

Assessment of Beach Energy's proposed onshore Otway Basin petroleum production & processing activities

Energy Resources Division
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Executive Summary

In the Otway Basin, Beach Energy (through its subsidiary Adelaide Energy) has held Petroleum Production Licences (PPL) 62 and 202 since 1990 and 2003 respectively along with a number of Petroleum Exploration and Retention Licences.

The Katnook Gas Plant, located within PPL 62 was initially constructed by Origin Energy Resources Limited and commenced production in 1991. The gas plant supplied gas for over 20 years to industrial customers in the South East region. In 2007 the gas plant and associated infrastructure was sold to Adelaide Energy Proprietary limited. Beach Energy acquired Adelaide Energy in 2011 and subsequently stopped production at the plant due to limited gas supply from fields. The Katnook Gas Plant is currently shut-in awaiting a new discovery of gas to support re-activating the plant.

Beach Energy recently drilled the Haselgrove-3 ST1 conventional gas exploration well in the Penola region resulting in a significant new gas discovery. Further to this drilling of additional wells targeting conventional targets in the region is planned.

To allow production and processing of the gas, if the resource proves commercial, an updated petroleum production Environmental Impact Report (EIR) and Statement of Environmental Objective (SEO) has been developed by Beach Energy in accordance with the *Petroleum and Geothermal Energy Act 2000* (P&GE Act).

This report details the Department for Energy and Mining – Energy Resource Division (DEM-ERD) assessment of the EIR and draft SEO and Beach Energy's responses to comments received during a DEM-ERD initiated public consultation process.

Approval process

The review was undertaken as part of Stage 2 of the three-stage approval process under the P&GE Act that all prospective operators must submit to. These stages are:

1. Licensing: Stage 1 approval grants exclusive rights to an area but does not grant rights to undertake on-ground activities;
2. EIR assessment and SEO approval: In this stage a draft SEO is prepared on the basis on an EIR. The draft SEO identifies the environmental objectives and conditions that the licensee will be required to achieve to ensure it addresses the risks identified in the EIR. Both the EIR and draft SEO for the proposed Beach Energy onshore Otway Basin petroleum production operations were the subject of public consultation. Stage 2 approval is only granted when all relevant issues raised through this public consultation process are adequately addressed;
3. Activity notification and approval: The Stage 3 process requires submission and approval of technical and operational plans in consultation and technical input from co-regulatory bodies such as the Environmental Protection Agency (EPA) and the Department for Environment and Water (DEW). Also

notification of intentions to undertake a regulated activity to all relevant landowners. After Stage 3 approval, on-ground activities can begin.

During the Stage 2 consultation process (24 November 2018 to 1 February 2019) a number of issues were raised by government, industry, local community groups and the public in a total of 6 submissions. These submissions are available on the DEM-ERD's environmental register¹. Beach Energy responded to these submissions within Appendix 5 of their EIR prior to formally submitting the revised EIR to the DEM-ERD on 21 March 2019.

Key concerns from public consultation

The key concerns raised in the consultation process were:

- reporting requirements to the EPA;
- potential impacts to water resources, particular concerns were raised regarding downhole well decommissioning and long term integrity in addition to Produced Formation Water (PFW) Management;
- potential Air Quality impacts to the local environment;
- potential impacts to existing land uses and third party infrastructure; and
- potential impacts on native vegetation and fauna, with particular focus on native vegetation clearance, fauna impacts and impacts to Matters of National Environmental Significance under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Recommendation

The Department for Energy and Mining, Energy Resources Division recommends Stage 2 SEO approval, based on:

- its detailed review of the EIR and draft SEO as summarised in this report;
- Beach Energy's responses to comments submitted as a result of public consultation; and
- consultation with co-regulatory agencies including (but not limited to) the Environmental Protection Agency (EPA) and the Department for Environment and Water (DEW).

¹ DEM Environment Register - http://petroleum.statedevelopment.sa.gov.au/legislation_and_compliance/environmental_register

1.0 About this document

This document summarises the main findings of the assessment undertaken by the Energy Resources Division within the Department for Energy and Mining (DEM-ERD) in relation to the potential issues and environmental risks associated with the Beach Energy Onshore Petroleum Production and Processing within the Otway Basin proposal.

Information from the Environmental Impact Report (EIR)² submitted by Beach Energy and additional information acquired by the DEM-ERD as the lead regulator of this project was used along with public submissions and advice from other co-regulatory agencies to inform the approval process for the Statement of Environmental Objectives (SEO)³ under the *Petroleum and Geothermal Energy Act 2000* (P&GE Act) for this proposal.

This document sets out the approval process (Section 2.0) and provides an overview of the Otway Basin (Section 3.0), and the Beach Energy Onshore Petroleum Production and Processing proposal (Section 4.0). Issues raised during public consultation (Section 5.0) are also presented, along with the final recommendation from DEM-ERD (Section 6.0).

² Beach Energy – Onshore Otway Basin Petroleum Production Operations EIR - [https://sarigbasis.pir.sa.gov.au/WebtopEw/ws/samref/sarig1/image/DDD/PGER00293EIR PETROLEUM OPERATIONS.pdf](https://sarigbasis.pir.sa.gov.au/WebtopEw/ws/samref/sarig1/image/DDD/PGER00293EIR%20PETROLEUM%20OPERATIONS.pdf)

³ Beach Energy Onshore Otway Basin Petroleum Production SEO - [https://sarigbasis.pir.sa.gov.au/WebtopEw/ws/samref/sarig1/image/DDD/PGER00294SEO PETROLEUM OPERATIONS.pdf](https://sarigbasis.pir.sa.gov.au/WebtopEw/ws/samref/sarig1/image/DDD/PGER00294SEO%20PETROLEUM%20OPERATIONS.pdf)

2.0 Approval process

At the outset, it is important to clarify the process for regulatory approval under the P&GE Act.

The approval process consists of three stages⁴:

1. Licensing;
2. Environmental Impact Report (EIR) assessment and approval of Statement of Environmental Objectives (SEO) and criteria that the proponent will need to demonstrably achieve;
3. Activity notification and approval.

Stage 1: Licensing

The licensing stage involves the licence application and grant process, where a proponent applies for the appropriate licence to give them the right to undertake regulated activities within a licence area. A licence granted under this stage is not a right to do any on-ground activities; rather it is simply an exclusive right to an area within which the licensee can then apply for approval to undertake activities. Only parties with the adequate demonstrated financial and technical capacity to invest and safely conduct regulated activities are eligible to become P&GE Act licence holders.

In the Otway Basin, Beach Energy (through its subsidiary Adelaide Energy) has held Petroleum Production Licences (PPL) 62 and 202 since 1990 and 2003 respectively along with a number of Petroleum Exploration and Retention Licences.

Within the Cooper Basin, Beach Energy hold a large number of Petroleum Exploration Licences (PEL), Petroleum Retention Licences (PRL) and PPL's. In particular Beach Energy currently produce gas through gas production facilities within PRLs 26, 30, 151 and PPLs 150, 239 and 257.

For proposed pipelines from well sites to the processing facility, Beach Energy will initially be required to apply for a Preliminary Survey Licence (PSL) to determine the best route for the pipeline, prior to applying for a Pipeline Licence (PL).

Despite the issuing of a licence under the P&GE Act, on-ground activities can only be undertaken subsequent to approvals granted under Stages 2 and 3, which address the environmental and operational aspects of activities.

⁴ DEM-ERD's approvals flowchart-
<https://sarigbasis.pir.sa.gov.au/WebtopEw/ws/samref/sarig1/image/DDD/BROCH098.pdf>

Stage 2: Statement of environmental objectives assessment and approval

The grant of a P&GE Act licence does not provide an automatic entitlement to land access to conduct operations. Rather, regulated activities under the P&GE Act (under Section 96) may not be carried out unless an approved SEO is in place, prepared on the basis of an EIR. The EIR describes the specific features of the environment where the activities will take place and identifies all potential impacts, the risks relating to the activity and the proposed risk-mitigation strategies. The SEO identifies the environmental objectives and conditions (assessment criteria) that the licensee will be required to achieve to ensure it addresses the risks identified in the EIR.

Examples of the information and potential impacts that the EIR and final SEO are expected to address include:

- Impacts and disturbance to Aboriginal sites;
- Impacts on aquifers, including pressure and contamination;
- Impacts on groundwater use;
- Contamination of surface water and shallow groundwater and soil;
- Impacts on native vegetation and native fauna and stock;
- Disturbance to existing land uses (e.g. within reserves under the *National Parks and Wildlife Act 1972*, pastoral land, etc.) or to local heritage features;
- Air pollution and greenhouse gas emissions;
- Impacts on the health and wellbeing of the local community; and
- Remediation and rehabilitation requirements.

It should be noted that Beach Energy has previously produced gas and condensate under an approved SEO⁵ and associated EIR⁶ and addendum⁷ provide in 2011 for Production and processing at the Katnook and Ladbroke Grove Plants, with the first SEO being developed for the site by Origin Energy and approved in 2004. Since

⁵ [Adelaide Energy Limited – Production and Processing of Petroleum Products and Associated Activities at the Katnook and Ladbroke Grove Gas Plants SEO, Otway Basin, Reviewed 2011 - https://sarigbasis.pir.sa.gov.au/WebtopEw/ws/samref/sarig1/image/DDD/PGER00046SEO%20PRODUCTION%20AND%20PROCESSING.pdf](https://sarigbasis.pir.sa.gov.au/WebtopEw/ws/samref/sarig1/image/DDD/PGER00046SEO%20PRODUCTION%20AND%20PROCESSING.pdf)

⁶ [Adelaide Energy – Production and Processing of Petroleum Products and Associated Activities at the Katnook and Ladbroke Grove Gas Plants EIR, Otway Basin, 2002 - https://sarigbasis.pir.sa.gov.au/WebtopEw/ws/samref/sarig1/image/DDD/PGER00044EIR%20PRODUCTION%20AND%20PROCESSING.pdf](https://sarigbasis.pir.sa.gov.au/WebtopEw/ws/samref/sarig1/image/DDD/PGER00044EIR%20PRODUCTION%20AND%20PROCESSING.pdf)

⁷ [Adelaide Energy – Production and Processing of Petroleum Products and Associated Activities at the Katnook and Ladbroke Grove Gas Plants, Otway Basin, EIR Addendum 2011 - https://sarigbasis.pir.sa.gov.au/WebtopEw/ws/samref/sarig1/image/DDD/PGER00045EIR%20PRODUCTION%20AND%20PROCESSING.pdf](https://sarigbasis.pir.sa.gov.au/WebtopEw/ws/samref/sarig1/image/DDD/PGER00045EIR%20PRODUCTION%20AND%20PROCESSING.pdf)

then the document was reviewed and revised by Adelaide Energy in 2011 subject to Regulation 14 under the Act.

Stage 3: Activity notification and approval

Once the relevant SEO, is gazetted in accordance with Part 12 of the P&GE Act, the proponent has to proceed to the third and final stage prior to commencing on-ground activities. This entails submission to DEM-ERD of an activity notification, and supporting information to satisfy the requirements of Regulation 20. As Beach Energy are classified as High Level Surveillance Operators for gas production activities, the activity notification must address the requirements of Regulation 19 and approval from DEM-ERD is required prior to commencement of regulated activities occurring.

DEM-ERD's assessment for approval will include consideration of supporting information provided by Beach Energy to demonstrate that all design, construction, commissioning and operations relating to this activity are in accordance with recognised industry standards and fit for the purpose for achieving the requirements of the final approved SEO objectives and conditions.

Of particular note, with respect to environmental obligations under Regulation 20(1)(g), an assessment is required to be provided by the licensee determining whether the proposed activity is covered by an existing and approved Statement of Environmental Objectives, in addition to detailing how the licensee will ensure that the proposed activity will satisfy the respective Statement of Environmental Objectives requirements.

To ensure compliance with the SEO, DEM-ERD may also require Beach Energy provide individual reports (generally from external consultants) to demonstrate compliance with the SEO. This may include, but not limited to, reports from ecologists, hydrogeologists, cultural heritage specialists or traditional owner groups.

Under Regulation 20(1)(j), Beach Energy must also include an assessment that indicates that any facility, equipment or management system used for undertaking the regulated activity is fit-for-purpose so as to ensure compliance with the requirements of the Act, including the SEO. This will typically include:

- demonstration of the suitability of the licensee's Environmental, Health and Safety Management Systems (EHSMS), including:
 - emergency response procedures and incident reporting;
 - fitness for purpose assessment of all contractors and management systems to be used during any proposed operations;
 - integrity, operation and maintenance plans;
 - environmental assessments, environmental management plans; and rehabilitation plans, cultural heritage assessments and monitoring plans.

- demonstration that any facility, pipeline and supplementary infrastructure will be designed, constructed, operated and maintained in accordance with relevant standards (e.g. AS 3000, AS 1940, AS 2885, AS 4041, ASME/ANSI B31.3, AS 1200, AS 3788, hazardous area compliance to AS 60079 series) and legislative requirements;
- provision of the basis of design or front-end engineering design documents, including drawings of the process (Process and Instrumentation Drawings (P&IDs) and Process Flow Diagrams (PFDs));
- risk assessments (such as a hazard and operability study (HAZOP) for facilities or safety management studies (SMS) for pipelines);
- reports and results of modelling undertaken to confirm equipment specifications and required performance, for example modelling of air quality/dispersion, thermal radiation (such as for a proposed flare) or noise; and
- demonstration that all downhole production equipment and the well head will be designed for the expected downhole conditions in line with recognised industry standards, practices and recommendations.

Following DEM-ERD's review of the supplied information, additional documentation and clarification may be requested prior to construction approval being granted. Once construction approval has been granted for significant infrastructure, DEM-ERD will request regular construction reports to provide information on the status of the construction activities (Regulation 46). DEM-ERD may also inspect relevant sites regularly during all project phases.

A separate approval will be required prior to commissioning and operation of the facility and pipelines. At this stage, Beach Energy will demonstrate that the facility has been tested and inspected as required by industry standards and is fit for service. It will also need to be demonstrated that appropriate safety, testing, maintenance and inspection procedures have been developed and implemented, and that operators are trained and competent in operating and controlling the facility.

While not specific to Stage 3 of the approvals process, there are requirements under the Regulations (Regulation 30) for a 5 yearly Fitness for Purpose assessment (FFP) to be undertaken by the Licensee and assessed by DEM-ERD. These assessments are only one of many surveillance tools utilised by DEM-ERD for compliance assurance.

Under Stage 3, the licensee is also required to notify all relevant landowners about its intentions to undertake any regulated activity and to clearly describe pursuant to the requirements under Part 10 of the P&GE Act, the nature of its activities to be undertaken, the potential impacts those activities may have on the landowner and the right of the landowner to dispute such entry including any compensation that may arise from such activities.

3.0 The Otway Basin

This section provides an overview of the Otway Basin petroleum history, geology with particular focus on the petroleum prospectivity, Hydrogeology, land uses and native flora and fauna.

3.1 Otway Basin Petroleum History

The Otway Basin in South Australia has been actively explored since the 1890s, with the first deep exploration well (Robe 1) being drilled in 1915. Commercial carbon dioxide was discovered in Caroline-1 in 1968, but it was not until 1987 that the first commercial gas discovery was made at Katnook, followed by discovery of the Ladbroke Grove Field in 1989.

In 2007, the appraisal of the Jacaranda Ridge Field significantly upgraded the northern portion of the Penola Trough as a wet gas–condensate play. To date eight gas fields have been discovered in the Otway Basin in South Australia. Gas from producing wells in the Katnook, Haselgrove, Haselgrove South and Redman gas fields was piped to the Katnook gas plant, built in 1991, before production declined, resulting in the suspension of wells and the mothballing of the plant in 2013.

The gas from these fields required processing to yield sales gas, which was then sold at the pipeline outlet from the Katnook Plant. Gas was transported through the South East Pipeline System (SEPS) to supply gas to the South East of South Australia (SA). Gas supplied was used by local industries including timber milling, pulp and paper milling, commercial food preparation, and gas-fired power generation for domestic use. Condensate was stored onsite at the Katnook Plant before transportation by road tanker for refining in Victoria.

Currently gas destined for the Limestone Coast region is sourced from offshore gas fields in the Otway Basin located near Port Campbell and the underground gas storage at Iona in Victoria. This gas is transported via the South East Australia Gas (SEA Gas) pipeline that links Port Campbell with Adelaide and supplied to regional users through the South East South Australia (SESA) pipeline.

Gas exploration has continued within the SA onshore Otway Basin recently supported by the SA government's Plan for Accelerating Exploration (PACE) Gas program. Beach Energy in 2018 announced the successful discovery of gas at Haselgrove-3. Significantly, the Haselgrove-3 gas discovery within the deeper and previously untested Sawpit Sandstone, opens up a new play fairway that could extend under the existing depleted gas fields. Further drilling within the Penola Trough, including new PACE Gas Program wells (Dombey-1 and Nangwarry-1) to be drilled in 2019 may extend the limit of this new play fairway in the onshore Otway Basin.

3.2 Otway Basin Petroleum Geology

The Otway Basin comprises one of a series of Jurassic to Cretaceous basins with a Tertiary cover (Gambier Basin) that occur both onshore and offshore along the southern coast of Australia, and which were formed as a result of rifting between the Antarctic and Australian plates approximately 145 million years ago.

Separate grabens and half grabens filled with a Jurassic to Early Cretaceous rift sequence are interpreted to exist across most of the basin but have only been fully penetrated onshore (Figure 1 – structural elements).

All existing onshore hydrocarbon discoveries to date have occurred in the Penola Trough whilst carbon dioxide has been produced commercially from the Caroline 1 well located in the Voluta Trough located to the south of the Tartwaup Hinge as shown within Figure 1.

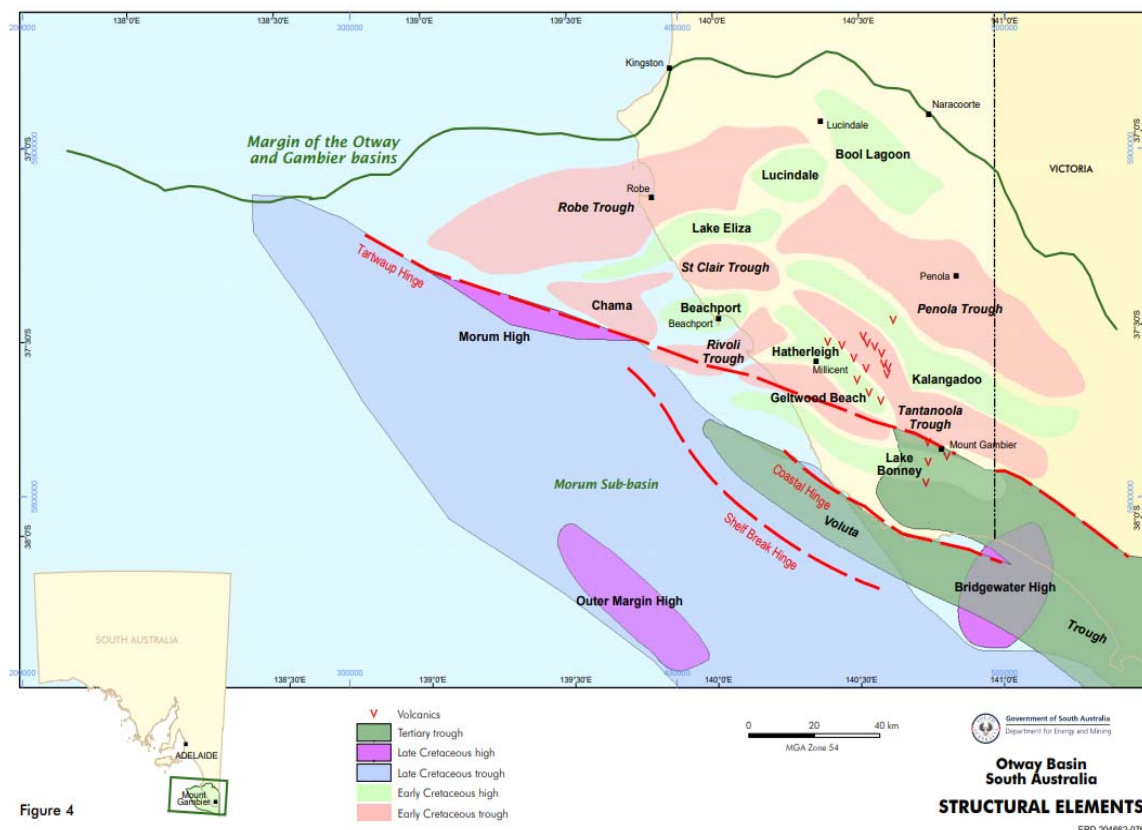


Figure 1 - Structural elements map of the Otway Basin in South Australia

Three major sedimentary sequences are targets for conventional petroleum exploration in South Australia as shown within the stratigraphic cross section in Figure 2:

1. The Berriasian to Hauterivian sequence (Crayfish Group, early rift) is known only from the northern area, where E–W and NW–SE trending half-grabens

- (Robe, Penola, St Clair, Rivoli and Tantanoola Troughs) contain fluvial to lacustrine sediments that are proven gas reservoirs;
2. The Early Cretaceous Barremian to Albian sequence (Eumeralla Formation, onshore sag phase) containing lacustrine, back swamp facies and proven gas reservoirs hosted in meandering fluvial Windermere Sandstone Member and unnamed younger sandstones; and
 3. The Late Cretaceous sequence (Sherbrook Group) occurs as a deltaic to deep-water wedge south of the Tartwaup Hinge.

The earliest Otway Basin sediments are shales of the Casterton Formation that were deposited in a graben lake setting. These organically rich shales are considered to be the major source of the gas, condensate and oil discoveries in the Penola Trough. It should be noted that oil recovered on test from one well in South Australia and another in Victoria in what was interpreted to be fractured basement, is now interpreted to be a deeper synrift facies of the Casterton Formation.

Overlying the Casterton Formation are the Lower Sawpit Shale, Sawpit Sandstone, Upper Sawpit Shale, Pretty Hill Sandstone, Laira Formation and Katnook Sandstone. These were deposited during rifting as episodic movement accommodated the crustal extension.

The overlying Sawpit Sandstone and the younger sandstone units, the Pretty Hill Sandstone and Katnook Sandstone are interpreted to be deposited in a braided stream environment and these units have been the main target of oil and gas exploration in the south-east of South Australia. All three units have flowed gas or gas, oil and condensate upon testing.

The Upper Sawpit Shale and Laira Formations are comprised of siltstone and shale and were deposited in a low energy environment such as a floodplain or lake. Both of these units are important as they act as seals to the Sawpit Sandstone and Pretty Hill Sandstone respectively thereby trapping hydrocarbons at depth.

A period of structural activity occurred after the Katnook Sandstone was deposited about 125 million years ago. The surface was uplifted and eroded before activity waned and a thick sequence of interbedded shales, siltstones and fine grained sandstones of the Eumeralla formation was deposited on a fairly low relief, slowly subsiding surface possibly in an expansive system of shallow lakes. Both the basal the Windermere Sandstone Member and unnamed intraformational sandstones of the Eumeralla Formation have been tested and found to be gas bearing and productive. The predominantly shale and siltstone dominated Eumeralla Formation sequence acts as a regional seal for this play.

The overlying Sherbrook Group of Late Cretaceous age is a thin sandstone sequence in the northerly part of the South Australian Otway Basin but in the south and particularly offshore it thickens and can be subdivided into lithological units representing the facies of a delta system.

The overlying Tertiary aged sediments are also relatively thin onshore, consisting mainly of sandstones of the Dilwyn Formation, shales of the Pember Mudstone and fossiliferous limestones of the Gambier Limestone. The Dilwyn, Pebble Point and Pember formations were deposited in a fluvial-deltaic setting and the overlying Gambier Limestone in a prograding marine sequence. All the Tertiary units thicken offshore.

Figure 2 shows an indicative cross-section in the onshore Otway Basin.⁸ The deep formations are targeted for hydrocarbon exploration whilst the near-surface aquifers of the unconfined Gambier Limestone and confined Dilwyn Formation are important aquifers that are currently targeted for water extraction to support stock and domestic, forestry and local industries. There is potential for water extraction from the Sherbrook Group.

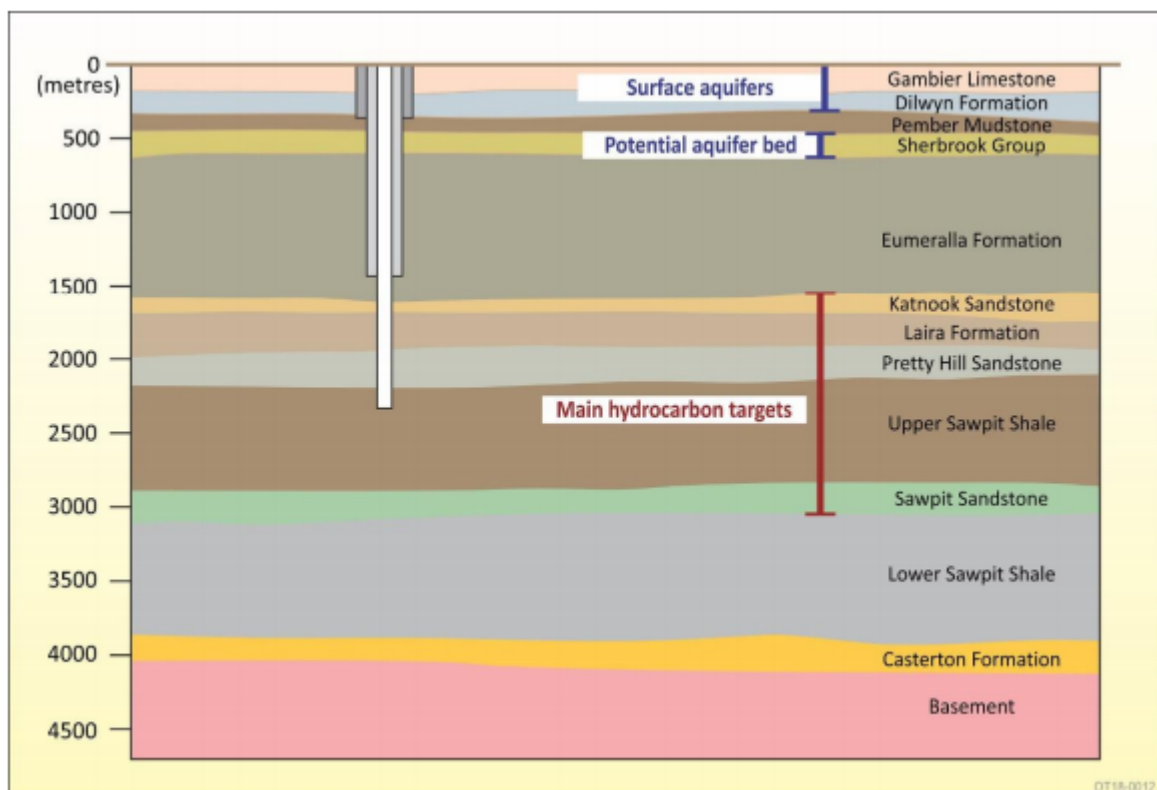


Figure 2 - Indicative cross-section in the onshore Otway Basin, showing expected stratigraphy and targets (extracted from Beach Energy EIR (Figure 7))

⁸ Beach Energy – Onshore Otway Basin Petroleum Production Operations EIR - [https://sarigbasis.pir.sa.gov.au/WebtopEw/ws/samref/sarig1/image/DDD/PGER00293EIR PETROLEUM OPERATIONS.pdf](https://sarigbasis.pir.sa.gov.au/WebtopEw/ws/samref/sarig1/image/DDD/PGER00293EIR%20PETROLEUM%20OPERATIONS.pdf)

3.3 Lower Limestone Coast Hydrogeology

The prescribed water resources of the Lower Limestone Coast Prescribed Wells Area (LLCPWA) consist of two distinct underground water systems, the upper unconfined Tertiary Limestone Aquifer (known generally as the unconfined aquifer) and the lower Tertiary Confined Sand Aquifer (known generally as the confined aquifer) (South East NRM Board (SENRM), 2015⁹).

The unconfined aquifer consists mainly of calcareous sandstone and limestone. It incorporates the Gambier and Murray Group Limestones in the higher inland plains in the east of the region, and the younger Coomandook, Bridgewater and Padthaway Formations in the low-lying flats,

In particular, the confined aquifer consists of non-calcareous quartz sands, interbedded with dark brown carbonaceous clays. Together these units make up the Dilwyn Formation, which was deposited during the early part of the Tertiary Period. Much of the water in the confined aquifer is over 25,000 years old (SENRM, 2015).

Beneath the Dilwyn Formation is a number of deeper aquifers from the Late Jurassic, Early and Later Cretaceous and Tertiary ages of variable water quality and lateral extent down to over 4000 metres, which demonstrate increasing salinity with depth (South East NRM Board 2015). These aquifers are not used for irrigation, industrial or town water supplies due to their depth and generally high salinity (South East NRM Board 2015). The aquifers within these deeper formations are noted in the Water Allocation Plan (SENRM, 2015) as being of potential value as targets for petroleum and geothermal exploration and production.

3.4 Local Land Use

Based on land use, livestock grazing of modified pastures is by far the predominant agricultural activity in the South East (58% of land use in 2008), followed by cropping (9%) and forestry (7%) (PIRSA, 2010).

There are multiple existing land uses within the South East and around the Beach Energy Katnook gas plant as shown in Figure 3 consisting of mainly dryland agriculture for cattle grazing, with some areas of irrigated cropping for production. Other land uses within the Beach Energy licence areas include plantation forestry, viticulture, horticulture, meat, wool and dairy production, tourism and recreation and other energy related infrastructure and services.

⁹ South East NRM Board 2015. Water Allocation Plan for the Lower Limestone Coast Prescribed Wells Area. Prepared by the South East Natural Resources Management Board. - https://www.naturalresources.sa.gov.au/files/sharedassets/south_east/water/llc-wap-amended-20nov2015-no-appendices.pdf

As outlined with Beach Energy's EIR, the Katnook Gas Plant is located approximately 10 km south southwest of Penola, 10 km northwest of Nangwarry, 14 km north east of Kalangadoo and 30 km east of Mount Burr, all of which are located within the Wattle Range District Council. The closest residences to the Katnook Gas Plant are located approximately 1 km to the north and 2 km to the south-east.

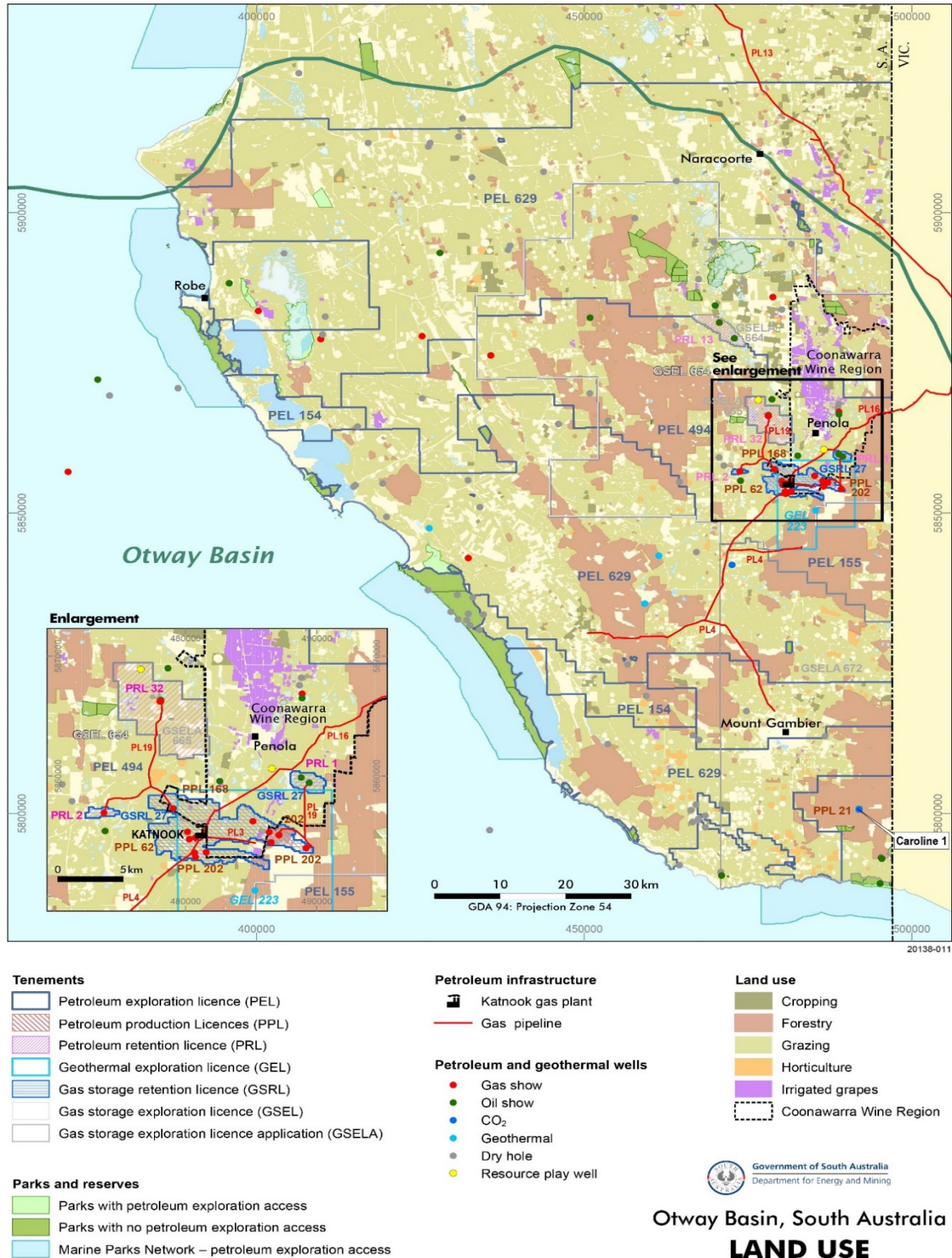


Figure 3 - Land Use within the Otway Basin

3.5 Native Flora and Fauna

As outlined by Beach Energy within their EIR, the licence areas fall within the Bridgewater, Lucindale and Glenelg Plain IBRA (Interim Biogeographical Regionalisation for Australia) sub-regions of the Naracoorte Coastal Plain IBRA region.

Native vegetation in the region has been heavily cleared with remnant vegetation mapping in the licence areas indicating native vegetation cover ranging approximately from 8% to 14 % (NatureMaps 2018). Broad vegetation communities present include eucalypt woodland and forest, mallee, coastal shrublands, heath, shrublands, coastal tussock grasslands, sedgeland, and fernland (Croft et al. 1999).

The South East of South Australia, together within adjacent areas in Victoria, is considered one of Australia's 15 national biodiversity hotspots (DSEWPC 2009). More than 1,300 native flora species and 750 native fauna species have been recorded in the South East (Croft et al. 1999).

The South East supports a large number of rare or threatened plant species, which predominantly occur within patches of remnant native vegetation. In total 135 (see Appendix 1 of Beach Energy's EIR) were identified through a search of the Biological Databases of South Australia (DEW 2018) when extending the search to 5km beyond their licence areas.

Of the 135 species, a total of 8 flora species, 6 fauna species and 4 migratory species were listed under the EPBC Act across the Beach Energy licence areas.

The South East Natural Resource Management Region contains 3 National Parks, 53 Conservation Parks and 4 Game Reserves established under the National Parks and Wildlife Act (South East NRM Board 2010). Nine reserves established under the *National Parks and Wildlife Act 1972* (NPW Act) are located in the vicinity of, within or overlap Beach Energy's licence areas.

Despite the proximity of Beach Energy licences to reserves under the *National Parks and Wildlife Act 1972* (NPW Act), the Beach Energy EIR and SEO do not cover activities in reserves established under the NPW Act or activities immediately adjacent to a Marine Park established under the *Marine Parks Act 2007*.

4.0 Beach Energy's Petroleum Production Operations proposal

This section provides a general overview of Beach Energy's proposed production and processing activities, for further detail please see section 3 of the EIR document.

Beach Energy's target area for onshore petroleum production operations is the onshore Otway Basin near Penola, South Australia, where they hold Petroleum Production Licences (PPL) 62 and 202 along with a number of Petroleum Exploration and Retention Licences as shown in Figure 4.¹⁰

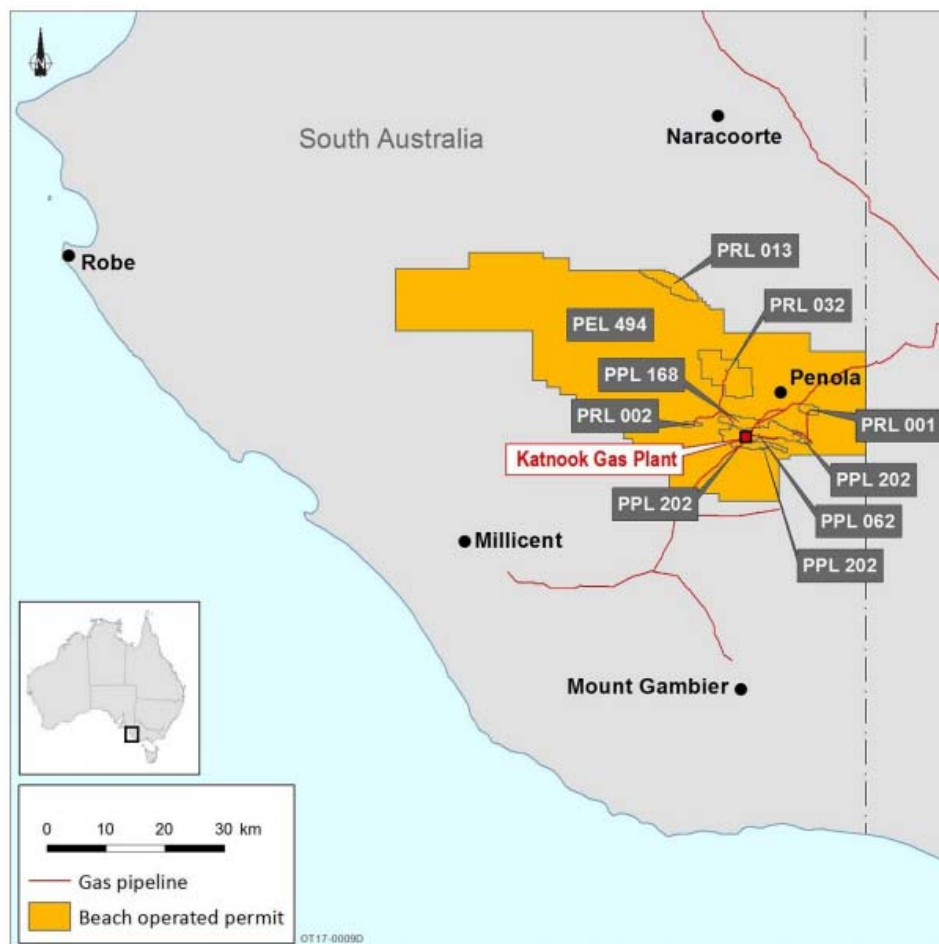


Figure 4 - Location of Beach Energy's onshore South Australia Otway Basin licences and operations (extracted from Beach Energy EIR (Figure 1))

¹⁰ Beach Energy – Onshore Otway Basin Petroleum Production Operations EIR - [https://sarigbasis.pir.sa.gov.au/WebtopEw/ws/samref/sarig1/image/DDD/PGER00293EIR PETROLEUM OPERATIONS.pdf](https://sarigbasis.pir.sa.gov.au/WebtopEw/ws/samref/sarig1/image/DDD/PGER00293EIR%20PETROLEUM%20OPERATIONS.pdf)

4.1 Facility design and construction

As outlined within Beach Energy's Environmental Impact Report (EIR), the previous Katnook facility received and processed natural gas from a number of fields from 1991, before being mothballed in 2013 due to declining gas production. Following the successful discovery of gas at Haselgrove-3, Beach Energy have proposed a number of options for the construction of a new gas processing facility at the Katnook site, shown in Figure 5.

It is proposed that the Katnook processing plant will include the following equipment and processes:

- Inlet separator;
- Filter coalescer;
- Compression;
- Hydrogen sulphide removal;
- Mercury removal;
- Dew point control;
- Methanol hydrate suppression;
- Dehydration and filtration;
- Produced Formation Water storage in ponds for removal offsite;
- Condensate storage and truck-load out;
- Flare for processing by product gas; and
- Pressure relief system for venting and emergency relief.

As outlined within the EIR, produced (raw) gas will be processed to meet sales gas quality specifications and is likely to be fed into the South East Pipeline System (SEPS) which supplies gas to the local region. The expected composition of sales gas processed at the facility is methane (91.2 mol%), ethane (2.8 mol%), propane (0.6 mol%), butane and residuals (0.2 mol%), carbon dioxide (4.7 mol%) and nitrogen (0.5 mol%).

Condensate will be stored on site before being transported at regular intervals to a refinery.



Figure 5 - Katnook Gas Plant and surrounding facilities (extracted from Beach Energy EIR (Figure 1))

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¹¹ Beach Energy – Onshore Otway Basin Petroleum Production Operations EIR - [https://sarigbasis.pir.sa.gov.au/WebtopEw/ws/samref/sarig1/image/DDD/PGER00293EIR PETROLEUM OPERATIONS.pdf](https://sarigbasis.pir.sa.gov.au/WebtopEw/ws/samref/sarig1/image/DDD/PGER00293EIR%20PETROLEUM%20OPERATIONS.pdf)

Under Stage 3 of the activity approvals process (as discussed in Section 2), before any facility construction approval will be considered, Beach Energy must submit an Activity Notification that provides specific details of the proposed facility, and demonstrates the facility will be designed for the expected gas composition and pressures in accordance with recognised industry standards. This will include assessments to demonstrate the fitness for purpose of all infrastructure, contractors and management systems to be used during operations.

Venting and flaring is proposed at the site. Assessments will be undertaken where appropriate during design and operation to confirm compliance with legislative requirements, particularly the *Environment Protection (Air Quality) Policy* and the *Environment Protection (Noise) Policy 2007* to ensure air quality and noise requirements are demonstrably complied with.

Beach Energy within their EIR section 3.3 introduce the possibility of production and limited processing at the well site in some circumstances which could involve separation of liquids and compression of gas for road transport. Any equipment installed will be designed, installed and tested in accordance with Australian standards, incorporate appropriate Beach Energy and/or project design standards and specifications, with design to meet or exceed good industry practice.

4.2 Produced Formation Water Disposal

As outlined within Beach Energy's EIR, section 3.1.3, historically production and processing of gas at the Katnook site generates relatively low volumes of produced formation water (PFW) from the targeted reservoirs. Beach Energy has proposed the use of above ground tanks at the Katnook site to collect PFW prior to offsite disposal at an EPA licenced facility. If future expansion of the site is feasible, the use of new or refurbished existing ponds may be considered following appropriate integrity testing to allow for evaporation of the PFW.

Both PFW management options proposed will be subject to the requirements of relevant EPA guidelines. In particular Beach Energy will comply with the requirements of the EPA guideline *080/16 Bunding and Spill Management*¹² for any above ground storage tanks and similarly, EPA Guideline *509/18 Wastewater lagoon construction*¹³ for evaporation ponds. Photos of the two current Katnook ponds are provided in Figures 6 and 7. A top down example is provided in Figure 3.

¹² EPA guideline *080/16 Bunding and Spill Management*
https://www.epa.sa.gov.au/files/47717_guide_bunding.pdf

¹³ EPA Guideline *509/18 Wastewater lagoon construction*
http://www.epa.sa.gov.au/files/4771372_guide_lagoon.pdf

It is proposed by Beach Energy that new groundwater monitoring wells and a Groundwater Management Plan will be developed to demonstrate compliance with the SEO and the EPA Guideline 509/18 *Wastewater lagoon construction*.



Figure 6 - Katnook Gas Plant PFW evaporation pond 1 (DEM Compliance database)



Figure 7 - Katnook Gas Plant PFW evaporation pond 2 (DEM Compliance database)

4.3 Well Operations and Well Integrity Management

Detailed well design, drilling operations (including the installation and cementing of casing) and the installation of the wellhead are covered in the existing approved EIR and SEO for Drilling, Completion and Initial Production Testing in the Otway Basin (Otway Drilling SEO).^{14 15}

Once a well is drilled and the information gathered during drilling and testing activities indicates the well is in fact prospective, Beach Energy will complete the well in preparation for, and initiation of, production. This includes the installation of packers and other subsurface equipment such as tubing, the installation of well head flow control valves and the perforation of the well bore at the target zone. This is typically completed with specialist contractor services who have extensive experience in their areas of expertise. Despite the current Beach Energy Otway Drilling, Completions and Initial Production Testing SEO also covering well completion activities, it is proposed by Beach Energy that well completions, as well as work-over activities moving forward will occur under the Onshore Otway Basin Production Operations SEO.

When a well is actively producing, or is suspended, Beach Energy manage ongoing well integrity through their well integrity management system. This system requires periodic assessment, testing and maintenance of barriers commensurate to the risk. For example, a well assessed as higher risk will require more frequent inspections, however a well assessed to have unacceptable risk will be subjected to a well intervention to repair barriers, or will be decommissioned. Well integrity specialists undertake the risk assessment, and a well integrity summary is presented to DEM-ERD as the regulator on a quarterly basis.

If a well is deemed un-prospective following drilling, it will be decommissioned in line with the requirements of the Otway Basin Drilling, Completions and Initial Production Testing SEO immediately, and production casing will not be installed.

¹⁴ Drilling, Completion and Initial Production Testing in the Otway Basin – EIR, 2013 - <https://sarigbasis.pir.sa.gov.au/WebtopEw/ws/samref/sarig1/image/DDD/PGER00008EIR%20DRILLING%20OPERATIONS.pdf>

¹⁵ Drilling, Completion and Initial Production Testing in the Otway Basin – Statement of Environmental Objectives, 2013 - <https://sarigbasis.pir.sa.gov.au/WebtopEw/ws/samref/sarig1/image/DDD/PGER00009SEO%20DRILLING%20OPERATIONS.pdf>

4.4 Gathering systems

The Katnook plant has a current gathering system of underground steel pipelines collecting gas from seven gas fields. Details of the current pipelines are presented within Table 1 and their locations within Figure 8.

Table 1 - Existing Beach Energy pipelines in the onshore Otway Basin (extracted from Beach Energy EIR (Table 3))¹⁶

Name	Material	Diameter	Length
Ey Lane (Jacaranda Ridge-2) to Redman	Steel	100 mm	10 km
Limestone Ridge to Ey Lane Redman Interconnector	Steel	80 mm	4.8 km
Redman to Katnook Gas Plant	Steel	80 mm	3.5 km
Wynn pipeline	Steel	80 mm	4.8 km
Ladbroke Grove field to Ladbroke Grove Gas Plant	Steel	150 mm	3.4 km
Haselgrove South-2 to Haselgrove South-1	Steel	80 mm	4.0 km
Katnook-2 to Katnook Gas Plant	Steel	100 mm	0.9 km
Haselgrove South-1 to Katnook Gas Plant	Steel	100 mm	7.0 km
Haselgrove-1 flowline	Steel	100 mm	1.1 km
Haselgrove-2 flowline	Steel	100 mm	0.5 km

The current network of mothballed pipelines have been maintained under a nitrogen blanket and cathodic protection for future use. Any of these pipelines proposed for future use will be required to undergo integrity testing prior to reinstatement. This may include pressure testing (hydrostatic), intelligent pigging and/or integrity dig-ups.

When Beach Energy seek to produce from a new well, additional pipelines will need to be constructed to connect the well to the processing facility. Similar as for facilities and wells, prior to any on-ground activities commencing, Beach Energy will be required to submit an Activity Notification for the intended activity. For pipelines, this is often undertaken in three stages – a survey to determine the best alignment for the pipeline, a construction notification, and a commissioning and operation notification.

All pipelines are required by Regulation 29 be constructed, operated and decommissioned in accordance with AS (Australian Standard) 2885 Pipelines – Gas and Liquid Petroleum. Beach Energy have committed to installing and constructing their pipelines in accordance with the Australian Pipelines and Gas Association Code

¹⁶ Beach Energy – Onshore Otway Basin Petroleum Production Operations EIR - [https://sarigbasis.pir.sa.gov.au/WebtopEw/ws/samref/sarig1/image/DDD/PGER00293EIR PETROLEUM OPERATIONS.pdf](https://sarigbasis.pir.sa.gov.au/WebtopEw/ws/samref/sarig1/image/DDD/PGER00293EIR%20PETROLEUM%20OPERATIONS.pdf)

of Environmental Practice – Onshore Pipelines (APGA 2017)¹⁷. Table 4 of the EIR provides detailed steps outlining typical pipeline construction activities.

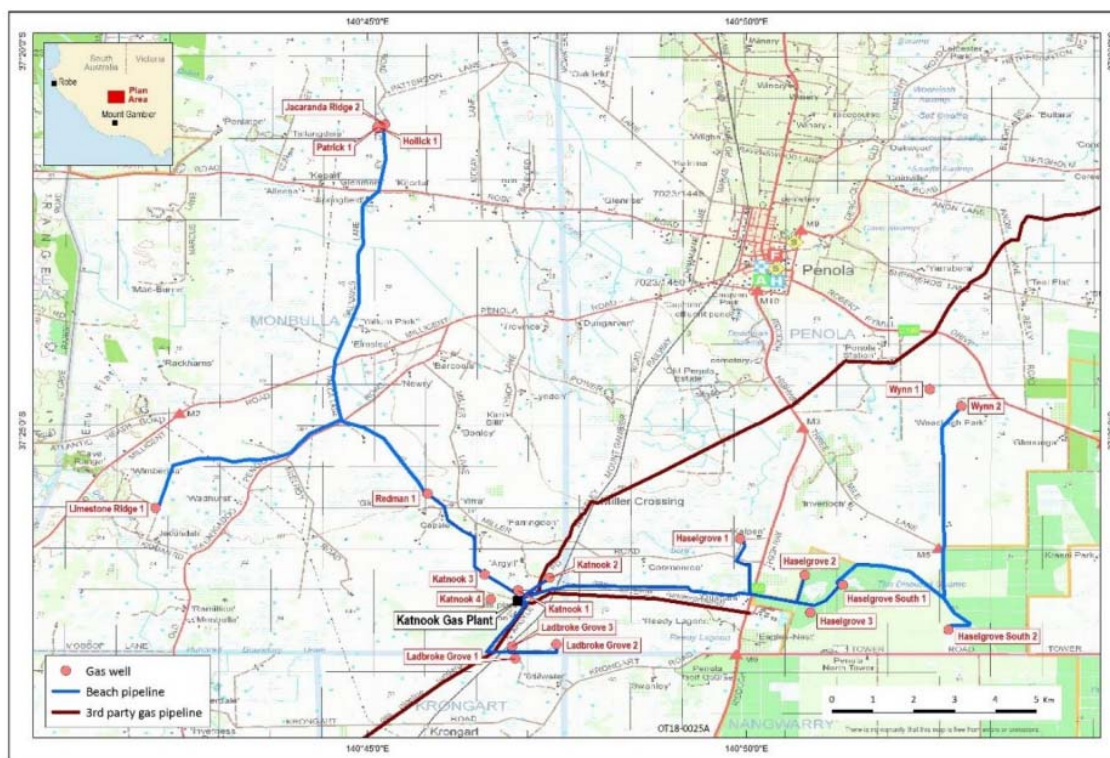


Figure 8 - Locations of existing Beach Energy pipelines in the onshore Otway Basin (extracted from Beach Energy EIR (Figure 4))¹⁸

4.5 Decommissioning and Rehabilitation

At the end of life of the gas plant, pipelines, wells and access roads, Beach Energy are required to decommission all infrastructure in accordance with the SEO which requires the development of a site-specific decommissioning and reinstatement plan that must be agreed upon with relevant stakeholders, including landowners and Government Regulators.

The decommissioning of facilities will generally require that all site infrastructure be removed and either re-used, recycled or disposed of at an EPA licenced waste facility. Following the removal of infrastructure the site will be assessed for potential contamination and where required rehabilitated using a risk based approach,

¹⁷ Australian Pipelines and Gas Association Code of Environmental Practice – Onshore Pipelines https://www.apga.org.au/sites/default/files/uploaded-content/field_f_content_file/apga-code-of-environmental-practice.pdf

¹⁸ Beach Energy – Onshore Otway Basin Petroleum Production Operations EIR - https://sarigbasis.pir.sa.gov.au/WebtopEw/ws/samref/sarig1/image/DDD/PGER00293EIR_PETROLEUM_OPERATIONS.pdf

consistent with the principles of the nationally recognised National Environment Protection (Assessment of Site Contamination) Measure (1999) amended in 2013¹⁹.

Following the removal of all infrastructure, any assessment and rehabilitation of potential contaminants the site will be re-contoured to approximate pre-existing contours and returned to a condition required for the proposed land use (eg. re-seeding for cattle pasture as required).

Pipelines are required to be decommissioned to AS 2885 standards and the Australian Pipelines and Gas Association Code of Environmental Practice – Onshore Pipelines (APGA 2017)²⁰. All pipelines are purged of gas, cleaned and then left to degrade in-situ unless the proposed future land use prohibits this. All underground pipeline is cut off at a minimum depth of 750mm below natural ground level. Any above ground pipelines or cut off sections are removed, salvaged and reused/scrapped.

Any well decommissioning activities are subjected to the activity notification process under the P&GE Act, and a detailed assessment undertaken by DEM-ERD. This assessment includes understanding critical barrier installation and verification in line with industry standards to ensure the long term integrity of the well is maintained and no transmissive pathways exist due to the well.

Any infrastructure (eg access tracks, pipe or well casing for cattle yards) deemed suitable for the use of the landowner may be transferred at the approval of the Minister's delegate (DEM-ERD Executive Director). Any decision to approve the transfer of relevant infrastructure to the underlying landowner will need to demonstrate compliance with all other relevant legislation.

4.6 Notice of Entry on Land

Beach Energy as licensees are obliged under Part 10 of the P&GE Act to give notices of entry to all landowners 21 days prior to entering and commencing any activity on any land. In accordance with the requirements of Regulation 22 of the Petroleum and Geothermal Energy Regulations 2013 the notice of entry must contain:

- a detailed description of what will be undertaken;

¹⁹ National Environment Protection (Assessment of Site Contamination) Measure (1999) amended in 2013 - <https://www.legislation.gov.au/Details/F2013C00288>

²⁰ Australian Pipelines and Gas Association Code of Environmental Practice – Onshore Pipelines https://www.apga.org.au/sites/default/files/uploaded-content/field_f_content_file/apga-code-of-environmental-practice.pdf

- sufficient information to enable the landowner to reach an informed decision about the impacts and potential impacts the activities will or may have on the land; and
- sufficient information on the use and/or consequential loss of use of the land by the landowner resulting from the activities.

As an owner of land the landowners have the right to dispute entry as per section 62 of the P&GE Act.

5.0 Issues raised during the consultation period

During the Stage 2 consultation process (24 November 2018 to 1 February 2019) a number of issues were raised by government and the wider public in a total of 6 submissions. These submissions are available on the DEM's environmental register²¹. Beach Energy responded to these submissions within Appendix 5 of their EIR prior to formally submitting the revised EIR to the DEM on 21 March 2019.

5.1 Reporting to the EPA

Comments were made in relation to the reporting requirements under the *Environment Protection Act 1993* (EP Act). The Beach Energy Katnook facility and associated infrastructure are subject to the requirements of an EPA licence²² (licence number 23644). Beach Energy are also required to report incidents causing or threatening serious or material environmental harm to the EPA in accordance with Sections 83 and 83A of the EP Act.

The EPA and DEM in 2012 entered into an Administrative Arrangement²³ which defines the incident reporting requirements under each Act and the roles each agency plays in the response to certain types of incidents.

5.2 Potential impacts to water resources

It is well understood that the community, landowners, industry and groundwater dependent ecosystems (GDE) rely heavily upon groundwater within this region. The groundwater resource within this region is prescribed through the Water Allocation Plan (WAP) for the Lower Limestone Coast Prescribed Wells Area. The Water Allocation Plan (WAP) sets out the rules for managing and taking prescribed water.

5.2.1 Downhole decommissioning and long term well integrity

Public concerns were raised with regards cross contamination of aquifers due to the adequacy of downhole decommissioning and long term well integrity. In particular concerns were raised around the quality of cement as an effective barrier and its potential for failure.

²¹ DEM Environmental Register
http://petroleum.statedevelopment.sa.gov.au/legislation_and_compliance/environmental_register

²² Beach Energy (Adelaide Energy as subsidiary) EPA Licence # 23644
https://www.publicregister.epa.sa.gov.au/document/da/bx/92Dw7PgA1Zxx_IPJc4RoiGc.pdf

²³ Administrative Arrangement between the EPA and DEM (then DMITRE)
http://www.energymining.sa.gov.au/_data/assets/pdf_file/0005/252959/20120625_ApprovedAA.pdf

Any well decommissioning activities are subjected to the activity notification process under the P&GE Act, and a detailed assessment undertaken by DEM-ERD. This assessment includes understanding critical barrier installation and verification in line with industry standards to ensure the long term integrity of the well is maintained and no transmissive pathways exist due to the well.

It is a requirement of Objective 6 (Goal 6.8) assessment criteria that any decommissioning program must be submitted to the satisfaction of DEM-ERD prior to the well decommissioning activity being undertaken. The assessment undertaken by DEM-ERD will also, where required, include requesting advice from the Department for Environment and Water (DEW) on the aquifer systems and / or hydrocarbon reservoirs that are typically in natural hydraulic isolation from one another.

Beach Energy as required by the SEO must ensure:

- No aquifer contamination as a result of production activities;
- There is no uncontrolled flow to surface (e.g. blow out);
- Appropriate barriers exist to protect separate aquifer systems and / or hydrocarbon reservoirs that are typically in natural hydraulic isolation from each other; and
- Well decommissioning program submitted to the satisfaction of DEM prior to well decommissioning

In general, within the Otway Basin and as required within recently decommissioned wells, isolation plugs will be placed across the following zones:

- Between the unconfined Gambier Limestone and overlying sediments (including Bridgewater Formation) and the underlying confined Dilwyn Formation;
- Between the Dilwyn Formation and the underlying condensed Sherbrook Group, in the event that there is evidence that aquifers are present;
- Between unnamed intra-Eumeralla Formation sandstones and any overlying or underlying sandstones;
- Between the Windermere/Katnook sandstones and the Laira Formation to ensure isolation from the Pretty Hill and/or Sawpit Sandstones;
- Between the Pretty Hill Sandstone and the Upper Sawpit Shale to isolate the deeper Sawpit Sandstone; and
- Between the Sawpit Sandstone and any deeper reservoirs within the Crayfish Group.

In the event that any additional sandstones (not identified above) are intersected with flow potential, these must also be isolated as a precautionary measure.

In response to comments raised through consultation regarding well integrity, Beach Energy stated the following:

- *Beach has a Well Engineering & Construction Management System that adheres to and/or exceeds international engineering standards and captures lessons learnt from previous wells and campaigns. Hazards and Risks associated with cementing must be included in a risk register which must be reviewed to ensure risks are managed to as low as reasonably practicable;*
- *To reduce the risk of groundwater contamination to as low as reasonably practicable, the Beach Well Engineering & Construction Management System aims to ensure that the cement:*
 - *Has permeability less than the adjacent formation;*
 - *Is free of contamination and channels or micro-annuli;*
 - *Has the planned compressive strength;*
 - *Is resistant to attack from downhole fluids and temperature degradation;*
- *In accordance with Beach's Well Engineering & Construction Management System every well must be designed, constructed, maintained and abandoned in such a manner that it can be demonstrated that at all stages in the Well Life cycle, there will be two verified well barriers between a hydrocarbon or water zone and the surface; and*
- *Beach use the best quality material for well casing that is engineered to withstand pressure much higher than the pressures experienced during our operations. After all possible gas is extracted and produced from a well it is filled with cement plugs using cement that is much stronger than the surrounding rock. In addition to the steel casing and cement well design, this step provides an additional barrier to isolate the content of the well bore from aquifers and the surrounding environment.*

5.2.2 Produced Formation Water (PFW) management

Public concerns and other agency comments were received with regards to PFW management, with particular relevance to the potential for groundwater contamination.

As required within the final approved SEO, the assessment criteria relevant to potential land and groundwater contamination due to spills (Goal 6.1) and in particular PFW management (Goal 6.6) include:

Goal 6.1 – To prevent spills and leaks occurring and if they occur minimise their impact:

- No adverse impact to land use or native vegetation and native fauna outside operational sites due to an escape of petroleum, processed substance, chemical or fuel;
- No unauthorised discharge or escape of petroleum, processed substance, chemical, fuel or solid wastes to surface water and/or groundwater; and

- Any escape of petroleum, processed substance, chemical or fuel to land is either immediately contained and removed or assessed in accordance with NEPM16 guidelines and remediated in a timely manner.

Goal 6.6 – To prevent impacts as a result of produced formation water treatment and disposal:

- No evidence of overflow or leakage of produced formation water from PFW ponds

As outlined within section 4.2, Beach Energy within their EIR have proposed to manage PFW at the Katnook facility through the use of above ground storage tanks prior to offsite disposal at an EPA licenced facility. Should future expansion of the site be required, upgraded or new evaporation ponds may also be considered for PFW disposal.

If Beach Energy store PFW within above ground storage tanks for offsite disposal, they will need to demonstrate through the Stage 3 approval process that the tanks are Fit for Purpose and bunded in accordance with EPA guideline *080/16 Bunding and Spill Management*²⁴. Any offsite disposal of PFW would be transported by an EPA licenced waste transportation company to an EPA licenced waste facility.

Should evaporation ponds be used, Beach Energy will need to demonstrate through the stage 3 approval process, compliance with the EPA Guideline *509/18 Wastewater lagoon construction*²⁵. This is the same guidelines that other industries within South Australia must meet for the construction and management of wastewater lagoons to ensure compliance with the EP Act.

This guideline considers a number of factors in determining the appropriate design and construction of wastewater lagoons dependent upon the assessed risk. The level of risk posed is dependent upon the location in relation to sensitive receptors and the nature of the stored wastewater and is determined by an EPA developed risk matrix (see Appendix 1 of the Guideline). This matrix is to be used in conjunction with the Suggested Construction and Lining Categories (SCL) (Appendix 2 of the Guideline) to determine the appropriate liners and monitoring to be used in the wastewater lagoons design.

It is an expectation of DEM, that any refurbished or new PFW evaporation pond (wastewater lagoon) would be high-density polyethylene (HDPE) lined with leakage detection. It is also expected and proposed by Beach Energy that groundwater

²⁴ EPA guideline *080/16 Bunding and Spill Management*
https://www.epa.sa.gov.au/files/47717_guide_bunding.pdf

²⁵ EPA Guideline *509/18 Wastewater lagoon construction*
http://www.epa.sa.gov.au/files/4771372_guide_lagoon.pdf

monitoring wells would be installed at the Katnook site and monitored in accordance with an approved Groundwater Monitoring Plan.

In response to comments raised through consultation regarding PFW management, Beach Energy has confirmed that it:

- *will conduct a risk assessment based on the final use of the pond/s including the type of fluid to be stored, in conjunction with the Wastewater Lagoon Storage guideline; and*
- *as part of the design and construction of the refurbished Katnook Gas Production facility, Beach will be undertaking appropriate environmental monitoring of operations. This will include the use of existing and new groundwater monitoring bores across the site and a Project specific Operational Monitoring Programme will be in place for the facility.*

5.3 Air quality impacts on the local environment

Public concerns and other agency comments were received with regards to potential impacts to air quality due to venting/flaring during operations and dust during construction.

Beach Energy must assure compliance with the following assessment criteria:

- Emissions minimised by implementation of reasonable practical measures during design and operation as outlined in the guide to how objectives can be achieved column; and
- Modelling or monitoring (where appropriate) of atmospheric emissions from production facilities demonstrate that legislative requirements are met
Any stakeholder complaints related to dust nuisance are documented and reasonable steps taken to resolve them can be demonstrated.

As outlined in Section 4.1, venting and flaring is proposed at the site. Assessments will be undertaken where appropriate during design and operation to confirm compliance with legislative requirements, particularly the Environment Protection (Air Quality) Policy to ensure air quality requirements are demonstrably complied with. At Stage 3, details will be provided of any modelling conducted during the design stage to confirm equipment specifications and required performance, for example modelling of air quality/dispersion and thermal radiation (such as for a proposed flare).

In response to comments raised through consultation regarding air quality, Beach Energy specified that:

- *Air dispersion modelling from the process units and the flare will be carried out when plant design is suitably progressed, with the scope requirements inserted into the Basis of Design for the refurbishment of the Katnook facility.*

DEM-ERD will consider the limitations of any assumptions made for any modelling undertaken during such assessments through the stage 3 Activity Approval Process.

Beach Energy are required to report emissions in accordance with statutory requirements e.g. National Pollution Inventory (NPI) and National Greenhouse and Energy Reporting (NGER) requirements.

5.4 Potential Impacts to existing land uses and third party infrastructure

One submission provided during the consultation process requested further advice on potential interactions with a third party pipeline within the area. In particular how the new facility and associated wells and gathering lines could potentially impact upon the SESA pipeline that connects into the Ladbroke Grove Power Station.

Comments were also received during consultation relating to potential noise impacts due to operations.

As extracted from the final approved SEO, the requirements outlined within Appendix A were incorporated into the SEO in relation to minimising disturbance to landholders, land use, third party infrastructure, or the local community. Of particular reference, Beach Energy must assure compliance with the following assessment criteria:

- No adverse impact outside agreed disturbance on land use or third party infrastructure as a result of activities ;
- Adverse impacts of accidental or unforeseen disturbance to infrastructure or land use resolved to the reasonable satisfaction of the landholder;
- Timely consultation and notification of proposed activities with relevant landowners and stakeholders can be demonstrated; and
- Landholder / stakeholder complaints are documented and reasonable steps taken to resolve them can be demonstrated.

Key to ensuring compliance with these criteria is Beach Energy engaging in ongoing consultation with relevant landowners throughout their operations.

Any pipeline operator, can also request that relevant stakeholders partake in a Safety Management Study, as required under AS2885 Part 6. This process would be expected to identify threats to third party pipeline infrastructure from the proposed works and agreeance on any risk mitigation measures required.

Pipeline operators within the area are also licenced and deemed as an owner of land under the P&GE Act. All owners of land will be issued a Notice of Entry (NOE) by Beach Energy 21 days prior to entering the land as required under the P&GE Act. As an owner of land the landowners have the right to dispute entry as per section 62 of the Act.

Assessments will be undertaken where appropriate during design and operation to confirm compliance with legislative requirements, particularly the *Environment Protection (Noise) Policy 2007* to ensure noise requirements are demonstrably complied with. At Stage 3, details will be provided of any modelling conducted during the design stage to confirm equipment specifications and required performance. DEM-ERD will consider the limitations of and assumptions made for any modelling undertaken during their assessment.

In response to comments raised during consultation regarding interaction with third part infrastructure, Beach Energy stated that it:

- *will undertake appropriate consultation with the relevant stakeholders at the detail design stage of specific projects activities.*

Regarding noise related comments, Beach Energy responded by confirming that:

- *a noise assessment will be carried out when plant design is suitably progressed, with the scope requirements inserted into the Basis of Design for the refurbishment of the Katnook facility; and that*
- *assessments will be undertaken as appropriate during operation to confirm compliance with the Environment Protection (Noise) Policy 2007.*

5.5 Potential impacts on native vegetation and fauna

Public concerns were raised during the consultation process on potential impacts to native flora and fauna.

Despite the proximity of Beach Energy licences to reserve under the *National Parks and Wildlife Act 1972* (NPW Act), the Beach Energy EIR and SEO do not cover activities in reserves established under the NPW Act or activities immediately adjacent to a Marine Park established under the *Marine Parks Act 2007*.

As outlined in section 5.4 of the EIR, potential impacts to native vegetation and fauna arise from:

- earthworks associated with construction and rehabilitation activities;
- spills or leaks;
- presence of personnel, lighting, general site activity and track use;
- loss of well integrity or well control incidents;
- explosion or fire at well sites and facilities; and
- storage, handling and disposal of waste.

5.5.1 Native vegetation clearance

Goal 3.1 of the SEO, is to avoid or minimise clearing of native vegetation as part of production activities. Beach Energy are required to demonstrate achievement of this goal by ensuring compliance with the following assessment criteria:

- No unauthorised clearing of native vegetation;
- Any sites of rare, vulnerable or endangered species or threatened communities have been identified, flagged and subsequently avoided;
- No rare, vulnerable or endangered flora removed without appropriate permits;
- High quality or significant remnant vegetation has not been cleared; and
- Activities are not carried out in parks or reserves established under the National Parks and Wildlife Act.

As part of the stage 3 approvals process, prior to any ground disturbance occurring, Beach Energy need to demonstrate to DEM-ERDs satisfaction compliance against all these criteria through site specific environmental assessments undertaken by a suitably qualified person.

Further to this, any native vegetation clearance that is approved to be undertaken must be offset through by protecting a separate area of land for conservation. The offset needs to provide a Significant Environmental Benefit (SEB), meaning it needs to provide an environmental gain over and above the damage being done to the native vegetation in the clearing activity.

The requirement to provide an SEB is captured under goal 3.3 of the SEO 'To ensure production activities are planned and conducted in a manner that minimises impacts on native fauna. Beach Energy are required to demonstrate achievement of this goal by ensuring compliance with the following assessment criteria:

- Significant environmental benefit for native vegetation clearance approved by DEM (where delegated authority applies) or Native Vegetation Council; and
- Significant environmental benefit obligation satisfied / implemented.

In response to concerns raised through consultation, Beach Energy specified that:

- *It will contract appropriately trained and experience ecologists with relevant knowledge of the region and in the appropriate cases, Native Vegetation Council accredited, to undertake appropriate assessments*
- *Suitably qualified consultants would be used to undertake assessments in any situations where native vegetation is present. Beach would report to DEM and required processes under the Native Vegetation Act followed*

5.5.2 Matters of National Environmental Significance

Under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), actions that have, or are likely to have, a significant impact on a matter of national environmental significance (MNES) must be referred to the Australian Government Minister for the Environment (the Minister). The Minister will decide whether assessment and approval is required under the EPBC Act.

The MNES protected under the EPBC Act are:

- world heritage properties;
- national heritage places;
- wetlands of international importance (listed under the Ramsar Convention);
- listed threatened species and ecological communities;
- migratory species protected under international agreements;
- Commonwealth marine areas;
- the Great Barrier Reef Marine Park;
- nuclear actions (including uranium mines); and
- a water resource, in relation to coal seam gas development and large coal mining development.

Under the EPBC Act, a referral can only be made by:

- the person proposing to take the action (which can include a person acting on their behalf); or
a Commonwealth, state or territory government, or agency that is aware of a proposal by a person to take an action, and that has administrative responsibilities relating to the action.

A referral must be made by the person proposing to take an action if the person thinks that the action will have, or is likely to have a significant impact on a matter protected by Part 3 of the EPBC Act. This test also applies to a government agency who has administrative responsibilities in relation to the action.

The EPBC Act provides for the listing of nationally threatened native species and ecological communities, native migratory species and marine species. Of particular concern raised in one submission was potential impacts upon the nesting and roosting habitats of the EPBC listed Red Tailed Black Cockatoos.

Beach Energy have stated within their EIR:

- that If threatened species (e.g. Red-tailed Black-Cockatoos) are detected or likely to occur near the site, specialist advice is sought regarding measures to mitigate potential impacts, particularly during breeding season. Undertake

detailed assessments and EPBC Act referral (if required) if avoidance of species or habitats is not possible (page 69);

- that in regard to petroleum activities in the onshore Otway Basin, issues that potentially require approval under the EPBC Act are relatively limited and can generally be avoided by site selection and implementation of appropriate field procedures (page 8); and
- their awareness of the key threats to threatened species identified within the region (appendix A1-3).

Beach Energy will be required to demonstrate through their Stage 3 approvals process compliance with the following assessment criteria under Objective 3 of their SEO:

- Any sites of rare, vulnerable or endangered species or threatened communities have been identified, flagged and subsequently avoided

To demonstrate this Beach Energy will be required to undertake and submit to DEM-ERD a site specific environmental assessment undertaken by a suitably qualified person prior to any on ground disturbance.

Any proposed action that will have or is likely to have significant environmental impacts on MNES will require referral to the Australian Government Minister for the Environment.

5.5.3 Potential for fauna impacts

Goal 3.3 in the SEO is to ensure production activities are planned and conducted in a manner that minimises impacts on native fauna. Achievement of this goal will be measured by the following assessment criteria:

- No significant adverse impacts on native fauna as a result of production activities;
- No rare, vulnerable or endangered fauna removed without appropriate permits; and
- No native fauna casualties that could have reasonably been prevented through management measures described in the guide

Prior to conducting any on ground activities, Beach Energy must demonstrate compliance with these criteria through appropriate site specific environmental assessments as part of the stage 3 approval process. In addition to this requirement prior to approval being granted, Beach Energy will also need to demonstrate ongoing compliance with these criteria for example through documentation of the following as outlined in the Guide to How Objectives can be Achieved column in the SEO:

- *Routine surveillance monitoring undertaken to detect fauna incursions into facilities or ponds. Fauna mortality (if it occurs) to be captured by incident reporting system and advice from an ecologist sought if required.*

In response to concerns raised through consultation, Beach Energy specified that:

- *environmental assessments are undertaken in the planning process to ensure that any potential issues are identified and appropriate avoidance or mitigation strategies are developed;*
- *As part of routine surveillance inspections Beach assess effectiveness of strategies on a site by site basis;*
- *detailed assessments and EPBC Act referral (if required) will be undertaken if avoidance of species or habitats is not possible; and*
- *If fauna entrapment or deaths did occur during operation, appropriate preventative measures would be implemented.*

6.0 Recommendation and further information

The Energy Resources Division recommends Stage 2 approval, based on:

- its detailed review of the EIR and draft SEO as summarised in this report;
- Beach Energy's responses to comments submitted as a result of public consultation; and
- consultation with co-regulatory agencies including (but not limited to) the Environmental Protection Agency (EPA) and the Department for Environment and Water (DEW).

For all enquiries regarding this assessment, DEM-ERD can be contacted through the Director of Engineering Operations, Michael Malavazos at michael.malavazos@sa.gov.au.

7.0 References

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