



CULLEN-1 ENVIRONMENT PLAN SUMMARY

MAY 2014



Cullen-1

Environmental Plan Summary

Prepared for: Beach Energy
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1. Introduction

Beach Energy Limited ('Beach Energy') is the titleholder and operator of petroleum exploration permit (EP) 126, situated in the Shire of Victoria-Daly in the Northern Territory. Within EP 126, Beach Energy is proposing to drill an exploration well named Cullen-1, located on Legune Station. The well is being drilled to discover gas within the onshore Bonaparte basin. The Cullen-1 well site is located at 538279mE, 8333479mN (GDA94). It is approximately 350 km southwest of Darwin and 100 km northeast of Kununurra, Western Australia (Figure 1.1).

This document provides a summary description of the proposed project, the existing environment in the vicinity of the project area, the potential environmental impacts of the project and management measures that will be implemented to minimise the potential impacts associated with the proposed drilling activities.

2. Project Activity Description

Access to Legune Station is from Kununurra, approximately 120 km via existing roads (Keep River Road and Legune Road). From the Station to the well lease pad, access will be via 4.5 km of an existing seismic track, which will be upgraded using locally sourced materials.

The Cullen-1 well lease pad will cover an area of 1.5 ha (150 m x 100 m). Construction of the well lease pad will involve removal of vegetation and topsoil, which will be stockpiled separately in the immediate vicinity of the cleared areas and used for rehabilitation. Road base material for the well lease pad will be sourced from Legune Station by the owner.

To support well construction and drilling activities, a camp site will be located at 540 826 mE, 8 330 437 mN (GDA94), also on Legune Station, approximately 4 km to the south of the well site (refer to Figure 2.1). An area approximately 60 m x 50 m will be required for the camp to accommodate up to 40 people.

Site preparation activities – including establishing the well lease pad, site access, camp site and erection of the drill rig – are expected to be of approximately 30 days duration. Drilling and testing will take approximately 50 to 70 days, with drilling to be undertaken 24 hours per day, 7 days per week during that time. The expected well depth is approximately 3,600 m, utilising an Ensign 965 drill rig, or similar.

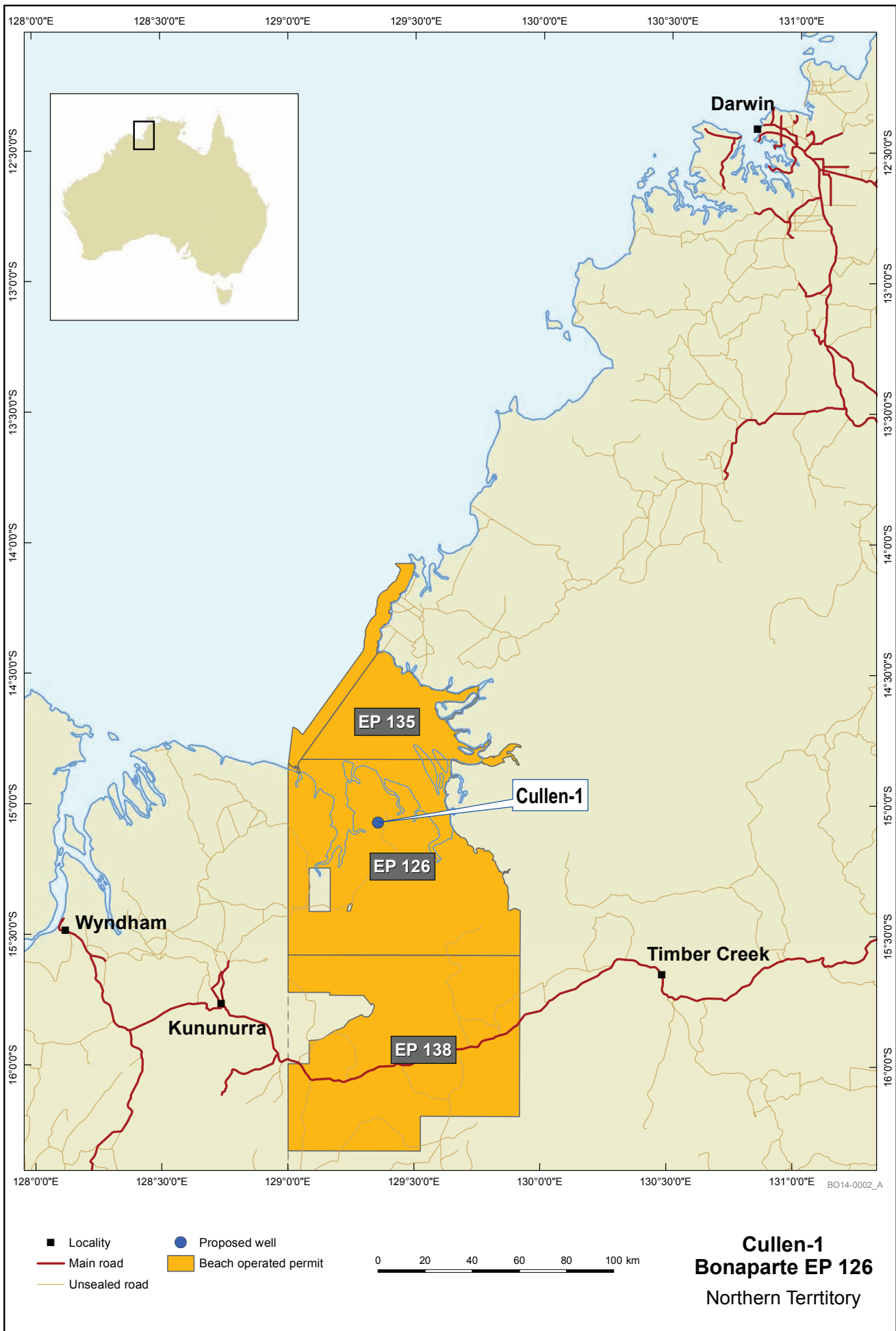


Figure 1.1 - Regional Location

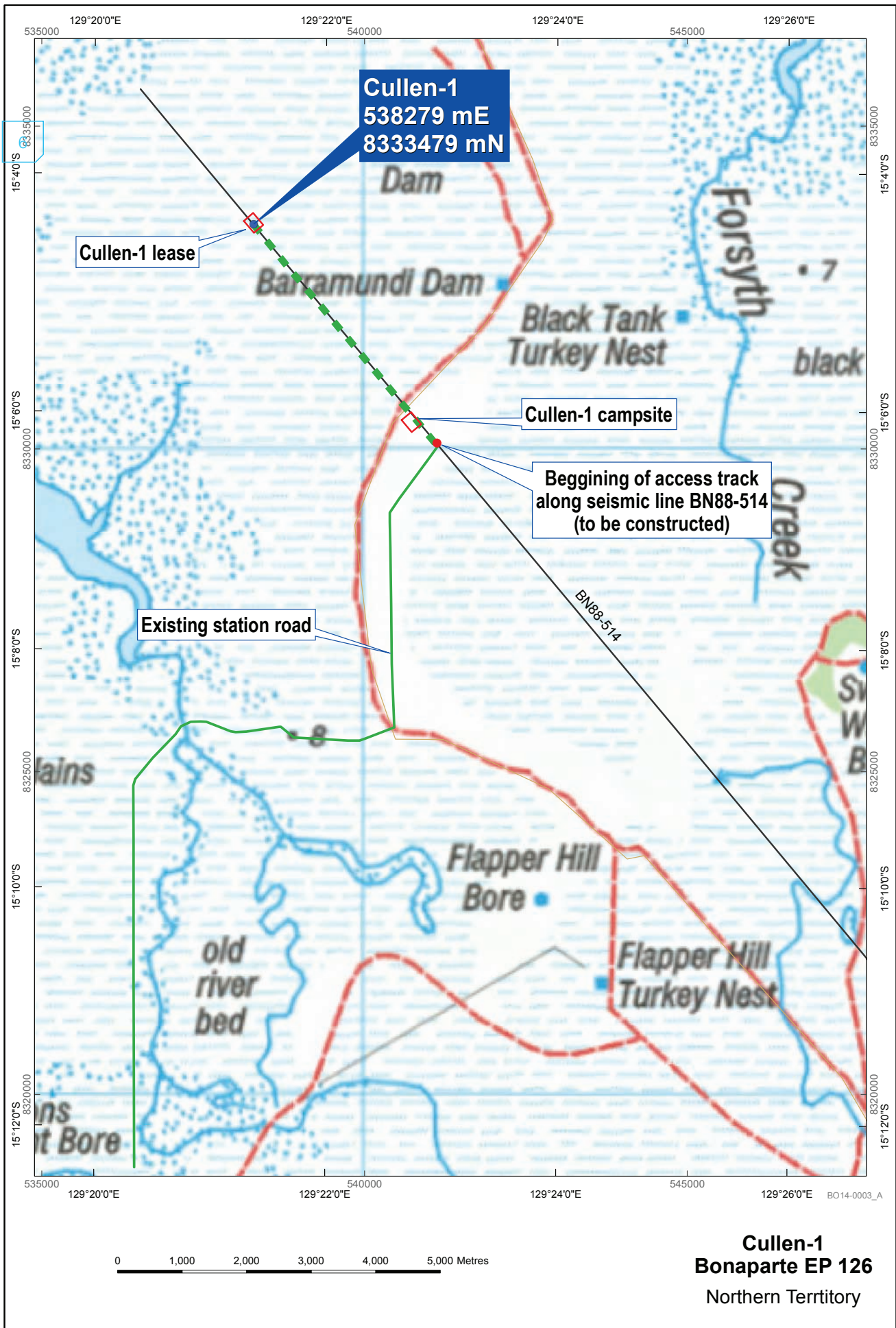


Figure 2.1 - Location of Cullen-1 Well Lease Pad, Camp Site and Site Access

3. Environment Description

The project site has a tropical savannah climate, with a wet season from about November to March. It is located on low flat land at 7 to 8 m above sea level, between the Keep River and Victoria River estuaries. The project site is a poorly drained, seasonally inundated coastal floodplain, with areas of tidal flats. The Cullen-1 well lease pad is situated on basalt geology, on alkaline black soil plains.

The project site is located within the Victoria Bonaparte IBRA (biogeographic) region and contains no reserves or conservation areas. Areas in the vicinity of the project site are described by the Australian and Territory governments as having conservation significance associated with wetland features and as habitat for waterbirds and marine birds.

A search of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Search Tool (PMST) and the Northern Territory Fauna Atlas databases identified 32 threatened or otherwise listed (e.g., migratory or marine) species as potentially occurring within 5 km of the project site. These included 10 bird species and 2 reptile species that are either known or likely to occur, and another 14 bird species, 4 reptiles and 2 rodent species that may possibly occur in this area.

There are no listed threatened ecological communities in the vicinity of the project site. The main vegetation community on site is tussock grassland, consisting of rice grass (*Xerochloa imberbis*) and cane grass (*Ophiuros exaltatus*). A review of the EPBC PMST and the Northern Territory Flora Atlas did not identify any threatened flora taxa likely to occur in the project area.

Pest animals listed by the EPBC PMST as potentially occurring on the project site include cane toads, feral pigs, dogs and/or cats. Weeds of National Significance previously recorded on Legune Station include Gamba grass (*Andropogon gayanus*), Olive hymenachne (*Hymenachne amplexicaulis*), *Mimosa pigra* and *Parkinsonia aculeata*.

A cultural heritage clearance survey undertaken by an archaeologist accompanied by representatives of the Northern Land Council did not identify any indigenous heritage sites of significance. A search of Commonwealth and Territory databases did not identify any non-indigenous heritage sites in the project vicinity.

The project site is located in a remote area of the Northern Territory, on Crown Land under a perpetual pastoral lease. The land is currently used for grazing of cattle on native pastures. The closest settlement is the Legune Station, associated with the pastoral lease, which is a cattle station approximately 13 km southeast of the project site. The closest community to the project site is the Aboriginal community of Marralum, 34 km to the southwest.

4. Environmental Impact Risks and Management

Potential environmental and social impacts of the project have been determined based on knowledge of the existing environment, current project planning, and experience in undertaking similar exploration projects. The impact assessment was as follows:

- 1 Review of all project activities that could impact on the environment.
- 2 Assessment of the potential hazards or threats that those activities might pose to the physical, biological or social/cultural environment.
- 3 Assessment of the potential impacts and risks of those hazards.
- 4 Identification of appropriate mitigation and management measures.

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Table 4.1 outlines the environmental hazards identified, the potential impact of these and the mitigation and management measures that Beach Energy will implement to manage the hazard.

Table 4.1 – Environmental Impacts Assessment

No.	Hazard	Potential Impact	Mitigation and Management Measures
Biological Environment			
B1	Vegetation clearing	Direct loss or degradation of native vegetation including wetland communities and/or fauna habitat	<ul style="list-style-type: none"> ◆ There will be no unauthorised clearing of vegetation. ◆ Prior to commencement of site works: <ul style="list-style-type: none"> – Works boundary extent will be surveyed and clearing boundaries will be marked out. – Any large/hollow-bearing trees within the camp site will be marked for retention and wetlands within 100 m of works boundaries will be designated as exclusion zones. ◆ Any inadvertent clearing will be reported to the Company Man, rehabilitated, the boundary re-marked, and the issue reviewed with all site personnel. ◆ Vegetation cleared from camp site and well lease pad will be stockpiled to use in rehabilitation. ◆ Any project areas not required past the exploration stage will be rehabilitated.
B2	Earthworks	Native fauna trapped/ injured in earthworks	<ul style="list-style-type: none"> ◆ Upon demobilisation of the drill rig the drill sump and flare pit will be fenced to exclude fauna and livestock. ◆ All open excavations, machinery and equipment will be checked daily for trapped fauna.
B3	Machinery and vehicle movement	Vehicle/machinery-related injury or roadkill of native fauna	<ul style="list-style-type: none"> ◆ A 40 km/h speed limit will be imposed on all project area tracks for personnel/contractors. ◆ Speed limits will be specified in the site works plan and personnel will be informed during inductions. ◆ Induction will outline procedures to be followed should fauna or livestock be injured.
B4	Site contamination	Harm to health of native vegetation and/or ecosystems, or the health of native fauna	<ul style="list-style-type: none"> ◆ If required, water spraying will be undertaken as needed to suppress dust. ◆ Pollution risks other than dust will be managed as per Risks P2 and P3.
B5	Noise, vibration, lighting	Altered fauna behaviour and use of habitat due to noise, lighting, etc.	<ul style="list-style-type: none"> ◆ Project planning will incorporate current equipment with standard noise/vibration attenuation fittings. ◆ Where practicable, site lighting will be directed to minimise light-spill outside the project footprint. ◆ Project timeframe will be minimised to the extent possible to effectively undertake drilling activities.
B6	Fire	Increased grass fires/bushfires impacting on native vegetation and habitat	<ul style="list-style-type: none"> ◆ At all times during site works: <ul style="list-style-type: none"> – Bushfire fighting equipment will be present on site. – Personnel inductions will include fire prevention. – Refuelling will be undertaken on the well lease pad, or at a minimum on cleared areas away from vegetation. – Flammable goods will be transported/stored as per MSDS. ◆ During site preparation works: <ul style="list-style-type: none"> – Vegetation clearing should not occur when the fire danger rating is 'Very High' or above. – A 10 m wide firebreak will be constructed around the well lease pad and flare pit, prior to drilling.

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No.	Hazard	Potential Impact	Mitigation and Management Measures
B7	Weeds	New or increased weed infestations that could threaten native vegetation or habitat	<ul style="list-style-type: none"> ◆ Legume Station will undertake all site preparatory work using locally sourced equipment and station borrow area. ◆ Vehicles and earth-moving machinery should be inspected and certified as weed-free prior to entry to the project site. ◆ The project site will be monitored for weed issues during site rehabilitation, and 12 months following project completion. Any issues will be managed appropriately.
B8	Pest fauna	Increased infestations of pests that could threaten native vegetation or fauna	<ul style="list-style-type: none"> ◆ All domestic waste will be adequately stored and managed on site so as to minimise attraction/ingress of feral fauna. ◆ All putrescible waste will be removed from site and taken to a licenced facility for disposal on a regular basis.
B9	Site rehabilitation	Reduction in vegetation health or diversity if site rehabilitation is unsuccessful	<ul style="list-style-type: none"> ◆ Any project areas not required post-exploration will be rehabilitated/revegetated within 12 months of project end. ◆ Rehabilitation of well lease pad and camp site will include re-spreading of stockpiled topsoil and vegetation. ◆ Revegetation success will be monitored for 3 years following project completion. If rehabilitation has not been successful, additional measures will be implemented.
Physical Environment			
P1	Soil management	Soil degradation (erosion, inversion, compaction) due to project activities	<ul style="list-style-type: none"> ◆ During site preparation activities: <ul style="list-style-type: none"> – For non-permanent site works (well lease pad and camp site), topsoil will be stockpiled separately to subsoil. – Height and slope length of soil stockpiles will be minimised. – Any batter slopes will be designed appropriately to soil type. ◆ During site rehabilitation activities: <ul style="list-style-type: none"> – Stockpiled topsoil and subsoil will be reinstated to approximately their original position in the soil profile. – If significant soil compaction has occurred, these areas will be ripped/scarified as part of site rehabilitation.
P2	Soil contamination	Contamination of soil due to spills/leaks or wastewater management	<ul style="list-style-type: none"> ◆ At all times during site works: <ul style="list-style-type: none"> – Dangerous goods will be transported and stored in accordance with the ADG Code and Australian Standards; usage will comply with relevant MSDS. – An oil spill and contamination management procedure is in place. – Camp site sewage will be managed via a temporary/transportable packaged sewage treatment system. – Solid wastes will be adequately stored prior to removal from site as required. Waste streams will be separated.
P3	Surface water pollution	Pollution of waters due to sediment runoff, spills/leaks, or wastewater management	<ul style="list-style-type: none"> ◆ Prior to commencement of works, wetlands will be designated as exclusion zones as per Risk B1. ◆ Post drilling, a berm wall will be constructed around the sump to prevent the inflow (and outflow) of surface water. ◆ If significant rainfall is anticipated during the project, sediment control measures will be maintained as required. ◆ Other water pollution risks will be managed as per Risk P2.
P4	Surface drainage diversion	Diversion of drainage lines during works	<ul style="list-style-type: none"> ◆ Where practicable, surface drainage lines will not be interrupted by project excavation or construction. ◆ During site preparation, any surface drainage lines will be diverted around project works.
P5	Air quality	Local air quality reduction due to	<ul style="list-style-type: none"> ◆ Speed limits will be managed as per Risk B3 to minimise dust emissions from access tracks. See also Risk B4.

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No.	Hazard	Potential Impact	Mitigation and Management Measures
		project-related dust emissions	<ul style="list-style-type: none"> ◆ During site preparation, areas of bare soil will be stabilised by laying road base.
P6	Soil and/or water contamination	Contamination of surface water, soils and/or groundwater due to well blowout	<ul style="list-style-type: none"> ◆ Groundwater quality in bores on site will be assessed in accord with the Cullen-1 Groundwater Management Plan. ◆ During drilling operations: <ul style="list-style-type: none"> – A Blowout Preventer (BOP) will be installed together with flow detection and alarm systems. Continuous monitoring of abnormal pressure parameters will be undertaken. – Regular emergency/well control response exercises will be undertaken with works personnel. An experienced/reputable company will be engaged to undertake drilling. All drillers/supervisors will have well control training and certification. – Fire fighting equipment will be maintained on site.
P7	Contamination of aquifers	Contamination or salinisation of aquifers due to drilling through aquifers.	<ul style="list-style-type: none"> ◆ Water based drilling muds will be used. ◆ Shallow freshwater aquifers will be protected from salinisation by use of freshwater mud in the top hole and isolation from mid to bottom hole by surface casing.
P8	Contamination of aquifers	Contamination due to loss of logging tool	<ul style="list-style-type: none"> ◆ If incident occurs, logging tool will be immediately retrieved. ◆ If retrieval is not possible, logging tool will be cemented in hole to isolate it, and government consultation/approval will occur.
P9	Contamination of water or soils	Contamination due to loss of well integrity	<ul style="list-style-type: none"> ◆ Engineering design of the casing and well head will be tailored for local conditions and loads. ◆ During drilling operations: <ul style="list-style-type: none"> – Isolate shallow aquifers behind multiple cemented casing strings. Casing seating depths positioned to cover aquifers at risk. Cement bond logs run on production casings to confirm quality of cement. – Well equipment and casing strings will be pressure and function tested regularly after installation. Ongoing well integrity monitoring will be undertaken. – Contractors will be supervised day and night. – Emergency response plan will be in place and regular emergency response exercises will be undertaken.
Social and Cultural Environment			
S1	Unknown cultural heritage	Unexpected find and/or disturbance of unknown heritage sites during soil moving activities	<ul style="list-style-type: none"> ◆ If any previously unidentified cultural heritage sites are discovered during works, personnel will stop work in the vicinity and advise the Company Man, who will obtain archaeological advice. Measures outlined in Beach Energy's cultural heritage procedures will be followed.
S2	Disruption to land use	Disruption to pastoral lease activities	<ul style="list-style-type: none"> ◆ Ongoing consultation will occur with the leaseholder to minimise any works disruption to pastoral activities. ◆ Any loss or damage to pastoral lease infrastructure (e.g., fences) will be reinstated as soon as possible.
S3	Earthworks	Stock trapped/injured in earthworks	<ul style="list-style-type: none"> ◆ Drilling sump will be fenced within one week of completion of drilling, to minimise risks to stock. ◆ All open excavations will be checked daily for trapped stock. Any issues will be reported to the Station manager.
S4	Weeds	New or increased weed infestations that could threaten pastoral lease activities	<ul style="list-style-type: none"> ◆ Refer Risk B7.

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No.	Hazard	Potential Impact	Mitigation and Management Measures
S5	Amenity	Temporary reduction in amenity values for Legune Station.	♦ Refer Risks B4 and B5.
S6	Road safety	Temporary reduction in road safety due to road traffic generated by the project	♦ The proposed track upgrades will contribute to improved road safety. ♦ Throughout all stages of project activities: – Speed limits will be imposed as per Risk B3. – All reasonable steps will be taken to minimise road hazards, including signs warning of machinery traffic.
S7	Public safety	Safety hazards for project and public due to unauthorised access to site	♦ Given the remote project location, security is not expected to be a significant issue at this site. ♦ All reasonable steps will be taken to prevent unauthorised access to the drilling site.
S8	Health	Health risks associated with high numbers of mosquitos	♦ Management of personal mosquito risks will be discussed during inductions and tool box meetings. ♦ Project wastewater will be irrigated on the surrounding grass so as to avoid ponding. ♦ Yellow lighting will be used to reduce mosquito attraction. ♦ Misting will be conducted over the camp area.
S9	Economic impact	Potential positive local economic impact due to project workforce	♦ Potential positive economic impact to local businesses through the provision of services. ♦ Supplies will be sourced locally where practicable.

5. Consultation

Beach Energy has undertaken consultation with all relevant stakeholders in order to minimise potential impacts, address relevant issues and implement required management measures. Stakeholder consultation conducted to date has included:

- ♦ Department of Mines and Energy: Beach Energy personnel met with DME in October 2013 to discuss Cullen-1. Approval for the Cullen-1 drilling program was granted by DME on 20 May 2014 in accordance with the Cullen-1 Environmental Plan and Cullen-1 Drilling Program.
- ♦ Northern Land Council: representative of the local indigenous community visited Legune Station and undertook a site inspection of the well lease pad, camp site and seismic track which will be upgraded. Following this site inspection Beach Energy was informed on 6 November 2013 that no matters of cultural significance were observed and that the proposed activities could proceed.
- ♦ Legune Station: Beach Energy personnel visited Legune Station on 23-24 of September 2013 and met with Station management to discuss Cullen-1. The main issues identified were:
 - Access route to well lease pad: the access route as outlined in Figure 2.1 was agreed with all parties at the meeting with Beach Energy contracting Legune Station to undertake the upgrade of 4.5km of former seismic track.
 - Camp site location: the location shown on Figure 2.1 was agreed with all parties at the meeting.

6. Contact

Beach Energy's nominated liaison for the Cullen-1 drilling program is Michael Giuliano Drilling Operations Manager – telephone: 08 8338 2833 or email: michael.giuliano@beachenergy.com.au.