access roads will be taken from pits operating under a current Extractive Mining Lease (EML). • Some internal property fencing may need to be modified. This will assist the property owner with management of stock on the property. • Water supply to control dust preferably will be taken be taken from a registered bore on the property or trucked in to the site by tanker. • Arrangements may be made to undertake a geo-technical investigation (core drilling) of the pad area prior to construction to ensure adequate foundations for the Drilling Rig • Site Construction activities will be performed in accordance with the " Specification for Earthworks Schedule - Otway Basin Campaign 2001" **Weeds and plant pathogens** If a declared weed or plant pathogen is discovered on site it will not be disturbed. The location of the infestation will be reported to the landholder and advice on required action (where necessary) will be sought from the relevant regulatory authority.	species
Intrusion or physical damage to areas of Aboriginal and European heritage significance Failure to recognise sites of significance that may be exposed during construction and to take appropriate measures to protect them and notify the relevant authorities	Construction of access road and rig pad. Mobilisation and demobilisation of earthmoving plant and ancillary equipment Rig and third party personnel movements	**Protection of cultural heritage** The LRR is used to identify any potential risk areas, which are then flagged and inspected by representatives of the local Aboriginal community together with the OERL Landman. The OERL Landman is in attendance for all activities on the site. In the event of the discovery of potential cultural heritage material the Landman will immediately inform the OCA Drilling Superintendent. No activity involving excavation will occur under this EIR. Activities that may lead to damage of a newly discovered heritage artifact/feature will immediately be suspended within a radius of 100m of the identified site. The State Department of Aboriginal Affairs and any other relevant regulatory authorities (e.g. Department for Environment and Heritage) will be informed of the discovery so that the material can be evaluated for cultural and heritage value. If the discovery is determined to be of heritage significance, OERL will take the advice of relevant stakeholders with respect to the appropriate course of action. .	Avoid disturbance to known sites of Aboriginal and European heritage significance

Possible Impact	Main Source of risk	Management Strategies (Avoidance, Management, Mitigation)	Environmental Objectives
Disturbance to rare, endangered, vulnerable flora	Construction of access road and rig pad. Mobilisation and demobilisation of earthmoving plant and ancillary equipment Rig and third party personnel movements	**Native vegetation** The proposed well locations for which this EIR for pad and access road construction applies are within private farming land that has been broadly cleared of native vegetation for agriculture – in the event some species are present, however, rare or endangered flora will not be cleared. Rare, vulnerable and endangered flora are defined in Schedule 7, 8 and 9 of the National Parks and Wildlife Act, 1972	Avoid disturbance to rare, vulnerable and endangered flora and fauna species
Pollution through local spills. Injury to livestock if allowed access to pollutants	Vehicle and plant refuelling during construction Chemical spills onsite or in transit Waste Material Generation	**Waste Management** Waste Management will be in accordance with the provisions of the OCA/OEL "Waste Management Plan – Revision 1/0, September 1999" No waste products will be left on site at the conclusion of construction activities. All Waste streams will be removed to the appropriate handling facility. • Waste grease and oils are to be stockpiled in suitable drums and disposed of at the Cleanaway Facility Mt Gambier	Minimise impact on the environment of waste handling and disposal Avoid spills of oil or hazardous material. Avoid adverse impacts to livestock Minimise risks to the safety of the public, employees and other third parties Minimise impacts on surface water and its drainage patterns
Threat to landowners and their property Threat to livestock Damage or injury to personnel and equipment Pollution due to noxious smoke	Construction activities Maintenance of earthmoving plant	**Fire Prevention** All welding and grinding is performed either in a designated area or under the jurisdiction of a Hot Work Permit issued under the joint onshore Permit To Work System "PTWS". All construction vehicles are fitted with fire extinguishers. • The local CFS captain is Mr Christopher Dean, Dept Group Office, Wattle Range CFS. He may be contacted on • Mobile – 0408 849 342 • Home – (08) 8737 2439	Minimise risks to the safety of the public and other third parties Avoid adverse impacts to livestock Minimise chance of fire by clearing of dry pasture around facilities Confinement of flammable sources, restrictions on

Possible Impact	Main Source of risk	Management Strategies (Avoidance, Management, Mitigation)	Environmental Objectives
			certain procedures and ready access to suitable fire fighting equipment