REFERRAL OF A PROJECT FOR A DECISION ON THE NEED FOR ASSESSMENT UNDER THE *ENVIRONMENT EFFECTS ACT 1978*

REFERRAL FORM

The *Environment Effects Act 1978* provides that where proposed works may have a significant effect on the environment, either a proponent or a decision-maker may refer these works (or project) to the Minister for Planning for advice as to whether an Environment Effects Statement (EES) is required.

This Referral Form is designed to assist in the provision of relevant information in accordance with the *Ministerial Guidelines for assessment of environmental effects under the Environment Effects Act 1978* (Seventh Edition, 2006). Where a decision-maker is referring a project, they should complete a Referral Form to the best of their ability, recognising that further information may need to be obtained from the proponent.

It will generally be useful for a proponent to discuss the preparation of a Referral with the Department of Planning and Community Development (DPCD) before submitting the Referral.

If a proponent believes that effective measures to address environmental risks are available, sufficient information could be provided in the Referral to substantiate this view. In contrast, if a proponent considers that further detailed environmental studies will be needed as part of project investigations, a more general description of potential effects and possible mitigation measures in the Referral may suffice.

In completing a Referral Form, the following should occur:

- Mark relevant boxes by changing the font colour of the 'cross' to black and provide additional information and explanation where requested.
- As a minimum, a brief response should be provided for each item in the Referral Form, with a more detailed response provided where the item is of particular relevance. Cross-references to sections or pages in supporting documents should also be provided. Information need only be provided once in the Referral Form, although relevant cross-referencing should be included.
- Responses should honestly reflect the potential for adverse environmental effects. A Referral will only be accepted for processing once DPCD is satisfied that it has been completed appropriately.
- Potentially significant effects should be described in sufficient detail for a reasonable conclusion to be drawn on whether the project could pose a significant risk to environmental assets. Responses should include:
    - a brief description of potential changes or risks to environmental assets resulting from the project;
    - available information on the likelihood and significance of such changes;
    - the sources and accuracy of this information, and associated uncertainties.
- Any attachments, maps and supporting reports should be provided in a secure folder with the Referral Form.
- A CD or DVD copy of all documents will be needed, especially if the size of electronic documents may cause email difficulties. **Individual documents should not exceed 2MB.**

- A completed form would normally be between 15 and 30 pages in length. Responses should not be constrained by the size of the text boxes provided. Text boxes should be extended to allow for an appropriate level of detail.
- The form should be completed in MS Word and not handwritten.

The party referring a project should submit a covering letter to the Minister for Planning together with a completed Referral Form, attaching supporting reports and other information that may be relevant. This should be sent to:

Postal address

Minister for Planning
PO Box 500
EAST MELBOURNE VIC 3002

Couriers

Minister for Planning
Level 17, 8 Nicholson Street
EAST MELBOURNE VIC 3002

In addition to the submission of the hardcopy to the Minister, separate submission of an electronic copy of the Referral via email to ees.referrals@dpcd.vic.gov.au is encouraged. This will assist the timely processing of a referral.

PART 1 PROPONENT DETAILS, PROJECT DESCRIPTION & LOCATION

1. Information on proponent and person making Referral

Name of Proponent:	**Origin Energy Resources Limited**
Authorised person for proponent: **Position:** **Postal address:** **Email address:** **Phone number:** **Facsimile number:**	Ivonne Milano Regulatory Affairs Manager, Southern Australia Assets GPO Box 186 Melbourne Vic 3000 Ivonne.milano@originenergy.com.au +61 3 9652 5887 +61 3 9652 5552
Person who prepared Referral: **Position:** **Organisation:** **Postal address:** **Email address:** **Phone number:** **Facsimile number:**	Jop van Hattum Project Manager Origin Energy GPO Box 186 Melbourne Vic 3000 Jop.vanHattum@originenergy.com.au +61 3 9652 5486 +61 39652 5552
Available industry & environmental expertise: (areas of 'in-house' expertise & consultancy firms engaged for project)	Origin Energy Resources Limited (hereafter "Origin") is a leading integrated energy company listed on the Australian Stock Exchange with over 4,000 employees and more than 4.5 million customers in Australia and New Zealand. Origin has an extensive conventional gas exploration and production portfolio with 'in-house' expertise in gas production, pipeline engineering and construction management. A number of suitably qualified consulting firms have been engaged to undertake the necessary investigations and support the preparation of this referral, including: • WorleyParsons (Planning and Environmental Management), • Biosis Research (Flora and Fauna), Appendix A, • Ochre Imprints (Cultural Heritage), Appendices B and C. • SLR Heggies - Noise Assessment, • Conneq (pipeline construction and integrity verification), and • JP Kenny (Pipeline survey). • K&M (extended reach drilling specialists)

2. Project – brief outline

Project title:

Halladale & Black Watch Gas Field Development Project

Project location: (describe location with AMG coordinates and attach A4/A3 map(s) showing project site or investigation area, as well as its regional and local context)

The Otway Basin is one of the best known and most actively explored basins on the southern coastline of Australia. Origin has defined commercial gas reserves in the Halladale and Black Watch gas fields within retention lease VIC/RL2(V). The proposed onshore drill site is located within Moyne Shire, approximately 3km southwest of the locality of Nirranda South, 30 km east of Warrnambool and 300 km southwest of Melbourne. The drill site is contained within PEP 168 issued under the *Petroleum Act 1998.* This property forms part of a dairy farming enterprise located between Baileys Road (to the northeast) and the Bay of Islands Coastal Park (to the south) (Attachment 1).

The gas fields are within an area in which Origin owns 100% development rights for the duration of the lease through its subsidiary Origin Energy Resources Limited. The fields are located approximately 5 km offshore and up to 2,000 m below the sea floor.

Gas would be transported from the drill site via two sections of 200 mm diameter pipeline, totalling 10 km. The first section of pipeline is to be constructed from the onshore wellhead facility to the existing gas pipeline, known as Croft 1. The second section would connect the Heytesbury Gas Plant to either the Otway or the Iona Gas Plant, within the Corangamite Shire (refer to Figure 1).

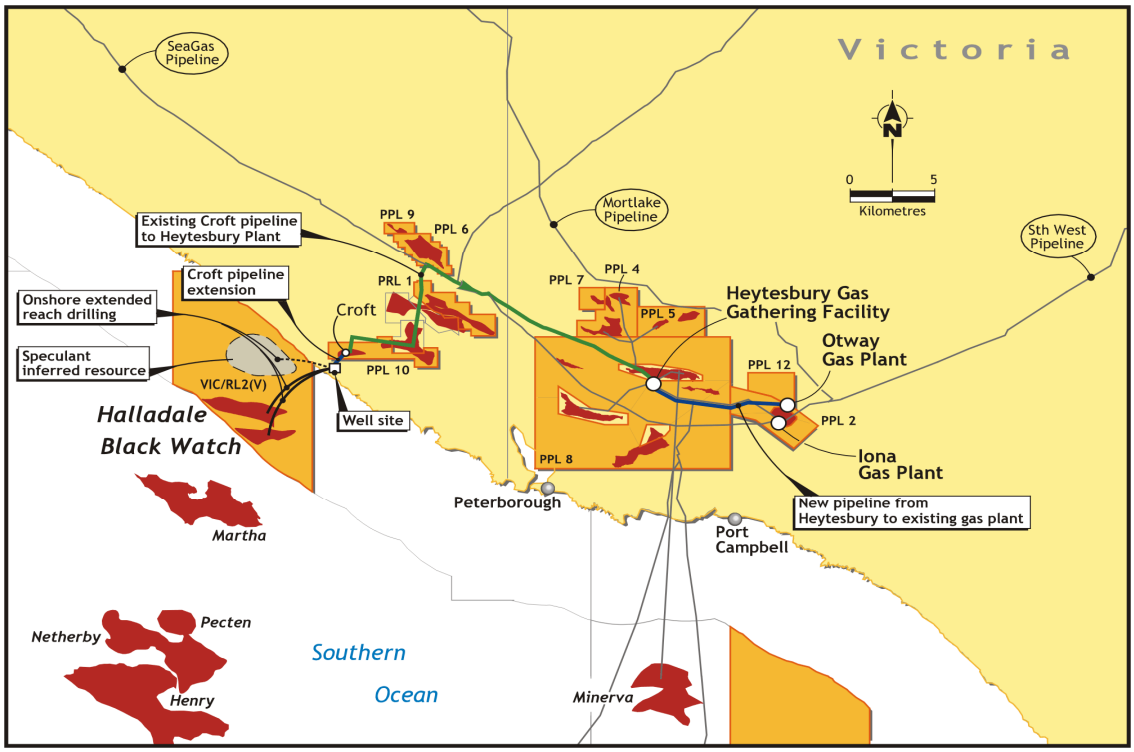


Figure 1 Key Project Components

Short project description (few sentences)**:**

Origin has defined gas reserves in the Halladale & Black Watch gas fields located in retention lease VIC/RL 2(v) in Victorian state waters and is now proposing to recover the gas using extended reach wells drilled from an onshore drilling site located at Nirranda South, approximately 30 km southwest of Warrnambool in southwest Victoria. Once recovered, the raw gas will be transported by pipeline to either the Otway or Iona Gas Plant.

3. Project description

Aim/objectives of the project (what is its purpose / intended to achieve?):

Origin is proposing to recover gas from offshore fields using extended reach wells drilled from an onshore drilling site. The near shore location of the gas fields enables the wells to be drilled onshore to the offshore gas fields. This drilling technique, applied previously in Victoria and elsewhere in Australia, avoids disturbance to the seabed or marine environment that can sometimes be associated with offshore drilling campaigns. The gas will supply either the Otway or Iona Gas Plant. The project will have the capacity to generate an average daily gas production of 20 to 30 TJ/d, depending on seasonal demand, with a maximum daily production capacity of 65 TJ/d. Security of gas supply is important to Origin and its customers as reserves from nearby producing fields such as Thylacine are declining.

The project is designed in such a way that it minimises environmental impact by maximising use of existing infrastructure by recommissioning previously mothballed pipelines and tying into either the Otway or the Iona Gas Plant, operated by Origin and TRUenergy respectively. Therefore project activities are limited to the construction of two short pipeline sections, 10 km in total and the drilling of potentially up to four development wells.

Natural gas reserves provide low carbon, cost-effective energy to the region's population and would provide energy security to Victoria during its transition from coal power to less CO_2 intensive sources.

Background/rationale of project (describe the context / basis for the proposal, eg. for siting):

Reservoir studies conducted by Origin during the initial planning phase indicate that there are approximately 88 billion cubic feet (BCF) of reservoir fluid within VIC/RL2(v) of which there are approximately 59 BCF (P50) of recoverable gas, 723,000 barrels of recoverable condensate and 98,000 tonnes of LPG. The predicted gas reserves at the Speculant gas field are currently being determined through seismic surveys (results due in mid 2011). At the planned rate of extraction, the gas fields are expected to be commercially viable for 8 years although secondary recovery techniques and changes in commodity prices may affect this estimate.

Main components of the project (nature, siting & approx. dimensions; attach A4/A3 plan(s) of site layout if available):

The Halladale & Black Watch project will comprise the following key components:

- Preparation of a 1-1.5 ha (4 acre) drill pad site.
- Drilling up to four long-reach wells, including construction of offshore well bore pipelines.
- Construction of a temporary accommodation facility (up to 60 drilling personnel will be stationed on site).
- Construction of two sections (totalling 10 km) of 200 mm onshore gas pipeline. Two new sections of pipeline will be built:
    - one 1.3 km section to link the onshore wellhead to the existing gas pipeline network (Croft #1); and
    - second section (approximately 8.7 km in length) to link the Heytesbury Gas Plant to either the Otway or Iona Gas Plant.
- Construction of a small, onshore well head facility (100m x 100m) for the operational phase of the project.

Ancillary components of the project (eg. upgraded access roads, new high-pressure gas pipeline; off-site resource processing):

The ancillary components of the project include those related to construction being the access roads, a lined sump to store drill cuttings and water-based drilling fluids produced during construction of the surface hole, fencing of the drill site and key habitat areas (i.e. wetland areas), pipeline laydown areas, drainage control structures, power generation, site office and mess rooms, mud handling, a drilling crew accommodation camp and parking areas.

Key construction activities:

The key drilling activities are outlined below:

Onshore Well site

The site area is approximately 1-1.5 ha and work to prepare the site will commence approximately six months before the planned start of drilling. Before the drilling rig is mobilised, the drilling site or 'well lease' and access roads are prepared to accommodate the physical characteristics and operational requirements of the drill site (as shown below in Figure 2).

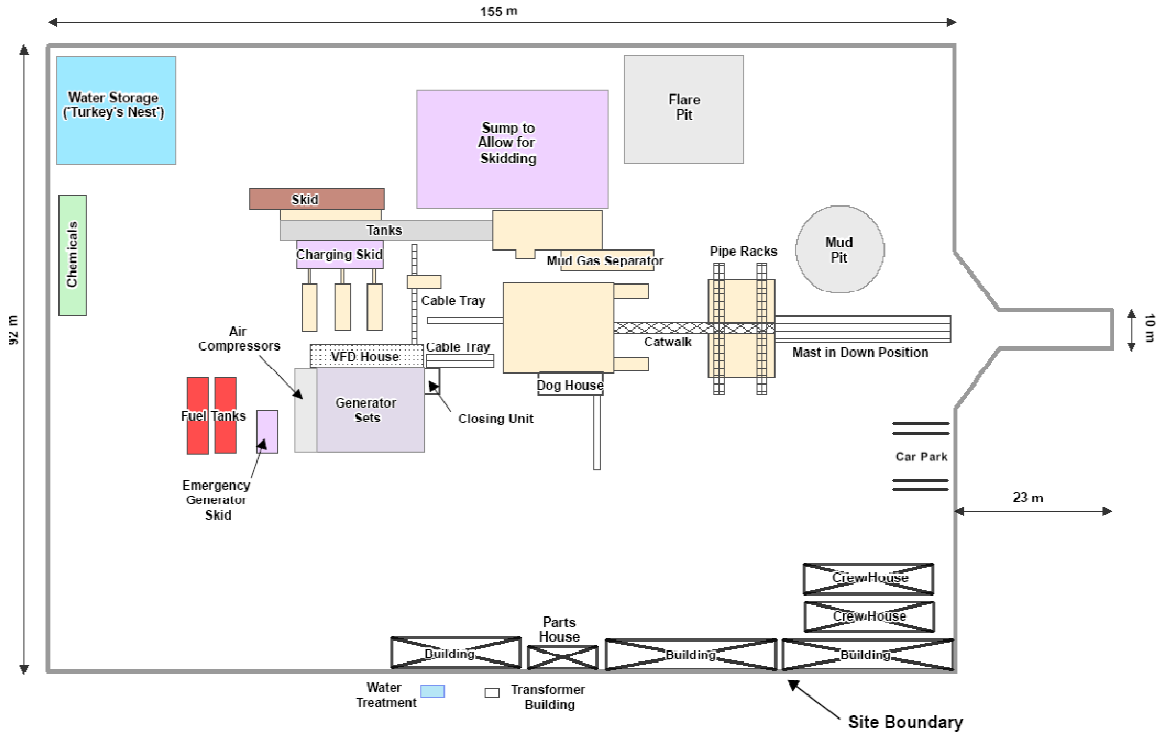


Figure 2 Layout of a typical drilling lease

Initial site preparation works will involve the installation of new access roads, security fencing, vegetation removal (minimised where possible), levelling of the site and drainage control. Once the fence is built, all site activity will take place inside the security fence.

Drilling operations

The wells will be drilled from shore to the offshore gas fields, termed extended reach wells. Extended reach is a term used for wells with a lateral distance to depth ratio greater than 2.0 (actual 2.7). The wells Origin is proposing to drill on Halladale & Black Watch extend laterally for approximately 4.5 - 5 km offshore and will penetrate the reservoir at a depth of about 1,800 m (Figure 3).

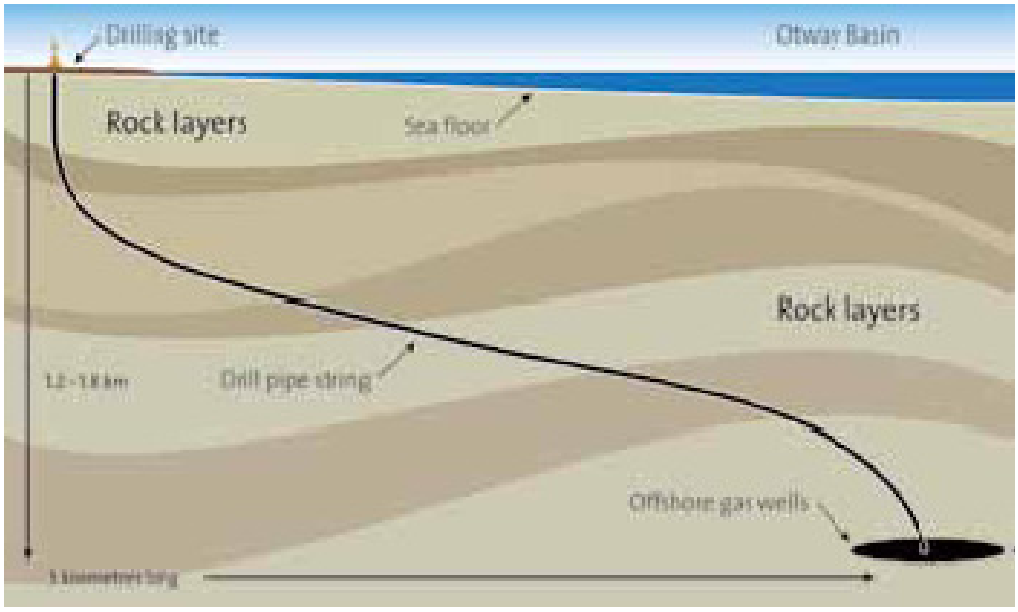


Figure 3 Stylised section of extended reach well

As is normal practice, Origin will use specialised equipment and services to steer the drilling bit to intersect the gas reservoir. Once under way, drilling will continue for about a year and as many as four wells may be drilled from the one onshore well location.

The well bore pipeline will be installed using the drilling rig and conventional directional drilling techniques. The wellbore pipeline will consist of the intermediate casing string which is typically set after the surface casing which isolates and maintains the stability of freshwater aquifers. In this case the intermediate casing or wellbore pipeline, will serve to build the well trajectory from its onshore origin to the offshore target. All casing strings will be cemented in place progressively as drilling continues to ensure a positive seal.

Due to the long reach nature of the well trajectory, the casing will be installed using a specialised technique which involves trapped air in the casing during installation in order to increase its buoyancy and thereby reducing friction so that the casing effectively "floats" into the (near horizontal) borehole over the lateral distance.

Drilling Crew Accommodation Facilities

Construction of a temporary drilling crew accommodation facility will involve living quarters for a 60-man crew (during peak drilling periods), recreation facilities such as a mess room and a TV room, as well as some mobile offices. Wastewater treatment and storage, rubbish collection and disposal and other waste management facilities will be provided along with necessary utilities such as communications, power, potable water etc.

Onshore Pipeline construction

The standard sequence of pipeline construction activities (Figure 4) will commence with securing access to the land and confirming access protocols with the landowner, concluding with reinstatement of sites and commissioning of the gas pipeline.

Construction activities will be confined to a designated area known as the right-of-way (ROW). The ROW will contain temporary vegetation stockpiles, topsoil stockpiles, trench spoil stockpiles, pipe stockpiles, the pipeline trench, a construction access track and drainage control structures.

As far as is practicable, construction will be timed to avoid the wetter months of the year to reduce construction delays, damage to tracks and farmlands and the risk of turbid run-off.

The pipeline will be constructed in the following phases:

Clear and Grade

The earthmoving phase of pipeline construction begins with clearance of vegetation and the grading of topsoil.

Pipe Stringing

The pipeline will be constructed of sections of steel pipe 12 or 18 m in length. Each section will be coated in two layers of fusion-bonded epoxy coating to reduce the risk of damage and corrosion and delivered to site with plastic end-caps to reduce the risk of access by animals.

Trench Excavation

The majority of the pipeline trench is excavated using bucketwheel ditchers while in areas of weathered or fresh rock, hydraulic excavators and rock saws will be used. The depth of the trench will vary with the terrain and the existing land use but will typically allow for a minimum cover of 1200 mm. Trench breakers will be used at regular intervals to prevent the trench being completely flooded during rain and to allow the escape of any animals that may make their way into the trench.

Open cut trenching is also proposed for waterways that are dry, or would result in minimal environmental impact, at the time of construction. The stream banks and bed will be rehabilitated to their existing morphology post construction.

Special Crossings

Origin proposes to construct the pipeline underneath roads by using horizontal directional drilling (HDD). This method does not involve excavation of a trench and instead, a small starter hole (the bell hole) is dug and a drilling rig used to directly install the pipe by boring at a low angle below the target structure.

Watercourse crossings will also be traversed by horizontal directional drilling (HDD) if the waterways are flowing and it is determined that open cut trenching may create environmental impacts through either disturbance to burrowing crays, riparian vegetation, or cause downstream water quality impacts.

Welding and Joint Coating

Welding links the individual pipe sections into a single, continuous pipe 'string' and may be carried out by either robotic or manual means. Once welding has been completed, every weld is X-rayed to ensure its integrity before being grit blasted in readiness for the joint coating that will further reduce the risk of corrosion and joint failure.

Lowering-in

Once the pipe string has been completed, a fleet of side-boom tractors lift the pipeline and carefully lower it into the trench. This process must be done with care to avoid damage to the pipe and requires both sufficient lateral clearance either side of the pipe and the use of a suitably fine-grained packing material (also known as bedding or padding) below the pipe.

Backfilling

Trench spoil is returned first and a slight crown formed over the trench to allow for settlement and similarly, crown breaks (i.e., periodic gaps in the line of the crown) are provided to maintain the natural drainage patterns in the area. The final layer of soil spread over the reinstated ROW is from the stockpiled topsoil and requires special care as it is this layer that generally determines the initial success of revegetation.

Hydrostatic Testing

The process of pressure testing the installed pipeline by filling and pressurising it with water (hydrostatic testing or hydrotesting) is a key component of the commissioning process.

Restoration of the ROW

At this point, construction of the pipeline has been completed and remaining works on site relate to restoring the ROW to its former condition, installing warning signs and removing construction materials. Areas of native vegetation will be rehabilitated using specialist advice from local experts and only using topsoil specifically set aside for areas of native vegetation.

Both the vegetation and the topsoil will be stockpiled for later reuse in the rehabilitation of the ROW due to their importance as a source of plant propagules such as seeds, rootstock and tubers.

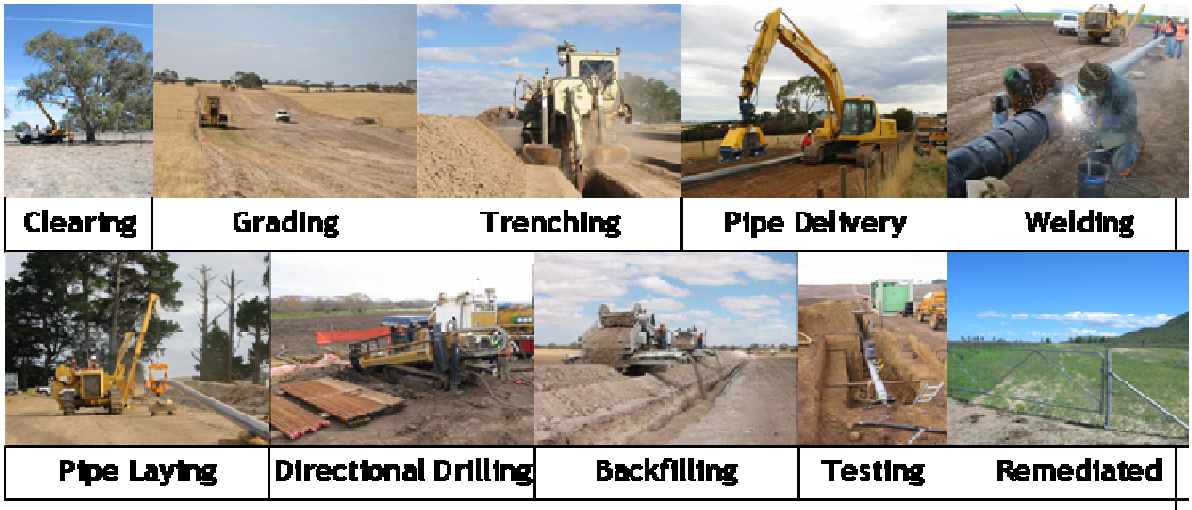


Figure 4 Typical pipeline construction activities

Connection to Otway or Iona Gas Plant

It is likely that the raw gas will be treated at the Otway Gas Plant which is now operated and partially owned by Origin Energy (67.5%). The existing plant will require some minor modifications to receive the gas from the Halladale and Black Watch fields. A production separator will be added, a filter coalescer unit, mercury removal units and some pumps and heaters.

Commercial terms and capacity constraints at the Otway Gas Plant may dictate that HBW gas processing will occur at the Iona Gas Plant. In this case Origin has existing agreements in place with TRUenergy to process, and if needed store the gas. Should this be the case, similar facilities will be required to receive the gas at Otway prior to transfer to the Iona Gas Plant. An additional section of pipeline (~300m) may be required to transport the gas from Otway to Iona Gas Plant. This short pipeline section would traverse existing cleared land.

Key operational activities:

On completion, a small, low-profile well head facility will be constructed at the onshore drilling location to capture and condition the gas prior to transport by pipeline to the Otway Gas Plant. It is planned that the operations at the well site would be monitored remotely through an integrated control system. Process conditions such as separator pressure, gas and associated water flow rates are monitored and transmitted to a central location via a radio telemetry system. In addition, operating changes such as reducing gas production or shutting in selected wells could also be managed via telemetry. This will enhance the safe operation of all facilities associated with the gas fields.

The onshore gas pipeline will operate continuously, and unscheduled outages are not expected. However, emergency line pipe, repair equipment and sufficient spares will be available in the event that urgent repairs are required.

Maintenance of the gas pipeline will include inspection surveys by vehicle along the gas pipeline and pigging* at regular intervals. If pigging detects any areas of concern, 'dig ups' of those pipeline sections may be required to enable visual inspections.

*An 'intelligent pig' is a pipeline inspection gauge used to monitor and record the internal condition of the gas pipeline.

Key decommissioning activities (if applicable):

In the event that the gas pipelines (onshore and offshore) are no longer required, they will either be decommissioned and mothballed, or abandoned:

Decommissioning and mothballing – depressurising the pipeline, then capping and filling it with an inert gas such as nitrogen or water with corrosion inhibiting chemicals at a slight overpressure. The cathodic protection would be maintained to prevent the pipe corroding and periodic inspections of the onshore sections would ensure prolonged pipeline integrity.

Abandonment – purging the pipe of natural gas, disconnecting it from the manifolds and removing all above ground facilities. The pipe would be cut at intervals to prevent inadvertent transfer of groundwater from one area to another. The pipe would then be left in place to corrode.

Both decommissioning and abandonment have the potential for small scale temporary environmental impacts that would need to be carefully managed. Recovering the pipe from the ground is unlikely to be a commercially viable option and would result in significant and unnecessary environmental and landowner impacts. A detailed rehabilitation and monitoring program would be developed and implemented in consultation with landholders, DPI, Council and DSEat the time of abandonment.

Is the project an element or stage in a larger project?

☒ No ☐ Yes If yes, please describe: the overall project strategy for delivery of all stages and components; the concept design for the overall project; and the intended scheduling of the design and development of project stages).

Is the project related to any other past, current or mooted proposals in the region?

☐ No ☒ Yes If yes, please identify related proposals.

The gas will be transported through to either the Otway or Iona Gas Plant for processing. The Otway Gas Plant Development Project (Woodside) was subject to formal assessment (EES/EIS) and approval under the Victorian *Environment Effects Act 1978* and the Australian Government's *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* in 2004. The EES/EIS highlighted the potential for other nearby gas fields in the Otway Basin to utilise the existing pipelines and plant in the future, should this prove commercially viable. The works approval application was approved based on a capacity average of 169 TJ/day, up to about 205TJ/day. The emission levels (noise and air) associated with the connection through to Otway and proposed works at the Plant, are predicted to be minimal and within the emission limits specified in the licence conditions for the Otway Gas Plant.

In addition, seismic surveys are currently being undertaken to better determine the gas reserves at the Speculant gas field. These surveys were assessed and approved under the *National Parks Act 1975* and the EPBC Act in 2010.

4. Project alternatives

Brief description of key alternatives considered to date (eg. locational, scale or design alternatives. If relevant, attach A4/A3 plans):

The potential onshore *well sites* were initially selected to optimise the development of the offshore gas fields. Three different onshore locations were identified as potential drill site locations for the extended reach wells. The sites were; Baileys Road, Blakes Road and Mathiesons Road. Offshore drilling was ruled out on the basis of cost and environmental impact compared with onshore drilling alternatives.

Origin commissioned several independent studies to explore the viability and potential impacts from drilling from each of the three potential locations. The studies comprised a Biodiversity Study (flora and fauna) and native vegetation (net gain) assessment (Biosis Research), a Cultural Heritage Study (Ochre Imprints) and a Drilling Technical Feasibility Study (K&M).
Following a full review of all appropriate constraints, the final well site, known as the 'Baileys Road' location was selected. This site is located within cleared agricultural land, and poses reduced environmental impacts.

The onshore *pipeline route* has been designed in order to maximise co-location opportunities (use of existing easements) and also involves the recommissioning of an existing pipeline in order to reduce disturbance to landowners and the environment. Initially two pipeline alignments were selected; being the 'base case' and an 'alternative' pipeline alignment (Attachment 2). The detailed pipeline survey and the field flora and fauna assessment undertaken in December 2010 confirmed

that the 'base case' remains the preferred pipeline route, with realignment in three areas of ecological significance.

Brief description of key alternatives to be further investigated (if known)**:**

The access routes to the drill site are currently being reassessed in order to further reduce the extent of native vegetation removal. Similarly the access routes for pipeline construction will be sited on existing access tracks and previously modified areas (where practicable) to minimise disturbance to vegetated and habitat areas.

5. Proposed exclusions

Statement of reasons for the proposed exclusion of any ancillary activities or further project stages from the scope of the project for assessment:

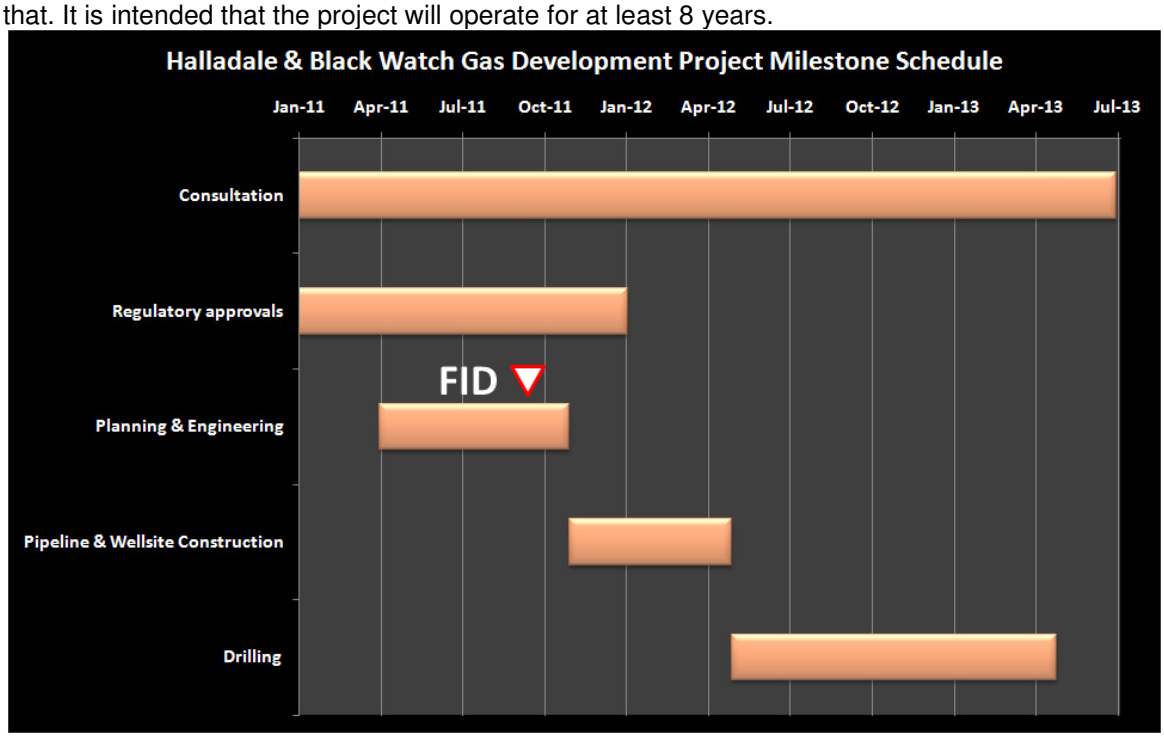
Not applicable.

6. Project implementation

Implementing organisation (ultimately responsible for project, ie. not contractor)**:**
Origin Energy Resources Limited

Implementation timeframe:

The project timeline indicates that drill site preparation and pipeline construction will begin in December 2011. As shown below, drilling is expected to begin in May 2012 and continue for 12 months ending in May 2013. First gas production from the Halladale and Black Watch gas fields is expected in mid 2013, with the additional two offshore wells (Speculant 1 & 2) to be drilled following that. It is intended that the project will operate for at least 8 years.



Proposed staging (if applicable):

Staging of construction works and gas production milestones are outlined above.

7. Description of proposed site or area of investigation

Has a preferred site for the project been selected?

☐ No ☒ Yes If no, please describe area for investigation.
If yes, please describe the preferred site in the next items (if practicable).

General description of preferred site, (including aspects such as topography/landform, soil types/degradation, drainage/ waterways, native/exotic vegetation cover, physical features, built structures, road frontages; attach ground-level photographs of site, as well as A4/A3 aerial/satellite image(s) and/or map(s) of site & surrounds, showing project footprint):

Topography, landform, geology and soils

The South East Coastal Plain consists of undulating Tertiary and Quaternary coastal plains and hinterlands that occur in several distinct segments (Warrnambool Plain, Otway Plain and Gippsland Plain subregions) rising up to 200 metres in altitude. The Warrnambool Plain subregion is dominated by nutrient deficient soils and low calcareous dune formations over a limestone plain, and the distinctive cliffed coastline.

The project site occurs on an area of undulating limestone plain with coastal dune sand deposits present in the local area. The site is located in geomorphological unit 6.2.3; Karst plains with depressions (Warrnambool) of the Corangamite and Glenelg-Hopkins Catchment Management Regions (Victorian Resources Online 2008). This geomorphological unit is characterised by a limestone plain which has developed many karstic features, particularly 'sinkholes'. These small limestone sinkholes vary between 20 and 100 m wide, with gently concave slopes and rounded margins.

Spectacular coastal cliffs, now eroded to give gorges, rock stacks and islands, and exposing cave entrances, formed by rising sea level over the past 15 000 years, mark the edge of the plain at the Southern Ocean. Associated soil types include deep sands over clay (sand depth may be variable) (Victorian Resources Online 2008).

Acid Sulphate Soils: Acid Sulphate Soils (ASS) could occur in localised low lying swampy areas such as the lower regions of Port Campbell Creek. Based on information provided by the Australian Soil Resource Information System (ASRIS), both the proposed drill site and the pipeline are located within an area identified as 'Low Probability' of ASS presence.

Drainage and waterways

No permanent water flows exist in the immediate area of the drill site. Some of the larger sinkholes in the surrounding farmland may hold water for most of the year. Most sinkholes however are very porous and do not retain water. A small wetland area surrounded by pasture also occurs towards the eastern boundary of the drill site.

The onshore pipeline route crosses Port Campbell Creek, Wallaby Creek and the upper reaches of several unnamed tributaries of these creeks. These creeks are generally degraded, flowing through exotic pasture with limited riparian vegetation (Biosis, 2010). Some areas have been revegetated. The waterways and aquatic ecology sampling locations within the Heytesbury pipeline study area are shown on Attachment 3.

Some of the larger sinkholes in the surrounding farmland may hold water for most of the year and provide fauna habitat i.e. the EPBC listed Growling Grass Frog.

The pipeline from the drill site to Croft is located within the boundaries of the Glenelg-Hopkins Catchment Management Authority (GHCMA). The new section of pipeline to be constructed between the Heytesbury and Otway or Iona Gas Plants, is located within the jurisdiction of the Corangamite Catchment Management Authority.

Native/exotic vegetation cover

The project area is dominated by existing agricultural lands which have been extensively cleared for grazing and dairy farming purposes (Figure 5). As such, the ecological value of the project area is generally low. The nearby Bay of Islands Coastal Park has significant ecological value.

Figure 5 Entrance to Bailey's Road well site

Whilst the area along the Heytesbury pipeline route is predominantly cleared agricultural land (Figure 6), there are areas of significant vegetation near North South Road (Damp Heath Scrub), and Port Campbell Creek, where the nationally significant Port Campbell Guinea Flower and Wavy Swamp Wallaby-grass were recorded in the recent field survey (Dec 2010).

Figure 6 Introduced pasture grassland along Heytesbury pipeline alignment

Results of the flora and fauna assessment of the project area undertaken by Biosis Research (December, 2010) are provided as Appendix A.

Built Environment

The proposed onshore drill site is located approximately 3km southwest of the locality of Nirranda South, 30 km east of Warrnambool and 300 km southwest of Melbourne. Property information for the drill site is Crown Allotment 52 of Nirranda Parish (52\PP3315) within the Moyne Local Government Area. This property forms part of a dairy farming enterprise located between Baileys Road (to the northeast) and the Bay of Islands Coastal Park (to the south).

Port Campbell is the closest regional centre, located approximately 7km south of the proposed Heytesbury pipeline and the Otway and Iona Gas Plants.

Road frontages

The proposed pipeline sections intersect a number of local roads (both sealed and unsealed), notably Bailey's Road, North South Road, and Cobden Port Campbell Road. Horizontal directional drilling will be used to construct the pipeline crossings underneath sealed roadways to allow traffic to continue with minimal disruption.

Site area (if known):
Onshore drill/well site: Up to 1.5ha

Route length (for linear infrastructure)

New pipeline section (Drill site to Croft #1)	1.5 km
New pipeline section (Heytesbury to Otway Gas Plant)	8 km
New pipeline section (Otway to Iona Gas Plant)	0.3 km

The width of construction 'Right of Way' will be ~30-50m.

The width of the rehabilitated pipeline easement will be 10m.

Current land use and development:

Agricultural production (dairy and beef cattle grazing) is the predominant land use in the Moyne and Corangamite Shires. There is also horticultural crop growing in the southern and coastal areas of the municipalities.

There are currently 17 known onshore gas fields in the Victoria section of the Otway basin of which five are in production (Geoscience Australia 2008). Major offshore fields in the Victorian section of the basin include La Bella, Minerva, Casino, Geographe and Thylacine.

Description of local setting (eg. adjoining land uses, road access, infrastructure, proximity to residences & urban centres):

The proposed onshore drill site has been sited in an area previously cleared for agricultural purposes, approximately 200m north of the Bay of Islands Coastal Park. In this area, the BICP forms a linear strip approximately 500m wide comprised of heath vegetation on the cliff tops, cliff faces and high energy beaches at the base of the cliffs.

Access to the proposed drill site is via Bailey's Road. The nearest dwellings to the drilling location are approximately 1.7 km and 2.3 km to the northeast and southeast respectively. The Great Ocean Road is located approximately 3km to the north of the drill site, although due to this visual separation, it is not expected that the road's scenic qualities would be affected.

Rural properties are located along the proposed pipeline route. Port Campbell is the closest regional centre, located approximately 7km south of the Heytesbury pipeline section and the Otway and Iona Gas Plants.

Planning context (eg. strategic planning, zoning & overlays, management plans):

The proposed drill site is located within Moyne Shire, with the section of pipeline between Heytesbury and Otway Gas Plants, extending into the Corangamite Shire.

Strategic and Local Policy Framework

The Moyne and Corangamite Municipal Strategic Statements (MSS) identify long-term strategic directions for land use and development in each municipality. A number of clauses of the SPPF and LPPF are of relevance to the project relating to biodiversity, significant environments and landscapes, natural resource management and economic development.

The Corangamite local planning policy framework (LPPF) specifically highlights the importance of oil and gas resource development to the region's economy (Clause 21.02 Key Influences). Similarly, Clause 19.03-6 Pipeline infrastructure aims to 'plan for the development of pipeline infrastructure subject to the *Pipelines Act 2005* to ensure that gas, oil and other substances are safely delivered to users …at minimal risk to people, other critical infrastructure and the environment'.

Zones and Overlays

Pursuant to the Moyne and Corangamite Planning Schemes, the land proposed to be developed is within the following zones:

- Farming Zone (predominantly) - Moyne and Corangamite Planning Schemes;
- Special Use Zone 1 – Waarre Road, Port Campbell – Gas Processing Plant, Corangamite Planning Scheme;
- Special Use Zone 2; Heytesbury Gas Facility, Timboon, Corangamite Planning Scheme;
- Special Use Zone 4 – Woodside (Otway) Gas Processing Plant; Corangamite Planning Scheme; and
- Road Zone 1 - Corangamite Planning Scheme.

Pursuant to the Moyne and Corangamite Planning Schemes, the following overlays apply to the land:

- Environmental Significance Overlay 1 - Moyne Planning Scheme;
- Significant Landscape Overlay 3 (Western Coastal Cliffs Landscape Area) - Moyne Planning Scheme;
- Vegetation Protection Overlay 2 - Corangamite Planning Scheme.

The proposed drill site is also in the vicinity of the Moyne Planning Scheme Wildfire Management Overlay (to the north).

The Bay of Islands Coastal Park is managed under the 'Port Campbell National Park and Bay of Islands Coastal Park Management Plan' (Parks Victoria 1998), which is administered by Parks Victoria.

Local government area(s):

The proposed Halladale and Black Watch Project is within the Moyne and Corangamite Shires.

8. Existing environment

Overview of key environmental assets/sensitivities in project area and vicinity
(cf. general description of project site/study area under section 7)**:**

The regional landscape is characterised by a broad flat to gently undulating plain with low windswept heathland vegetation, contrasting with high vertical and rugged cliffs. The region is dominated by nutrient deficient soils and low calcareous dune formations over a limestone plain which has developed many karstic features, particularly 'sinkholes'.

The project area is dominated by existing agricultural lands which have been extensively cleared for grazing and dairy farming purposes. As such, the ecological value of the project area is generally low. The Bay of Islands Coastal Park, located near the drill site, has significant ecological value.

The predominate habitat areas within the project area include:

- Heathy Woodland
- Heathland
- Scrub
- Introduced vegetation

A wetland at the eastern border of the drill site study area, and the numerous sinkholes throughout the project area provide additional habitat for native fauna. In particular the wetland provides habitat for water birds and frogs, including the potential for significant species, notably the EPBC listed Growling Grass Frog.

Native vegetation occurs in various patches along Baileys Road, with patches identified as Damp Heathy Woodland (EVC 793) and Heathy Woodland (EVC 48), both of high conservation significance.

The private farmland within the pipeline study area has also been largely cleared and developed as exotic pasture for sheep and cattle grazing. Small remnants of native vegetation, while largely impacted by introduced species, were identified on private agricultural land and in roadside reserves as outlined in Section 12. The Heytesbury site has been highly modified and is of poor quality for native fauna.

Biosis' (2009, 2010a) field surveys conclude that the project area does not contain suitable habitat for any significant or migratory species, however some may forage or disperse across the site.

Aquatic habitats:

A variety of aquatic habitats also occur within the Heytesbury site, including five dams, a marshy swamp and two creeks (with flowing water). Two of the dams have been fenced off from livestock disturbance and therefore contain dense emergent riparian and floating aquatic vegetation.

Port Campbell Creek, Wallaby Creek and an unnamed tributary of Port Campbell Creek were all found to contain habitat which supports native fish and decapod crustaceans. All sites were relatively low in cover of aquatic macrophytes; however some aquatic vegetation may have been reduced or removed temporarily from sites following recent flooding.

For the Halladale and Black Watch development, regionally controlled weeds are considered to be of greatest relevance as these weeds are usually widespread and considered important in a particular region (Biosis, 2010). A number of regionally controlled weeds were recorded within the project area including Spear Thistle, Hemlock and Hawthorn.

In relation to Cultural Heritage, a review of the Victorian Aboriginal Heritage Register (VAHR) identified that the closest aboriginal place to the proposed drill site is a stone artefact scatter (VAHR 7420-0047), located approximately 200m to the north east of the site. Ochre Imprints concluded from the 2009 field survey, that the area has been significantly disturbed by agricultural practices such as ploughing, reducing the likelihood of these scatters existing *in situ* anywhere in the proposed drill site area. Further sub-surface testing will determine the extent of the artefact scatter, and the proximity of the pipeline route (from the drill site) to this registered site.

The VAHR search also identified four Aboriginal places within 1 km of the proposed Heytesbury pipeline. Of these, one Aboriginal place (VAHR 7520-0174) has been previously located on Port Campbell Creek, within 100 m of the project area. The remaining places are greater than 600 m from the project area. A zone 200 m either side of Port Campbell Creek has been identified as a zone of moderate sensitivity for Aboriginal places.

The nearest residences to the drilling location are approximately 1.7 km and 2.3 km to the northeast and southeast respectively, and the site is 3km south of the Great Ocean Road. Rural properties exist along the proposed pipeline route.

The existing noise environment for the project area is typical of a rural area, with low levels of background noise dominated by natural sources (e.g. wind, rain, animals, and insects) and intermittent noise from vehicular traffic and agriculture activities.
Two large commercial gas plants are currently operational in the area, being the Otway Gas Plant (previously owned and operated by Woodside Energy) and the Iona Gas Plant (TRUenergy).

9. Land availability and control

Is the proposal on, or partly on, Crown land?

☐ No ☒ Yes If yes, please provide details.

A section of the offshore well bore pipeline traverses through Coastal Crown Land.

Current land tenure (provide plan, if practicable):
In 2008 a retention lease, VIC/RL2(v), was granted over the Halladale and Black Watch gas reservoirs. The Speculant gas field, currently the subject of additional seismic surveys, are also located within this lease area.

The well bore pipeline commences onshore in Crown Allotment 52 of Nirranda Parish (52\PP3315) within the Moyne Local Government Area, before extending offshore to the target well locations. This property forms part of a dairy farming enterprise located between Baileys Road (to the northeast) and the Bay of Islands Coastal Park (to the south).

The pipeline section's traverse privately owned farmed land, a number of local roads (Bailey's Road, North South Road, and Cobden – Port Campbell Road) and a series of watercourse crossings (Port Campbell, Wallaby Creek and a number of unnamed tributaries).

Origin is liaising with the Department of Sustainability and Environment, and local Council regarding coastal crown land matters, and with VicRoads in relation to the proposed road crossings.

Intended land tenure (tenure over or access to project land):

Origin will discuss options for agreements with the landowner of each affected property to create pipeline easements across the privately owned farmed land.

Other interests in affected land (eg. easements, native title claims):

Construction access will be confirmed in consultation with landowners to ensure that disruption to existing land uses and farming practices is minimised as far as is practicable.

Origin has conducted a search of the land parcels associated with the proposed drill site and pipeline alignment and can confirm that Native Title has been extinguished for these areas.

10. Required approvals

State and Commonwealth approvals required for project components (if known):
The project is currently being considered under various Federal and State legislation:

Commonwealth Legislation
Environment Protection and Biodiversity Conservation Act 1999
Potential matters of National Environmental Significance (NES) were assessed in Biosis' flora and fauna assessment. An EPBC referral will be submitted to the Australian Department of Sustainability, Environment, Water, Population and Communities. It is deemed unlikely that the project constitutes a controlled action (Biosis, 2010).

State legislation
Planning and Environment Act 1987
Planning approval will be required for the proposed development and use of the drill site, the temporary accommodation facility and native vegetation removal. Discussions are continuing with Moyne Shire regarding the statutory planning process.
Although exemption from planning controls are available for the pipeline under the *Pipelines Act 2005*, the objectives and requirements of each of these, notably objectives of the Native Vegetation Framework, will be considered and assessed including the identification of offset targets for any native vegetation removal.

Coastal Management Act 1995 consent will be required for the drilling component of the Halladale and Black Watch Project. Relevant policies, such as the Victorian Coastal Strategy and the South West Coastal Action Plan, will be considered in the consent application.

National Parks Act 1975; The onshore drilling location is situated approximately 200m from the Bay of Islands Coastal Park. Drilling beneath this park will be required to access the offshore hydrocarbon targets. Under Section 40 of this Act, approval from the Minister for Environment will be required for the offshore well bore pipeline to traverse beneath the surface (~300-700m) of the BICP.

A Cultural Heritage Management Plan (CHMP) will be developed for the project (combined drilling activities and pipeline construction) under the *Aboriginal Heritage Act 2006*. A Notice of Intent to prepare a CHMP has been lodged for the Project.

Water Act 1989. A licence to construct & operate a bore is required to take and use groundwater (drilling and dust suppression).

Environment Protection Act 1970. Compliance with the relevant State Environment Protection Policies including Waters of Victoria, Noise (N-3), Groundwaters of Victoria and Air Quality Management.

Development approval is also required under Victorian petroleum legislation including the *Petroleum (Submerged Lands) Act 1982, Petroleum Act 1998* and the *Pipelines Act 2005*. Approved EMPs are required under each of these Acts.

Have any applications for approval been lodged?

☒ No ☒ Yes If yes, please provide details.

Approval agency consultation (agencies with whom the proposal has been discussed):

The proposed development has been discussed with officers of the following government agencies:

- Department of Planning and Community Development – Environment Assessment Branch
- Department of Sustainability and Environment (Biodiversity – South West region, and the Forest and Parks Division) – chair the National Parks Working Group.
- Moyne and Corangamite Shires
- Southern Rural Water
- Parks Victoria
- EPA Victoria
- Department of Primary Industries (Minerals and Petroleum Regulation Branch)
- Commonwealth Department of Sustainability, Environment, Water, Population and Communities

Other agencies consulted:

VicRoads has also been consulted regarding the project's development, and construction requirements for road crossings.

PART 2 POTENTIAL ENVIRONMENTAL EFFECTS

11. Potentially significant environmental effects

Overview of potentially significant environmental effects (identify key potential effects and comment on their significance and likelihood, as well as key uncertainties):

A number of technical investigations have been undertaken by specialist consultants to address the potential impacts of the Halladale and Black Watch project. The specialist studies have included:

- Flora and Fauna (Terrestrial and aquatic)
- Cultural Heritage
- Greenhouse gas emissions
- Noise and Vibration

The community consultation program and identification of potential social impacts have been undertaken by Origin's stakeholder team.

Whilst an overview is provided below, a more detailed summary of the key studies is presented in the following sections of this referral.

Flora and Fauna (Terrestrial Ecology) - Biosis Research

Although much of the existing physical environment throughout the project area has been modified by agricultural uses, detailed field assessments were undertaken to assess the project against State and Federal environmental legislation.

Terrestrial flora and fauna surveys were conducted by Biosis Research at the site from late October 2008, through 2009 to December 2010. An assessment of aquatic habitat and waterways was also conducted in December 2010. A list of studies is provided in Section 12.

The project area is dominated by existing agricultural lands which have been extensively cleared for grazing and dairy farming purposes. Small remnants of native vegetation, while largely impacted by introduced species, were identified on private agricultural land and in roadside reserves. The Bay of Islands Coastal Park, located near the drill site, has significant ecological value.

The potential impacts to flora and fauna values include:

1. Native vegetation removal
2. Habitat fragmentation
3. Increased sedimentation and erosion
4. Potential impacts of noise, lighting and dust on significant fauna
5. Ability of native fauna to become trapped in an open trench

Biosis (2010) concludes that, while some significant species may use the project area on occasion, it does not provide important habitat for an ecologically significant proportion of any of these species. Therefore the project is not expected to have significant impacts on any of the State or Nationally listed species identified as potentially occurring within the study area.

Flora and Fauna (Aquatic Ecology) - Biosis Research

Port Campbell Creek, Wallaby Creek and an unnamed tributary of Port Campbell Creek were all found to contain habitat which supports native fish and decapod crustaceans. All waterways have suffered some form of degradation, with all sites being affected by removal of native and riparian vegetation, and increased sedimentation (refer Attachment 3).

Open cut trenching is proposed for waterways that are dry, or where there would be minimal environmental impact at the time of construction. The stream bed will be rehabilitated to its existing morphology post construction. Watercourse crossings will be traversed by horizontal directional drilling (HDD) where it is determined that open trenching could cause physical disturbance to stream banks with riparian habitat, if burrowing crays occur within the area, or if open cut trenching would create downstream water quality impacts.

Further ecological assessment will be undertaken at the proposed waterways crossings prior to construction to inform a decision as to whether open cut trenching or horizontal directional drilling would be required. This will include assessment and pre-construction monitoring of:

- Fish and macro-invertebrates
- Water quality parameters (turbidity, pH, dissolved oxygen, flow type)
- Stream bed morphology and substrate type

Further technical assessment will also be required closer to the time of construction in order to support authorisation from the Corangamite Catchment Management Authority for works on a waterway.

Where HDD is undertaken, a 10-m-wide buffer zone will be flagged around the section of watercourse and ground-disturbing works excluded from the riparian zone.

Construction will be timed to avoid the wetter seasons of the year. In addition, sediment control structures such as cut-off drains, sedimentation dams and silt fences will be used to prevent sediment entering watercourses.

Cultural Heritage (Ochre Imprints)

Drill site

Whilst no registered Aboriginal Places occur within the drill site area, given the site's proximity to the coastal cliffs, the broader study area is deemed to be of moderate archaeological sensitivity. Furthermore, given that the area had been significantly disturbed by agricultural practices such as ploughing, Ochre imprints concluded that there was a reduced likelihood of any *in situ* artefact scatters being impacted upon by the proposed drilling.

An artefact scatter (VAHR7420-0047) was located in the 2009 field survey conducted as part of the Speculant Project. This field survey was conducted following the pipeline infrastructure desktop assessment so it has not been identified in the pipeline report (Appendix B). The site has been recorded as a surface scatter although the full extent of the site has not been determined. Further sub-surface testing will better describe the geographical extent of the site, and any potential interaction between the proposed pipeline route from the well site and this registered cultural heritage site.

Heytesbury Pipeline

As previously reported, a search of the VAHR determined that four Aboriginal places occur within 1 km of the project area. Of these, one place (VAHR 7520-0174) is within 100 m of the project area, at Port Campbell Creek. This site will be fenced, with a buffer established, prior to pipeline construction, to avoid disturbance.

A zone 200 m either side of Port Campbell Creek has been identified as a zone of moderate sensitivity for Aboriginal places. It is possible that previously unknown indigenous and European cultural heritage sites could be discovered during vegetation clearance and ground disturbing works.

Further work proposed to complete the CHMP includes pedestrian survey and subsurface testing intended to identify Aboriginal cultural heritage and refine the zones of cultural heritage sensitivity. This additional field survey is scheduled for February 2011.

Social Impacts

A Baseline Social Impact Study will be undertaken of the local Otway region. This regional study will provide information on which to develop a targeted Community Engagement Plan for the Halladale and Black Watch Project. A full Social Impact Assessment and Management Plan may then be developed to support the statutory planning approvals process.

Noise

The existing noise environment for the project area is typical of a rural area, with low levels of background noise dominated by natural sources (e.g. wind, rain, animals, and insects) and intermittent noise from vehicular traffic and agriculture activities.

A noise assessment is currently being undertaken, including the following activities:

- Survey the proposed drilling location and identify noise sensitive receiver locations.
- Outline the relevant noise regulations which relate to the project.
- Deployment of noise monitoring equipment for a duration of one week, to establish the current background noise levels.
- Predict noise levels from drilling operations through the means of SOUNDPLAN noise modelling to establish the potential noise impact at the receiver locations.
- Provide a report outlining current noise conditions and the potential noise impact of the proposed drilling site.
- Where necessary provide concept noise mitigation design advice.

Based on the noise profile of the proposed drill rig (~85 dB), and attenuation due to distance between the rig and the boundary of the Bay of Islands Coastal Park, Biosis reports that fauna is unlikely to be significantly impacted by drilling operations although they are likely to avoid the habitat in close proximity to the drilling site (Appendix A).

Greenhouse Gas Emissions and Air Quality (WorleyParsons)

The emissions generated from the drill rig and support vehicles add to the GHG load in the atmosphere, which adds to the global warming potential. However, these emissions are negligible and short-term, and therefore not significant contributors to Victoria's or Australia's total emissions.

Whilst the nameplate capacity of the Otway Gas plant will be increased from 205TJ to 225TJ/day to cater for peak winter demand, the greenhouse gas emissions associated with this increase (25 TJ/day average increase in gas production, 9000 TJ/year) have been calculated at 18,820 t CO_2-e/year. When combined with the predicted fugitive emissions from drilling activities, and construction and operation of the pipeline for the transport of gas, this totals 19,236 t CO_2-e/year, well below the EES referral criteria of 200,000 t CO_2-e/year.

The emission of non-GHG gases, such as NO_X and SO_X, can lead to a reduction in local air quality. Air quality impacts are not expected to be significant enough to present a health hazard, but may in some circumstances, such as a temperature inversion, cause a decrease in visual amenity. However this is likely to be localised and temporary and is considered low risk.

12. Native vegetation, flora and fauna

Native vegetation

Is any native vegetation likely to be cleared or otherwise affected by the project?

☐ NYD ☐ No ☒ Yes If yes, answer the following questions and attach details.

What investigation of native vegetation in the project area has been done? (briefly describe)

Biosis Research has conducted surveys at the site from October 2008 through 2009, to December 2010. Each of these has included flora and native vegetation assessments.

Specifically a net gain assessment was undertaken of the roadside vegetation near Bailey's Road and offset targets identified in Feb 2010. Biosis reduced the rating of the Damp Heathy Woodland from very high conservation significance vegetation to only high conservation significance in the November 2010 survey (Appendix A).

What is the maximum area of native vegetation that may need to be cleared?

× NYD Estimated area as detailed below.

The maximum amount of native vegetation losses have been calculated for each project component as follows:

Halladale and Black Watch drill site

A number of patches of native vegetation along Bailey's Road may be required to be removed to allow for construction access. The extent of native vegetation proposed for removal potentially includes:

- 0.03 ha (0.01 habitat hectares) of High conservation significance Damp Heathy Woodland EVC. This remnant patch of vegetation was initially classified as being of very high conservation significance. However it has since been re-rated as of only high conservation significance, as significant fauna is unlikely to occur in this small linear remnant.
- 0.21 ha (0.08 habitat hectares) of High conservation significance Heathy Woodland EVC
- Less than 0.01 ha (less than 0.01 habitat hectares) of wetland vegetation if only 2.5m vegetation required for removal. In the case that draining of the wetland is required, 0.12 ha (0.05 habitat hectares) of wetland vegetation,
- scattered native shrubs,
- scattered Austral Bracken *Pteridium esculentum*,
- pruning up to 1/3 of one tree outside a remnant patch, Messmate Stringybark *Eucalyptus obliqua*. According to DSE pre-1750 mapping, this tree is a remnant of Damp Heathland/Damp Heathy Woodland Mosaic EVC. The size (diameter at breast height) was not measured during the initial field assessment as removal is not expected. The conservation significance of this tree, regardless of its size, is low, as there are no threatened species or other attributes to increase its' rating.

In summary the maximum amount of losses at the Halladale site are:

- Drill site 0 habitat hectares
- Access routes (drill site) 0.09 habitat hectares

The access routes are currently being resurveyed in an effort to further reduce the extent of native vegetation removal required.

Heytesbury site

The native vegetation along the proposed Heytesbury pipeline route was assessed in Nov 2010. Whilst the alignment, and required access routes are yet to be finalised, the maximum amount of losses have been calculated.

- Heytesbury (base case - preferred) alignment 0.21 habitat hectares
- Heytesbury (alternative) alignment 0.26 habitat hectares

Losses for each EVC and habitat zone are presented in Section 5.3 of Biosis' assessment report, 2010 (Appendix A). These have been further reduced as a result of the pipeline realignments as described in Section 13: Flora and Fauna.

How much of this clearing would be authorised under a Forest Management Plan or Fire Protection Plan?

× N/A ..... approx. percent (if applicable)

Which Ecological Vegetation Classes may be affected? (if not authorised as above)

× NYD × Preliminary/detailed assessment completed. If assessed, please list.

The native vegetation remnants comprise:

Halladale and Black Watch well site

Only minor clearing of roadside vegetation is proposed to create access and safe turning circles for construction vehicles. These access routes are currently being revisited in order to further reduce the extent of native vegetation removal required. However the maximum losses are:

- Damp Heathy Woodland EVC 793 High conservation significance (downgraded from very high significance as initially categorised).
- Heathy Woodland EVC 48 High conservation significance

Heytesbury Pipeline Site

- Lowland Forest EVC 16 Medium conservation significance
- Damp Heath Scrub EVC 165 High conservation significance
- Sedgy Riparian Woodland EVC 198 High conservation significance
- Swamp Scrub EVC 53 High conservation significance

Have potential vegetation offsets been identified as yet?

☒ NYD ☐ Yes If yes, please briefly describe.

Some offsets have been identified by Origin, notably EVC 48: Heathy Woodland in the Warrnambool Plain bioregion, however offset targets and potential offset sites for other EVCs will be identified following additional pipeline survey and confirmation of the extent of native vegetation removal.

Other information/comments? (eg. accuracy of information)
No FFG or EPBC listed communities occur within the study area.

NYD = not yet determined

Flora and fauna

What investigations of flora and fauna in the project area have been done?
(provide overview here and attach details of method and results of any surveys for the project & describe their accuracy)

A series of flora and fauna assessments have been conducted at the site from late 2008 through to 2010. These include:

- A preliminary flora assessment was undertaken in late 2008. A fauna assessment was not undertaken; however, general observations of the terrestrial fauna habitat within the study area were noted during the botanical site inspection.
- Speculant 3D Transitional Seismic survey (assessed area immediately adjacent to the proposed drill site). Field survey conducted from 23 November through to 27 November 2009.
- Flora and desktop terrestrial fauna assessment (June 2009), including review of FIS database, and the EPBC Act DSEWPC database.
- Net gain assessment of roadside vegetation (Feb 2010), as previously highlighted in section 12, Native Vegetation.
- Aquatic Habitat Assessment and survey (Oct 2010).
- Flora and fauna survey of the proposed Heytesbury pipeline – flora and terrestrial fauna – late Nov/Early Dec 2010.

Have any threatened or migratory species or listed communities been recorded from the local area?

☐ NYD ☐ No ☒ Yes If yes, please:

- List species/communities recorded in recent surveys and/or past observations.
- Indicate which of these have been recorded from the project site or nearby.

Drill Site

Biosis identified five species of State and National significance that have been recorded within or immediately adjacent to the proposed drill site.

1. Orange-bellied Parrot – (EPBC/FFG listed) - Recorded within the Bay of Islands Coastal Park in 2002.
2. Southern Bent-wing Bat (EPBC/FFG listed) – detected by ANABAT survey during the November 2009 Biosis survey.
3. Baillon's Crake – (FFG Act listed), recorded foraging at wetlands on site by Biosis.

Whilst the following species are not listed as threatened under the FFG Act, they are recognised on the DSE advisory list.

4. Brown Quail – (DSE Advisory List – near threatened). Recorded at the boundary of the

Bay of Islands Coastal Park by Biosis in November 2009.

5. Hardhead (DSE List vulnerable) - Recorded within the Bay of Islands Coastal Park in 2002.

A further eight EPBC listed migratory species have been recorded within 5km of the study area (Biosis, 2010).

Heytesbury Pipeline Site

A series of targeted fauna surveys were conducted on site. One species of state significance, Otways Cray *Geocharax gracilis*, was recorded in the onsite survey in November 2010. Whilst this species is not listed under the FFG Act, it is recognised as endangered on DSE's advisory list.

No FFG or EPBC listed communities occur within the study area.

If known, what threatening processes affecting these species or communities may be exacerbated by the project? (eg. loss or fragmentation of habitats) Please describe briefly.

Whilst *Phytophthora cinnamomi* (cinnamon fungus) has not been recorded from the local area, movement of earthmoving equipment during the proposed works could potentially result in the introduction of *Phytopthora*. The spread of this pathogen is listed as a potentially threatening process under the FFG Act. Vehicle hygiene procedures, including washdowns and inspections, will be detailed in the Drilling and Pipeline Environment Management Plans.

Are any threatened or migratory species, other species of conservation significance or listed communities potentially affected by the project?

☐ NYD ☒ No ☐ Yes If yes, please:

- List these species/communities:
- Indicate which species or communities could be subject to a major or extensive impact (including the loss of a genetically important population of a species listed or nominated for listing) Comment on likelihood of effects and associated uncertainties, if practicable.

Fauna Species

Biosis Research has undertaken a preliminary risk assessment for each of the state and nationally listed species that are deemed to have at least a medium likelihood of occurrence in the project area. A medium level of likelihood is assigned where there are "records of terrestrial species within 5km of the site or of aquatic species in the relevant basin/neighbouring basin but habitat limited in its capacity to support the species due to extent, quality or isolation" (Biosis, 2010).

An impact assessment was undertaken for those species deemed to have at least a medium level of likelihood of occurrence in the project area. This assessment, presented as Table 11 in Biosis' assessment (Appendix A) reports that, assuming that mitigation measures are implemented, a low level of impact is predicted for all species identified, with the exception of the Southern Toadlet (*Pseudophryne semimarmorata*), Otways Cray (*Geocharax gracilis*), and the Hairy Burrowing Cray (*Engaeus sericatus*). Additional targeted survey will be conducted prior to construction to confirm presence of these species. If present at the proposed watercourse crossing, then horizontal directional drilling, at a minimum depth of 2.5m, would be undertaken.

Potential impacts on the Southern Toadlet are more difficult to avoid given this species' broad habitat preferences; known to breed in highly degraded wetland areas. Potential impacts will be reduced to some extent by the proposed timing of pipeline construction, scheduled to occur in the drier months to avoid potential impacts on wetland habitat.

Biosis (2010) concludes that, while some conservation significant and migratory species, may use the project area on occasion, it does not provide important habitat for an ecologically significant proportion of any of these species.

Potential Impacts of Noise on Fauna

Biosis' assessment of the potential impacts of noise from drilling operations at the Halldale and

Black Watch drill site, reports that fauna species present within, or in close proximity to, the study area are likely to display adaptive behavioural changes to increases in noise resulting from drilling operations. The most likely adaptation will be habitat shift or avoidance, with the majority of species actively avoiding habitat in close proximity to the drilling site.

Noise is likely to have a localised negative impact on foraging success for the Southern Bent-wing bat, due to interference with the species echolocation ability, leading to avoidance of this area. Noise may also mask the call of the Rufous bristlebird, although this species was not detected in close proximity to the drilling site. As such, the Project is not expected to significantly impact on any of the State or Federally listed species identified.

Flora species

Two flora species of state and national significance were recorded within the study area in the recent survey (Dec 2010). These species are not FFG or EPBC listed.

• Port Campbell Guinea Flower *Hibbertia truncata* (DSE Advisory List rare, Nationally significant).

This species was recorded within the Swamp Scrub to the east of North South Road. This vegetation patch appears to be associated with a spring which is partly dammed and has been fenced to exclude stock.

• Wavy Swamp Wallaby-grass *Amphibromus sinuatus* (DSE Advisory List vulnerable - State significant).

Wavy Swamp Wallaby-grass was recorded at one location within the study area. The area was characterised by occasional native aquatic species in a small wetland dominated by introduced species. The wetland was grazed with high weed levels.

There is also a medium likelihood of Slender Pink-fingers *Caladenia vulgaris* (DSE Advisory List rare – State significant) occurring in Heathy Woodland and Damp Heathy Woodland remnants within the study area. This vegetation was only assessed along roadsides at Bailey's Road (proposed access route) which are fragmented and relatively low quality.

Each of these conservation significant flora species will be avoided during Project construction.

Is mitigation of potential effects on indigenous flora and fauna proposed?

☒ NYD ☒ No ☒ Yes If yes, please briefly describe.

The Bailey's Road site was selected as the preferred drilling location due to the relatively low ecological sensitivity of the site, compared with the other sites initially identified. Clearing and levelling of the drill lease area and the construction of the temporary accommodation facility will occur within grassed paddock areas. The only impact that will occur in these locations is clearing of the introduced grass species in the already highly modified habitat. There will be no access by vehicles or personnel to the Bay of Islands Coastal Park.

The widening of Baileys road is of most concern because there are intermittent strips of conservation significant vegetation that line the roadside (Biosis, 2009). A maximum of 0.09 Hha is proposed for removal, with further survey work to reduce the extent of removal required.A number of areas of ecological sensitivity were identified along the Heytesbury pipeline route. The pipeline survey undertaken by JP Kenny considered these areas in its assessment and has been able to avoid them as follows:

- Port Campbell Creek Crossing – The pipeline was realigned to run to the south of the Sedgy Riparian Woodland habitat and cross the creek at a point with no vegetation. The creek crossing is only 1-2 metres wide in this section.
- North–South Road crossing – The pipeline was realigned to avoid two patches of Damp Heath Scrub (HZ5), in which the nationally significant Port Campbell Guinea Flower was located.
- Biosis identified an area of Swamp Scrub (HZ9) as shown in their assessment report (Figure 4c), that also contained a Port Campbell Guinea Flower. The proposed pipeline route has been moved to the south of this vegetation community. As such, no clearing or HDD under this vegetation is required.

The revised Heytesbury pipeline route, that avoids these areas of ecological sensitivity, is presented as Attachment 4.

A series of mitigation measures have also been outlined in Biosis' assessment report and will be incorporated into the Drilling and Pipeline Environment Management Plans, including

- Establishment and fencing of no-go zones to avoid disturbance to areas of significant habitat value.
- Avoid and minimize removal of native vegetation, in accordance with Victoria's Native Vegetation Framework.
- Implementation of Horizontal Directional Drilling (HDD) underneath habitat zones and Port Campbell Creek for pipeline crossings.
- Undertake design based on the use of the base case pipeline route at the Heytesbury site. This route is a preferred option as it will result in the need to remove less native vegetation.
- Avoid impacts to fauna habitat. This can be achieved through fencing access tracks within 200 metres of wetlands at the Halladale site. This should include use of sediment fencing, acting as fauna proof fencing as well, buried into the ground and secured at regular intervals. This fencing should be constructed prior to commencement of construction works and should be regularly maintained.
- All stream banks and riparian zone areas around creek crossing have some potential for threatened burrowing crayfish to occur. There is limited knowledge on the depth at with relevant species burrow to, however conducting HDD at a minimum depth of 2.5m should avoid the tunnels of these crayfish species.
- Weed control measures, including washdown procedures and vehicle inspections.

Other information/comments? (eg. accuracy of information)

Additional pipeline survey work is proposed to further reduce the extent of native vegetation removal required.

13. Water environments

Will the project require significant volumes of fresh water (eg. > 1 Gl/yr)?

☐ NYD ☒ No ☐ Yes If yes, indicate approximate volume and likely source.

It is predicted that less than 20ML of fresh water will be required for drilling activities, pipeline construction and hydro testing.

Will the project discharge waste water or runoff to water environments?

☐ NYD ☒ No ☐ Yes If yes, specify types of discharges and which environments.

Are any waterways, wetlands, estuaries or marine environments likely to be affected?

☐ NYD ☐ No ☒ Yes If yes, specify which water environments, answer the following questions and attach any relevant details.

Waterways

There are no waterways located within the vicinity of the proposed drill site or the pipeline connection to Croft #1.

The Heytesbury pipeline route crosses Port Campbell Creek, Wallaby Creek and the upper reaches of several unnamed tributaries of these creeks. These creeks are generally degraded, flowing through exotic pasture with limited riparian vegetation (Biosis, 2010). Some areas have been revegetated.

As previously stated, horizontal directional drilling will be undertaken where required to avoid environmental impacts. Further ecological assessment to determine potential localised impacts, (i.e. flow, turbidity, likely presence of burrowing crays) will inform a decision as to whether open – cut trenching or HDD will be adopted at a particular watercourse crossing.

Whilst it's considered unlikely that waterways will be detrimentally impacted by the proposed pipeline construction, there is still potential for contamination of surface water environments due

to accidental release of drilling muds, poor construction techniques, inappropriate storage of chemicals and/or as a result of a major chemical spillage, or from ineffective waste management practices. Sources of potential contamination will be strictly managed and therefore the risk of contamination of the site and surrounding water environments are considered low.

Construction activities will occur during summer months when rainfall is low. This will ensure that erosion and sedimentation through run-off is minimised. Stockpiles will also be located away from waterways or drainage lines. All project activities will cease during periods of high rainfall to reduce the likelihood of erosion and sedimentation occurring.

Specific erosion and sedimentation measures will be defined in the Pipeline Environment Management Plan (EMP) to be approved under the *Pipelines Act 2005*.

Wetlands

A small wetland at the eastern border of the project area, and the numerous sinkholes throughout the project area provide habitat for native fauna. In particular the 'sinkholes' provide habitat for water birds and frogs, including the potential for significant species, as discussed previously. Wetlands with the potential to provide suitable fauna habitat will be fenced with a 200m buffer established to prevent potential impacts to habitat values.

Although there may be some interaction with aquatic environments, Biosis predicts that, assuming the proposed mitigation measures are applied, the level of impact is predicted to be low.

Are any of these water environments likely to support threatened or migratory species?

☐ NYD ☐ No X Yes If yes, specify which water environments.

Port Campbell Creek, Wallaby Creek and an unnamed tributary of Port Campbell Creek were all found to contain habitat which supports native fish and decapod crustaceans, including the state significant Otways Cray *Geocharax gracilis*. These water bodies also provide potential habitat for the state significant Hairy Burrowing Cray *Engaeus sericatus;* however there was a lack of suitable habitat for any other significant aquatic fauna species. All waterways have suffered some form of degradation, with all sites being affected by removal of native, riparian vegetation and increased sedimentation.

In relation to the wetland areas located near the proposed drill site, Biosis (2009, 2010a) concluded that the project area does not contain critical habitat for any threatened or migratory species. However, it was noted that one of these species, the Growling Grass Frog *Litoria raniformis*, has the potential to occur within the wetland at the east of the project area, and if present, may also forage or disperse across the project area.

This wetland area will be fenced with a 200m buffer established, to avoid any construction related impacts.

Are any potentially affected wetlands listed under the Ramsar Convention or in 'A Directory of Important Wetlands in Australia'?

☐ NYD ☒ No ☐ Yes If yes, please specify.

Could the project affect streamflows?

☐ NYD ☒ No ☐ Yes If yes, briefly describe implications for streamflows.

Potential impacts to streamflows are predicted to be minimal as construction will occur in drier months, when some of the watercourses identified in the recent survey are unlikely to be present. If open trenching is undertaken, the presence of a coffer dam to isolate the construction ROW will be short term and temporary (in the order of 24hrs). If it is determined that there may be adverse impacts on perennial watercourses ,i.e. Port Campbell Creek, then the waterway will be traversed by horizontal directional drilling (HDD) to avoid impacts to streamflows.

Hydrotest water will not be sourced from local waterways.

Could regional groundwater resources be affected by the project?

☐ NYD ☒ No ☐ Yes If yes, describe in what way.

It is estimated that less than 20ML of groundwater will be used for the proposed drilling activities.

As the drill site is located in the Nullawaare Water Supply Protection Area, water would be purchased from an existing entitlement holder rather than Origin extracting an additional volume from the aquifer.

Shallow groundwater may also be encountered in the project area. There is potential for contamination of this groundwater due to infiltration of drilling muds during drilling operations or pipeline construction, seepage from drilling sumps, inappropriate storage of chemicals and/or as a result of a major chemical spillage or from loss of well integrity. Impacts may also result from:

- Intersection of HDD boring with an existing fracture or cavity in the limestone or surficial gravels.
- A breakthrough into an existing fracture or cavity in limestone.
- Alteration of local groundwater flow patterns

Aquifer stability is maintained, and the potential for groundwater contamination reduced, by:

- Drilling mud design, and formation of a filter cake to minimise losses to porous aquifers.
- Use of water based additives
- Casing and cement to provide isolation of water bearing aquifers.

Could environmental values (beneficial uses) of water environments be affected?

× NYD X No × Yes If yes, identify waterways/water bodies and beneficial uses (as recognised by State Environment Protection Policies)

Surface water

Water quality parameters recorded at all sites were generally within the expected range (Dissolved Oxygen, pH, temperature), however the turbidity records taken from Port Campbell Creek were elevated, potentially as a result of disturbance to banks and substrate caused by recent flooding (Biosis, 2010).

Construction will be timed to avoid the wetter seasons of the year, and erosion and sedimentation measures implemented, to reduce the potential for turbid run-off and increased sedimentation to cause detrimental water quality impacts. Horizontal directional drilling will be undertaken at watercourse crossings as required.

Groundwater

The following impacts may also impact on the beneficial uses of the groundwater system (i.e. for irrigation purposes, groundwater dependent ecosystems).

Sub-surface drilling:

- Reduced aquifer stability
- Leakage or pollution of aquifers
- Trench inflows/dewatering impacting on groundwater dependent ecosystems or groundwater users
- Contamination of shallow groundwater resources from spills of chemicals, fuels, or sewage
- Contamination of shallow groundwater from inappropriate storage or disposal of hydrotest water.

Could aquatic, estuarine or marine ecosystems be affected by the project?

× NYD **X** No × Yes If yes, describe in what way.

There is not expected to be any interaction with the marine environment given the depth of the proposed offshore well bore pipeline (up to 1800m depth).

Is there a potential for extensive or major effects on the health or biodiversity of aquatic, estuarine or marine ecosystems over the long-term?

☒ No ☐ Yes If yes, please describe. Comment on likelihood of effects and associated uncertainties, if practicable.

Potential impacts on habitat values and the aquatic environment are expected to be minor given the short term nature of pipeline construction, timed to occur in drier months to avoid potential erosion and sedimentation impacts.

Is mitigation of potential effects on water environments proposed?

☐ NYD ☐ No ☒ Yes If yes, please briefly describe.

Horizontal directional drilling (HDD) will be used under stream crossings in the case that impacts to waterways cannot be avoided. . In addition, a number of control measures will be implemented to avoid turbid run-off or potential impacts of erosion. These measures will be stipulated in the Drilling and Pipeline Environment Management Plans, but would include:

- Drainage Management plans. As a minimum these plans will include diagrams that display water drainage pathways and the location, type and installation requirements for each erosion and sediment control
- Overland flow will be diverted around stockpiles (topsoil, subsoil and erodible construction materials such as road base) by installation of upslope diversion drains, if local topographic conditions require such diversion drains.
- Stockpiles of topsoil, subsoil or any erodible construction material will not be located within 50m of the boundary of any sinkhole, or in any areas subject to concentrated water flow;
- Sediment fencing will be installed immediately downslope of the construction area and all stockpiles of soil and erodible construction materials. Sediment fencing will be positioned so that it does not intercept runoff water from upslope diversion drains; and,
- Erosion and sediment controls will be inspected weekly and after each rainfall event resulting in >20mm in 24 hrs. Erosion and sediment controls will be repaired and reinstated as required.
- Riparian vegetation will also be avoided, and fenced where appropriate to prevent physical disturbance i.e trampling.
- Fencing of sinkholes and a buffer of 200m established to avoid impacts to wetland habitat.

Other information/comments? (eg. accuracy of information)

Records indicate that there is a shallow groundwater table (<5m) at Port Campbell Creek. Therefore there is some uncertainty associated with the potential level of interaction between horizontal directional drilling (if it was to be required) and the groundwater table in this area. Further assessment of the depth of the watertable in this area will be undertaken prior to pipeline construction.

14. Landscape and soils

Landscape

Has a preliminary landscape assessment been prepared?

☒ No ☐ Yes If yes, please attach.

A landscape assessment will be undertaken as part of the planning approvals process.

Is the project to be located either within or near an area that is:

- **Subject to a Landscape Significance Overlay or Environmental Significance Overlay?**

☐ NYD ☐ No ☒ Yes If yes, provide plan showing footprint relative to overlay.

Whilst the proposed drill site is located within cleared agricultural land and set back from the Bay of Islands Coastal Park, the site falls within a Significant Landscape Overlay (SLO3) of the Moyne Shire Planning Scheme. The purpose of the overlay is to protect the significant landscape values of the Western Coastal Cliffs Landscape Area, located from Warrnambool to beyond Port Campbell (see Attachment 5).

The proposed drill site and a section of the proposed pipeline, also falls within an Environmental Significance Overlay (ESO1) of the Moyne Shire. This overlay seeks to protect significant coastal parks and estuaries in the area, including the Bay of Islands Coastal Park, recognised for its significant value as a conservation, scientific and tourism resource (see Attachment 6).

- **Identified as of regional or State significance in a reputable study of landscape values?**
  ☐ NYD ☒ No ☐ Yes If yes, please specify.

The proposed drill site is located approximately 3km from the Great Ocean Road. The landscape assessment to be undertaken, would consider the proposal relative to values identified within the Great Ocean Road Region Landscape Assessment Study (Planisphere, 2003).

- **Within or adjoining land reserved under the *National Parks Act 1975*?**
  ☐ NYD ☐ No ☒ Yes If yes, please specify.

The onshore drilling location is situated approximately 200m from the Bay of Islands Coastal Park. Drilling beneath this park will be required to access the offshore hydrocarbon targets. Under Section 40 of this Act, approval from the Minister for Environment will be required for the offshore well bore pipeline to traverse beneath the surface (~300 -700m) of the BICP.

- **Within or adjoining other public land used for conservation or recreational purposes ?**
  ☐ NYD ☐ No ☒ Yes If yes, please specify.

The Bay of Islands Coastal Park is managed under the *National Parks Act 1975* for the protection of its natural features and recreation, education and research values (Parks Victoria, 1998). The park is frequented by conservation groups, tourists and hunting clubs. Public access to the Bay of Islands Coastal Park via Bailey's Road will be retained during drilling activities. Key visitor and user groups will be consulted throughout the Project's development in order to reduce any potential social impacts.

The offshore well bore pipeline will also extend through Coastal Crown land. *Coastal Management Act* consent will be sought for these works.

Is any clearing vegetation or alteration of landforms likely to affect landscape values?
☐ NYD ☒ No ☐ Yes If yes, please briefly describe.

Only introduced pasture would be removed during the site clearance for the drill pad and pipeline. Similarly, whilst site levelling is required, this is of such a minor extent, that it is not expected to impact on landform characteristics of the area.

Is there a potential for effects on landscape values of regional or State importance?
☐ NYD ☒ No ☐ Yes Please briefly explain response.

Whilst the derrick (drilling rig) may be visible from the Great Ocean Road (approximately 3km), due to the visual separation, and shielding of the drill rig, it is not expected that the landscape values of the coastal area will be impacted.

Is mitigation of potential landscape effects proposed?
☐ NYD ☐ No ☒ Yes If yes, please briefly describe.

Whilst the *drill rig* will be illuminated for safety reasons, the following measures will be implemented to reduce visual intrusion and potential landscape effects:

- Lights to be fitted with shields (e.g., blinkers) to minimise light emanating outside the project area.
- The fencing of the drill site will be covered in shade cloth to minimise light disturbance outside the project area.

In addition, there will be no clearing of vegetation or construction access to the Bay of Islands Coastal Park.

Pipeline construction will be sited to avoid removal of native vegetation wherever possible. Where areas of native vegetation need to be cleared, this 'native topsoil' will be stockpiled separately from that originating from previously cleared or agricultural land. Disturbed areas will be rehabilitated to be consistent with surrounding areas.

Other information/comments? (eg. accuracy of information)

As previously highlighted, a landscape assessment will be undertaken to support the planning approvals process with Moyne Shire and to determine potential implications under the Significant Landscape Overlay.

Note: A preliminary landscape assessment is a specific requirement for a referral of a wind energy facility. This should provide a description of:

- The landscape character of the site and surrounding areas including landform, vegetation types and coverage, water features, any other notable features and current land use;
- The location of nearby dwellings, townships, recreation areas, major roads, above-ground utilities, tourist routes and walking tracks;
- Views to the site and to the proposed location of wind turbines from key vantage points (including views showing existing nearby dwellings and views from major roads, walking tracks and tourist routes) sufficient to give a sense of the overall site in its setting.

Soils

Is there a potential for effects on land stability, acid sulphate soils or highly erodible soils?

☐ NYD ☒ No ☐ Yes If yes, please briefly describe.

Acid Sulphate Soils (ASS)

Predictive mapping indicates that the potential to encounter acid sulphate soils during construction, including during horizontal directional drilling at creek crossings, is likely to be low.

Prior to conducting any works involving disturbance to land, including land clearing, excavations and trenches, the subcontractor shall assess the work sites for the presence of PASS/ASS.

Waste ASS and rock must be managed in accordance with the requirements of the *Industrial Waste Management Policy (Waste Acid Sulfate Soils) 1999*. The Victoria EPA Information Bulletin Publication 655.1 provides a general hierarchy of ASS management: (1) Avoid disturbance, (2) Minimise disturbance, (3) Prevent oxidation, (4) Treat to reduce or neutralise acidity, and (5) Off-site reuse or disposal. The range of management options will be outlined in the EMPs.

Are there geotechnical hazards that may either affect the project or be affected by it?

☐ NYD ☒ No ☐ Yes If yes, please briefly describe.

A Ground Penetrating Radar Survey (GPRS) has been undertaken for the proposed drilling site in order to characterise the sub-surface conditions. Whilst the area is prone to sink holes, no potential cavity anomalies were identified at a consistent depth of investigation of ~7m across the survey areas.

Other information/comments? (eg. accuracy of information)

The current acid sulphate soil preliminary assessment is based on desktop research and the use of the Australian Soil Resource Information System (ASRIS) for PASS/ASS Soil Risk Mapping. A more detailed soil assessment will be undertaken prior to construction to confirm soil characteristics, specifically the presence of acid sulphate soils in low lying coastal areas.

15. Social environments

Is the project likely to generate significant volumes of road traffic, during construction or operation?

☐ NYD ☒ No ☐ Yes If yes, provide estimate of traffic volume(s) if practicable.

Is there a potential for significant effects on the amenity of residents, due to emissions of dust or odours or changes in visual, noise or traffic conditions?

☐ NYD ☒ No ☐ Yes If yes, briefly describe the nature of the changes in amenity conditions and the possible areas affected.

Traffic

Construction works will result in localised traffic impacts from construction equipment and vehicles, and delivery and removal of construction materials.

The pipeline route will cross a number of road crossings (including the Cobden-Port Campbell Road and North South Road). Where road crossings are necessary, works will be carried out to minimise disruptions to traffic and designed to suit local environmental conditions. VicRoads has requested HDD or tunnel boring underneath road crossings, with a minimum cover of 1200mm.

Interference with local users and residents is expected through increased traffic movements on local roads. It is estimated that there will be less than ten movements of heavy haul vehicles per day, and approximately ten buses per day to transport workers to site. There is a local school bus that travels down Bailey's road to collect school children. However no interference with the school bus is anticipated as traffic to the site will be well managed through the traffic management plan.

Project specific speed limits will be adhered to. Speed limits are:

- 20 km/h on unsealed tracks; and
- 40 km/h on sealed roads.

A traffic management plan will be developed and implemented in consultation with VicRoads, and the Moyne and Corangamite Shire Councils.

Noise

Noise levels will be low, with truck movements restricted to day-time hours so that impacts to residents are expected to be negligible.

The onshore drill site has been sited in sparsely populated farmland with the nearest residence about 1.8km away from the site. The accommodation camp will be powered by electricity taken from the grid to reduce power generation noise levels.

Air Quality

Existing air quality in the project area is likely to be good, although dust from agricultural activities may occasionally create poor conditions over a short duration. The following measures will be adopted to avoid potential impacts to local air quality conditions:

- Construction vehicles and other internal combustion equipment will be appropriately maintained to minimise greenhouse gas emissions and air pollution.
- Where required, dust control measures will be implemented which may include the use of water trucks.
- Where works are conducted near residential dwellings, care will be exercised to ensure that the risk of adverse dust and air quality impacts at the receptor are minimised. This may include a reduction in speed limit for construction vehicles.

Is there a potential for exposure of a human community to health or safety hazards, due to emissions to air or water or noise or chemical hazards or associated transport?

☐ NYD ☒ No ☐ Yes If yes, briefly describe the hazards and possible implications.

An increased risk of bushfire arises from the presence of flammable liquids (predominantly diesel) onsite and the potential of loss of well integrity/ well blowout, pipeline rupture causing an explosion and fire. The majority of the pipeline traverses grassed paddock areas, which is considered a category one (low risk) source of fuel. However, the proposed drill site is in proximity

to a number of vegetated areas; “shrub and heath” which is a category two fuel source, which carries a higher risk of bushfire.

With mitigation measures, the likelihood of a loss of well integrity or pipeline rupture occurring and sparking a bushfire, is considered low. Further information relating to the safety study is provided in the Drilling and Pipeline Safety Management Plans. Discussions will also be undertaken with the local CFA, and a Fire Management Plan developed, prior to construction.

Is there a potential for displacement of residences or severance of residential access to community resources due to the proposed development?

☐ NYD ☒ No ☐ Yes If yes, briefly describe potential effects.

Public access to the Bay of Islands Coastal Park will not be restricted during the Project.

Are non-residential land use activities likely to be displaced as a result of the project?

☐ NYD ☐ No ☒ Yes If yes, briefly describe the likely effects.

Minor interference to landowner properties and farming operations is anticipated during pipeline construction.

Do any expected changes in non-residential land use activities have a potential to cause adverse effects on local residents/communities, social groups or industries?

☐ NYD ☒ No ☐ Yes If yes, briefly describe the potential effects.

Is mitigation of potential social effects proposed?

☐ NYD ☐ No ☒ Yes If yes, please briefly describe.

A landowner consultation plan has been developed for the Project. Whilst specific measures will be required on some properties, they generally include:

- Movement of livestock from paddocks as required.
- Construction times to avoid peak agricultural activities and seasons.
- Pipeline to follow fencelines wherever practicable.
- All construction gates shall be kept shut. Farm gates must be left as found.
- Gates and fencing will be maintained and reinstated to a condition equal or better than the pre-existing condition.
- Consideration will be given to the use of temporary fencing to exclude access to the trench by livestock.
- Stock routes will be avoided as far as practicable.

The temporary accommodation facility will be located near the drill site as opposed to within a local township at the request of the local Council (Moyne Shire).

Where possible, employees and goods and services will be sourced locally. No impacts on housing affordability are predicted.

Origin will also continue to consult with local stakeholders to identify and minimise any potential impacts on local user groups. In order to facilitate community consultation Origin has developed a Stakeholder Consultation Management Plan outlining the various stakeholders and levels of interaction and frequency.

Other information/comments? (eg. accuracy of information)

Cultural heritage

Have relevant Indigenous organisations been consulted on the occurrence of Aboriginal cultural heritage within the project area?

☐ No If no, list any organisations that it is proposed to consult.
☒ Yes If yes, list the organisations so far consulted.

Aboriginal Affairs Victoria (AAV) has been consulted regarding the project's development. A Notice of Intent to prepare a Cultural Heritage Management Plan for the proposed drilling and pipeline construction has been lodged.

Indigenous groups consulted to date include Framlingham Aboriginal Trust, Ella Maar Aboriginal Corporation (EMAC) and Kuuyang Maar Aboriginal Corporation (KMAC). At the time of preparation of this referral (Jan 2011), there was no Registered Aboriginal Party for the project area.

What investigations of cultural heritage in the project area have been done?
(attach details of method and results of any surveys for the project & describe their accuracy)

Ochre Imprints was commissioned to undertake a cultural heritage assessment and prepare a Cultural Heritage Management Plan for the Project. The aim of the assessment was to establish if any Aboriginal cultural heritage and/or areas of archaeological sensitivity were likely to be impacted by the project. The assessment to date has comprised desktop assessment (drill site and pipeline) and a ground truthing exercise of the proposed Speculant survey area which abuts the proposed drill site.

A Cultural Heritage Management Plan (combined drilling site and pipeline construction) is being developed for approval by Aboriginal Affairs Victoria in accordance with the *Aboriginal Heritage Act 2006* and associated regulations. Indigenous stakeholders will be consulted during development of the management plan, to ensure any issues and concerns are adequately addressed.

Further work proposed to complete the CHMP includes pedestrian survey of the activity area to identify any visible Aboriginal cultural heritage and refine the zones of Aboriginal sensitivity. This additional field survey, including sub-surface testing (as required), is scheduled for February 2011.

Is any Aboriginal cultural heritage known from the project area?

☒ NYD ☒ No ☒ Yes If yes, briefly describe:

- Any sites listed on the AAV Site Register
- Sites or areas of sensitivity recorded in recent surveys from the project site or nearby
- Sites or areas of sensitivity identified by representatives of Indigenous organisations

A search of the Victorian Aboriginal Heritage Register was undertaken to assess the potential for impacts upon Aboriginal cultural heritage. The results of the desktop assessment are outlined in Section 8 of this referral. In summary the Aboriginal Places recorded within 1km of the study area are as follows:

Site	**Registered Aboriginal Places Within Site**	**Closest Aboriginal Place**	**Potential Archaeological Sensitivity**
Drill site – Bailey's Road	None	VAHR 7420-0047 (c.200m north east). This aboriginal place was recorded during the 2009 field work and comprises 21 stone artefacts. This area has been significantly disturbed by agricultural practices such as ploughing. Sub-surface testing will be undertaken to confirm the geographical extent of the surface scatter (VAHR 7420-0047) and proximity to the proposed pipeline from the onshore wellhead to Croft#1.	Moderate
Heytes-bury Pipeline	None	VAHR 7520-0174 (one silcrete flaked stone fragment) is within 100m of the project area. The remaining places are greater than 600 m from the project area.	A zone 200 m either side of Port Campbell Creek has been identified as a zone of moderate sensitivity for Aboriginal places

There is low potential for Aboriginal burials, shell middens and scarred trees to be present. It is possible that previously unknown indigenous and European cultural heritage sites could be discovered during vegetation clearance and ground disturbing works.

Are there any cultural heritage places listed on the Heritage Register or the Archaeological Inventory under the *Heritage Act 1995* within the project area?

☐ NYD ☒ No ☐ Yes If yes, please list.

Is mitigation of potential cultural heritage effects proposed?

☐ NYD ☐ No ☒ Yes If yes, please briefly describe.

A Cultural Heritage Management Plan (combined drilling site and pipeline construction) is being developed for approval by Aboriginal Affairs Victoria. Indigenous stakeholders will be consulted as part of the development of the management plan, to ensure any issues and concerns are adequately addressed.

No cultural heritage sites have been identified along the proposed pipeline route. However the area of moderate cultural sensitivity, Port Campbell Creek, will be directionally drilled to avoid disturbance to riparian (stream bank) areas.

In the event that a previously unrecorded heritage site is discovered in the project area, works in the vicinity shall cease immediately and the Project Manager shall be notified. The Origin Cultural Heritage and Native Title Manager will then be notified.

Other information/comments? (eg. accuracy of information)

The information presented in this section is based on the technical reports as presented as Appendices B and C. A field (pedestrian) survey is scheduled for February 2011, to ground truth the pipeline alignment. Additional sub-surface testing will be undertaken as required.

16. Energy, wastes & greenhouse gas emissions

What are the main sources of energy that the project facility would consume/generate?

☒ Electricity network.
If possible, the accommodation camp will be connected to the electricity grid. Power consumption will range between 40 – 100 kW (peak). A backup generator will be installed to mitigate power outages.

☒ Natural gas network. If possible, estimate gas requirement/output …not required……...

☒ Generated on-site (at the drill site) If possible, estimate power capacity/output
Rig Power Capacity 6,500 HP (~ 5MW)

☒ Other. Please describe.
Please add any relevant additional information.

What are the main forms of waste that would be generated by the project facility?

☒ Wastewater. Describe briefly.

Waste water will be collected in sumps and trucked off site for treatment at designated treatment facilities.

Sewage and grey water will be temporarily stored on site at the temporary accommodation facility and periodically trucked offsite to licensed treatment or disposal facilities.

☒ Solid chemical wastes.

Drill cuttings
Several methods exist for the treatment of drill cuttings, being:
- Solidification – An absorption process using soil, fly ash, kiln dust, cement, clay or sawdust to solidify the contaminated drill cuttings
- Stabilisation – An absorption process where the contaminants are electrochemically bonded to the stabilising agent and therefore less likely to be released into the environment
- Thermal desorption – not economically viable.

Cuttings will be collected in cuttings bins or lined pits and treated in accordance with one of the methods identified above. Depending on type of mud used for the section drilled (water based or synthetic mud based) cuttings may be used for composting or direct return to landfill.

☒ Excavated material. Describe briefly.
The main waste stream from pipeline construction will be excavated trench spoil. Detailed design will seek to minimise the amount of existing material to be excavated. Uncontaminated soil will also be set aside in defined areas for later use as fill.

☒ Other. Describe briefly.

General Wastes

Waste management will be undertaken in accordance with the Halladale and Black Watch Project Waste Management Plan and will in general accord with the following:
- Minimising waste sources;
- Recycling wherever practicable; and
- Minimising waste volumes.

Construction scrap will be reused or recycled wherever practicable. Construction wastes which

cannot be reused or recycled onsite will be removed for offsite disposal at an approved disposal facility.

Domestic waste consisting of non-hazardous solid waste and putrescible kitchen scraps will be stored in lidded bins prior to collection and disposed offsite at licenced facilities. These wastes will be stored such that the ingress of pests and vermin is prevented. General wastes will be separated where practicable for recycling.

Other hazardous wastes that are generated, such as spent spill kits or used oils, will be appropriately stored in a sheltered and bunded area prior to disposal by a licensed contractor at a licensed facility.

Contractor's will be required to prepare waste management procedures in accordance with Origin's Health, Safety and Environment Policy, and requirements specified within the Drilling and Pipeline Environment Plans.

What level of greenhouse gas emissions is expected to result directly from operation of the project facility?

- ☒ Less than 50,000 tonnes of CO_2 equivalent per annum
- ☐ Between 50,000 and 100,000 tonnes of CO_2 equivalent per annum
- ☐ Between 100,000 and 200,000 tonnes of CO_2 equivalent per annum
- ☐ More than 200,000 tonnes of CO_2 equivalent per annum

Please add any relevant additional information, including any identified mitigation options.

The Halladale & Black Watch fields will provide gas with a reduced CO_2 content, compared with the gas currently sourced from the Thylacine field. (<0.5 Mol% vs Thylacine ~10 mol%)

The CO_2-e emissions from each source have been calculated as follows, based on an estimated average increase of 25TJ/day in gas production.

- Gas transport emissions 196 t CO2-e/year
- Gas processing fugitive emissions 220 t CO2-e/year
- Gas processing at Otway Gas Plant (fuel gas) emissions 18,820 t CO2-e/year

Total estimated emissions are 19,236 t CO2-e/year.

17. Other environmental issues

Are there any other environmental issues arising from the proposed project?

☒ No ☐ Yes If yes, briefly describe.

18. Environmental management

What measures are currently proposed to avoid, minimise or manage the main potential adverse environmental effects? (if not already described above)

☒ Siting: Please describe briefly

The preferred drill site, known as the 'Baileys Road' location was selected as it offers the least environmental impact and reduced threat to cultural heritage values. The proposed drill site also maximises the use of existing access roads and tracks, reducing the extent of native vegetation removal required.

The preferred pipeline alignment was selected on the basis of linking in with an existing pipeline, thereby reducing the extent of land disturbance required. The preferred pipeline route is largely located on private property, with minimal native vegetation removal. Land uses such as agriculture, primarily grazing and cropping will continue after construction and during operation of the gas pipeline. The likelihood of future urban development in this area is low.

☒ Design: Please describe briefly

The following design features and construction methods have been adopted, in order to reduce

land disturbance and environmental impacts:

- The pipeline alignment will be designed to minimise the excavation of material
- The drilling technique adopted is Extended Reach Drilling from an onshore location, intended to reduce marine and seabed disturbance that can sometimes be associated with offshore drilling campaigns.
- Pipeline alignment designed to avoid stands of remnant vegetation, particularly significant riparian vegetation near Port Campbell and Wallaby Creeks.
- Horizontal directional drilling adopted to avoid impacts to watercourses.

‘

☒ Environmental management: Please describe briefly.

An EP has been prepared in accordance with the requirements of the Victorian *Petroleum Act 1988* (onshore drilling location) and the *Petroleum (Submerged Lands) Act 1982* (offshore) (well bore pipeline and production activities) for approval by the Victorian Department of Primary Industries.

The Environment Plan (EP) provides an assessment of the potential environmental effects that may arise from the Halladale and Black Watch gas field development and to identify measures that are being implemented to mitigate or reduce potential impacts to the environment.

An EMP is also being prepared in accordance with the requirements of the Victorian *Pipelines Act 2005,* Pipeline Regulations 2007 and the APIA Code of Environmental Practice – Onshore Pipelines (2005). It is also likely that these environment plans will be required to support the planning documentation.

The Environment Plans present the following information:

- Project description and development programme
- Construction methods
- The legislative framework for the construction and operation of the project infrastructure
- The existing project environment.
- Project stakeholders and consultation undertaken with them.
- The potential environmental risks associated with the project.
- Measures by which potential risks will be avoided, managed or mitigated.
- Implementation strategy including performance objectives, monitoring and auditing requirements.

The performance requirements will be implemented by the construction contractors through detailed environment management plans, sub-plans and contractual provisions.

☒ Other: Please describe briefly

Add any relevant additional information.

19. Other activities

Are there any other activities in the vicinity of the proposed project that have a potential for cumulative effects?

☒ NYD ☒ No X Yes If yes, briefly describe.

The existing noise emissions from the Otway Gas Plant will influence background noise levels for nearby properties. The potential of the increase in gas plant capacity to impact on noise levels has been considered, and the proposed works will have negligible impact on local noise conditions, and therefore is not expected to affect existing approved limits.

Potential cumulative impacts on air quality associated with the increase in gas capacity at Otway Gas Plant have also been considered. The Halladale and Black Watch fields will provide a less CO_2 intensive gas source to the Otway Gas Plant, than the current gas source. NOx emissions are not expected to change, and Volatile Organic compounds will be within current discharge requirements.

20. Investigation program

Study program

Have any environmental studies not referred to above been conducted for the project?

☒ No ☐ Yes If yes, please list here and attach if relevant.

Has a program for future environmental studies been developed?

☐ No ☒ Yes If yes, briefly describe.

Findings of preliminary technical assessments have informed the preparation of this referral. However, as previously described, further study and assessment will continue as follows:

- Baseline Noise Monitoring, including the potential impacts and attenuation that may be required at some residences.
- Planning – preparation of the planning report and documentation required to support the planning approvals process.
- Landscape Assessment
- Net Gain Assessment, including a revised assessment of the access routes to the drill site, proposed pipeline route and identification of offset targets.
- Cultural Heritage - a pedestrian survey of the project area, and sub-surface testing where required.

Consultation program

Has a consultation program conducted to date for the project?

☐ No ☒ Yes If yes, outline the consultation activities and the stakeholder groups or organisations consulted.

During Project planning, a number of key stakeholders, were consulted to ensure there was awareness of the technical aspects associated with the project as well as to assist with the identification of key issues for consideration.

A wider programme of engagement with stakeholders is in place to ensure adequate consultation with:

- Government regulators and other decision making authorities
- Relevant commercial enterprises
- Landowners and the local community, and
- Non-government organisations, environmental or conservation groups, including Birds Australia.

Has a program for future consultation been developed?
NYD No ✕ Yes If yes, briefly describe.

Origin is committed to continuing the consultation process throughout the planning and operational phases of the project.

A stakeholder engagement plan has been developed for the Halladale and Black Watch Project. Origin will continue their stakeholder consultation through the following measures:

Periodic updates with key stakeholders which may be potentially affected by the project,

Periodic updates to Government and stakeholders in relation to changes in project scope and timing;

An Origin representative will be onsite to liaise with any stakeholders present in the project area.

Timely project announcements will be made in local media and a website may be established for the Project.

Authorised person for proponent:

I, Ivonne Milano (full name),
Regulatory Affairs Mngr. (position), confirm that the information contained in this form is, to my knowledge, true and not misleading.

Signature _____

Date 23/2/2011

Person who prepared this referral:

I, PP VAN HATTUM (full name),
PROJECT MANAGER (position), confirm that the information contained in this form is, to my knowledge, true and not misleading.

Signature _____

Date 23/2/2011.