Exploration Permits 112, 125, 82, and 105 – Exploration Program

Environment Plan

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Facility: Southern Amadeus Basin Exploration

Project Title: 2016 Southern Amadeus 2D Seismic Program

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Document Review Log:

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0	31 October 2014	Issue to DME	Corey Beggs Senior Environmental Adviser	Emma Hicks Senior Environmental Adviser	Mike Giles Manager, Operations Geophysics
1	27 January 2016	Revised Draft to DME	Ollie Glade-Wright Senior Environmental Adviser	Sam Nunan	Mike Giles Manager, Geophysical Services
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5	20 January 2017	Updated to correct Figure 3-6	Mitch Bird Environmental Adviser	Mike Giles Manager, Geophysical Services	Mike Giles Manager, Geophysical Services
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Santos:	Manager, Geophysical Services Exploration Manager, NT Onshore
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Central Land Council (CLC)	
Seismic Contractor	

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1 CORPORATE ENVIRONMENTAL POLICY

1.1 Environmental Policy and Commitment

The Santos Corporate Environmental Policy is provided in Figure 1-1. The policy is Santos' public declaration to reducing the environmental impacts and risks associated with its operations.

1.2 Environmental Performance Objectives

Santos has defined ten (10) performance objectives for the works included in the 2016 Southern Amadeus Seismic Program ('the Program') Environment Plan (EP). The performance objectives are to:

1. Minimise the visual impact of seismic operations;
2. Minimise disturbance to and contamination of soil resources;
3. Minimise disturbance to native vegetation and native fauna;
4. Avoid disturbance to sites of cultural, sacred and heritage significance;
5. Minimise disturbance to livestock, pastoral infrastructure and landholders;
6. Avoid the introduction or spread of exotic species and implement control measures as necessary;
7. Minimise disturbance to drainage patterns and avoid contamination of surface waters and shallow groundwater resources;
8. Optimise (in order of most to least preferable) waste avoidance, reduction, reuse, recycling, treatment and disposal;
9. Remediate and rehabilitate operational areas as necessary; and
10. Generate no fires from the Seismic operations.

1.3 Responsibility for Corporate Environmental Policy

The Santos Environmental Policy was approved (and signed) by the Chief Executive Officer and Managing Director. All personnel are responsible for the environmental performance of their activities and for complying with the general environmental duty as outlined in the Santos Environmental Policy.

The Manager, Geophysical Services, is responsible for the implementation of the EP for the Program. Their responsibilities include:

- Ensuring conformance with the Santos Environment, Health and Safety Management System (EHSMS);
- Ensuring required permits and approvals are in place and complied with;
- Management of non-compliances and non-conformances;
- Inductions of staff and contractors;
- Satisfying monitoring and reporting requirements;
- Incident management and reporting;
- As and where required, conducting internal and external audits; and
- Records management including waste records and hazardous goods manifests.

The Seismic Contractors are responsible for ensuring compliance with the EP through contractual commitments.

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1.4 Approval of this Plan

This plan was approved by:

Mike Giles
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Environmental Policy

Santos
We have the energy.

Our Environmental Vision:

"We will minimise our environmental impact across the whole lifecycle of our activities."

At Santos we adopt the principles of sustainable development. We recognise our responsibility to meet community expectations and we are committed to the continuous improvement of our environmental performance. We believe that environmental stewardship is both a management obligation and the responsibility of every individual. To achieve this we will:

- Comply with and continuously improve the Environment, Health and Safety Management System (EHSMS) across the business.
- Proactively identify environmental hazards, assess their risk and eliminate or, if not possible, manage the risk to as low as reasonably practicable.
- Establish annual environmental objectives and targets, implement programs to achieve them, and review and report on environmental performance against those objectives and targets.
- As a minimum comply with relevant legal and other requirements.
- Ensure that we have the resources and skills necessary to achieve our environmental commitments.
- Include environmental performance in the appraisal of workers' performance.
- Implement strategies to minimise pollution, manage waste, use water and energy efficiently, and address relevant biodiversity issues.
- Formally monitor, audit, review and report annually on our environmental performance and EHSMS requirements against defined objectives.
- Require that companies providing contract services to Santos manage their environmental performance in line with this Policy.
- Positively influence the environmental performance of Joint Venture activities operated by others.

K. T. Gallagher

Kevin Gallagher
Managing Director and Chief Executive Officer

Santos Limited	ABN 80 007 550 923
Policy reference number	P040
Title	Santos Environmental Policy
Date approved	8 February 2016
Approved by	Nick Fox, Chief Environment & Safety Manager
Responsibility for review	Nick Fox, Chief Environment & Safety Manager
Frequency of review	3 years

Figure 1-1: Santos Environmental Policy

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2 ENVIRONMENTAL LEGISLATION AND OTHER REQUIREMENTS

The *Petroleum Act 2011* is the principal piece of legislation governing the Program. In addition, the Act is supported by the *Petroleum Regulations* (Regulations) and the *Schedule of Onshore Petroleum Exploration and Production Requirements, 2012* (Requirements).

In accordance with Section 67 of the *Petroleum Act*, exploration activities such as the seismic surveys require approval to be obtained from the Northern Territory (NT) Department of Mines and Energy (DME) by the tenure holder prior to commencing works.

Formal Program approval is required from the NT Director of Energy in accordance with clause 501 of the *NT Schedule of Onshore Petroleum Exploration and Production Requirements, 2012*.

Santos is in regular contact with the DME to ensure changes in environmental legislation are met as required.

A list of relevant legislation, agreements and codes of practice relevant for the Program is provided in Sections 2.1 to 2.3.

2.1 Key Legislation Overview

Act	Summary
Commonwealth	
Aboriginal Land Rights (Northern Territory) Act 1976	Provides for the preservation and protection from injury or desecration of areas and objects in Australia and in Australian waters, being areas and objects that are of particular significance to Aboriginals in accordance with Aboriginal tradition.
Australian Heritage Council Act 2003	Establishes the Australian Heritage Council that is the principal adviser to the Australian Government on heritage matters. The Council's major role is to assess the heritage values of places nominated for the National Heritage List and the Commonwealth Heritage List, and to advise the Minister on promotion, research, education, policies, grants, conservation and other matters.
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	Provides for the protection of the environment and the conservation of biodiversity. It regulates a development or activity if it is likely to have a significant environmental impact on 'matters of national environmental significance' (MNES). This Act is administered by the Department of the Environment (DoE). **It is considered that the proposed activities will not adversely impact MNES, and has not been referred for assessment and approval under the EPBC Act.**
National Environment Protection Council Act 1994	Provides national standards for ambient air quality, movement of controlled wastes, and contaminated sites. This Act is administered by DoE.
Native Title Act 1993	This Act provides statutory recognition and protection for the concept of native title, including provisions for reaching Indigenous land use agreements.
Northern Territory	

Act	Summary
Aboriginal Land Act 2013	Provides access to areas which are Aboriginal land, whether it is on land or sea.
Biological Control Act 2011	Makes provision for the biological control of pests in the NT, and related purposes.
Bushfires Act 2014	Provides for the prevention and suppression of bushfires in the NT.
Control of Roads Act 2015	Provides for the administration and control of roads, including the maintenance of roads and opening and closing of roads.
Dangerous Goods (Road and Rail Transport) Act 2012	Makes provision for safety in the transport of dangerous goods by road as part of the system of nationally consistent road transport laws and makes provision for safety in the transport of dangerous goods by rail. Establishes common guidelines so that dangerous goods can be transported between states and territories.
Environmental Assessment Act 2013	Establishes the framework for the assessment of potential or anticipated environmental impacts of development, and provides for protection of the environment. The NT Environmental Protection Authority (EPA) is responsible for administering the act. The EPA also determines the appropriate level of assessment for new developments or material changes to existing operations, based on the sensitivity of the local environment, the scale of the proposal and its potential impact upon the environment. Note: This Program is not subject to this Act and will be approved under the *Petroleum (Prospecting and Mining) Act 1980*.
Environmental Offences and Penalties Act 2011	Establishes a penalty structure for environmental offences based around four offence levels. Penalties are defined in a variety of environmental statutes such as the *Waste Management and Pollution Control Act* and the *Water Act*.
Fire and Emergency Act 2015	Provides for the establishment of the Northern Territory Fire and Rescue Service, the operational and emergency response activities of the Service, the protection of life, property and the environment against fires and other emergencies and for related purposes.
Heritage Act 2015	Establishes the Heritage Council and the NT Heritage Register. It sets the process by which places become heritage places, allows for interim protection of places and sets out the process for getting permission to do work to heritage places and allows for fines and imprisonment for offences against the Act.
Northern Territory Aboriginal Sacred Sites Act 2013	Establishes the Aboriginal Areas Protection Authority (AAPA) as the body responsible for overseeing the protection of sacred sites in the Northern Territory. The AAPA provides a process for avoidance of sacred sites and entry onto sacred sites and the issue of Authority Certificates which indemnify the holder against prosecution under the Act for damage to sacred sites in the certificate area, provided works

Act	Summary
	or use has occurred in accordance with the conditions of the Authority Certificate.
Plant Health Act 2015	Provides the framework to ensure appropriate actions can be taken for the control of pests; and facilitates the production and trading of plants and plant products that are free from pests.
Petroleum Act 2016	Provides a legal framework to undertake exploration for petroleum and to develop petroleum production so that the optimum value of the resource is returned to the NT. The *Petroleum Act* is the principal legislation dealing with petroleum tenure, exploration and production activities onshore and inland waters of the Territory. Most current petroleum permits and licences are governed by the *Petroleum Act* (Act). In addition, the Act is supported by the *Petroleum Regulations* (Regulations) and the *Schedule of Onshore Petroleum Exploration and Production Requirements 2012* (Requirements). The Act, Regulations and Requirements are administered by the Northern Territory Petroleum Registry (Registry) which forms part of the DME. The Minister for Mines and Energy (Minister) is the applicable Minister for the purposes of the Act.
Public and Environmental Health Act 2015 *and* *Public Health (General Sanitation, Mosquito Prevention, Rat Exclusion and Prevention) Regulations*	Makes provision to protect and promote the health of individuals and communities in the Territory, and to monitor, assess and control environmental conditions, factors and factors and agents, facilities and equipment and activities, services and products that impact on or may impact on public and environmental health. Relates to public health and is directed at preventing pollution of water-courses and water supplies in the Northern Territory. Wastewater treatment systems may be subject to requirements under the *Public Health Act 1987* and Regulations. Sewerage Plants need to meet the NT Code of Practice for Small On-site Sewage and Sullage Treatment Systems and the Disposal or Reuse of Sewage Effluent.
Schedule of Onshore Petroleum Exploration and Production Requirements 2012 (under the Petroleum Act 2016)	Sets out detailed requirements, including approval for seismic activities and reporting of incidents.
Soil Conservation and Land Utilisation Act 2013	Makes provisions for the prevention of soil erosion and soil conservation and reclamation. It makes provisions for restricting construction activities that may damage or further damage land that is not environmentally stable, such as areas suffering soil erosion or areas that have the potential to erode.
Territory Parks and Wildlife Conservation Act 2011	Makes provision for the establishment of Territory Parks and other Parks and Reserves and the study, protection, conservation and sustainable utilisation of wildlife. It sets aside areas of the NT as parks and conservation areas that may not be developed.

Act	Summary
Waste Management and Pollution Control Act 2014	Aims to protect, and where practicable, restore and enhance the quality of the NT environment; encourage ecologically sustainable development; and facilitate the implementation of NEPMs established by the National Environment Protection Council. It is designed to prevent contamination of the surrounding environment, including soil, air, and water, and imposes a general duty on conducting an activity or action that causes or is likely to cause pollution resulting in environmental harm, or that generates or is likely to generate waste.
Water Act 2013	Provides for the investigation, allocation, control, protection, management and administration of water resources in the NT. The Act prohibits waste to come in contact with water or water to be polluted unless under authorisation.
Weeds Management Act 2013	Aims to prevent the spread of weeds throughout the NT, ensuring the management of weeds is an integral component of land management. It is designed to ensure there is community consultation in the creation of weed management plans and that the community takes responsibility in implementing weed management plans.
International Agreements	
Migratory species: • *Japan-Australia Migratory Bird Agreement* • *China-Australia Migratory Bird Agreement* • *Republic of Korea-Australia Migratory Bird Agreement* • *Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention)*	Australia is party to a number of international agreements to protect and conserve migratory species and their habitat. Migratory species listed on the annexes to these Agreements are placed on the migratory species list under the EPBC Act.
Ramsar Convention on Wetlands	The Ramsar Convention's broad aims are to halt the worldwide loss of wetlands and to conserve, through wise use and management, those that remain. Ramsar wetlands within Australia are listed as a Matter of Environmental Significance and protected under the EPBC Act.

Additional information on relevant legislation and legal obligations is provided in the Santos EHS Legal Obligations Directory, which is accessible on the Santos intranet *The Well*.

2.2 Relevant Agreements and Operating Consents

Table 2-1 lists agreements and operating consents of the geophysical operations including a summary of the key items.

Table 2-1: Agreements and Operating Consents Overview

Document	Summary
Indigenous Land Use Agreement EP No.s 82, 112, 118 and 125	Signed on 18 July 2007, this agreement between Central Land Council, Central Petroleum Ltd, Helium Australia Pty Ltd, Frontier Oil and Gas Pty Ltd, Ordiv Petroleum Pty Ltd refers to obligations under the Native Title (Cth) Act 1993. Details of this agreement are confidential and have been redacted.
Exploration Agreement EP 105, 106 and 107	Dated 14 October 2013, this agreement is between Central Land Council, Merlin Energy Pty Ltd and Santos QNT Pty Ltd. Details of this agreement are confidential and have been redacted.

The terms of this agreement are confidential and have been redacted.

Santos will ensure that prior to commencement of the Program, necessary consents and approvals will have been identified, obtained and be in place and the work will be undertaken in accordance with the terms and conditions as detailed in the CLC Agreement and the Sacred Site Clearance Certificate.

Landholder Access and Compensation Agreements are currently being negotiated with the affected pastoral leaseholders. These agreements set out arrangements for compensation payable to landholders under the *Petroleum Act 2011* and agreement on how Santos will conduct activities while on each property. All landholder consultation and negotiation will be carried out in accordance with in accordance with the DME *Petroleum Exploration Two Way Communication Consultation Process and Stakeholder Engagement Guidelines Land Access.*

2.3 Codes of Practice and Relevant Guidelines

Contractors undertaking activities as part of the Program will be required to comply with the following environmental standards, guidelines and codes of practice:

- Santos Environmental Health and Safety Management System (EHSMS).
- Santos environmental hazard standards (EHS).
- Santos Health and Safety Hazard Standards (HSHS).
- Conditions of Sacred Site Clearance Certificates.
- Australian Petroleum Production and Exploration Association (APPEA) *Code of Environmental Practice* (2008).
- Petroleum Exploration Two Way Communication Consultation Process (NT Government 30/11/2005)
- Stakeholder Engagement Guidelines Land Access (NT Government).

3 PROJECT DESCRIPTION

3.1 Project Location

The Project's proposed seismic activities will be carried out over Exploration Permits 82, 105, 112, and 125 which are located east, south and south west of Alice Springs (The Project Area) (Figure 3-1). These Exploration Permits cover a combined area of approximately 48,100km2 of the Amadeus Basin. The seismic survey application covers 2514 km but Santos only expect to record approximately 1,300km. The additional kilometres have been permitted to allow for flexibility of program based on results of survey on an ongoing basis.

The Exploration Permits are located on Aboriginal, Leasehold and Freehold land.

3.2 The Seismic Method

Seismic acquisition allows the explorer to 'image' below the surface and identifies areas where oil and gas may have accumulated. The seismic method uses vibrator trucks to produce sound waves, which travel into the earth and are then reflected from subsurface geological structures (refer to Figure 3-2). The returning reflections are recorded in a digital format and sent to a seismic data processing centre to produce a 'cross-section' of the layers of the earth's crust. The following sections explain the field procedures for recording seismic data.

3.2.1 Planning

Once the exploration team of an exploration company have proposed a seismic program, the seismic program is plotted onto detailed topographic and/or satellite images (as shown in Figure 3-1).

There are two basic types of seismic survey:

- A 2D survey records data along a single line of traverse, giving a cross-sectional 'picture' of the subsurface. 2D seismic lines are normally 10km to 50km long, or longer for regional exploration surveys and spaced 500m to 5000m apart; and
- A 3D survey records data over a 'grid' of lines simultaneously, giving a three dimensional view of the subsurface, beneath an area generally covering 15km^2 to 1500km^2.

The proposed work programme and this EP covers only 2D seismic survey activities.

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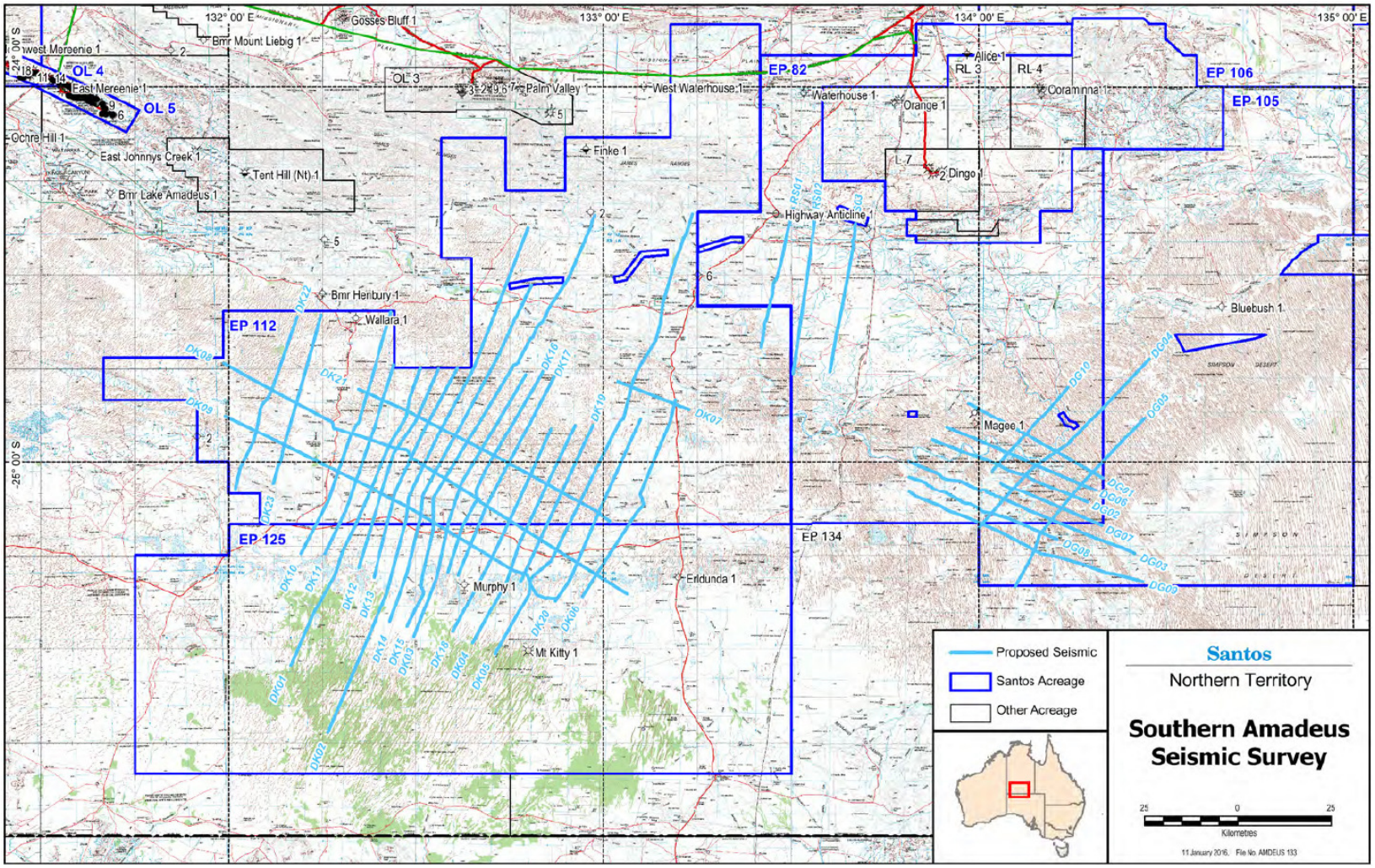

Figure 3-1: 2016 Southern Amadeus Seismic Survey

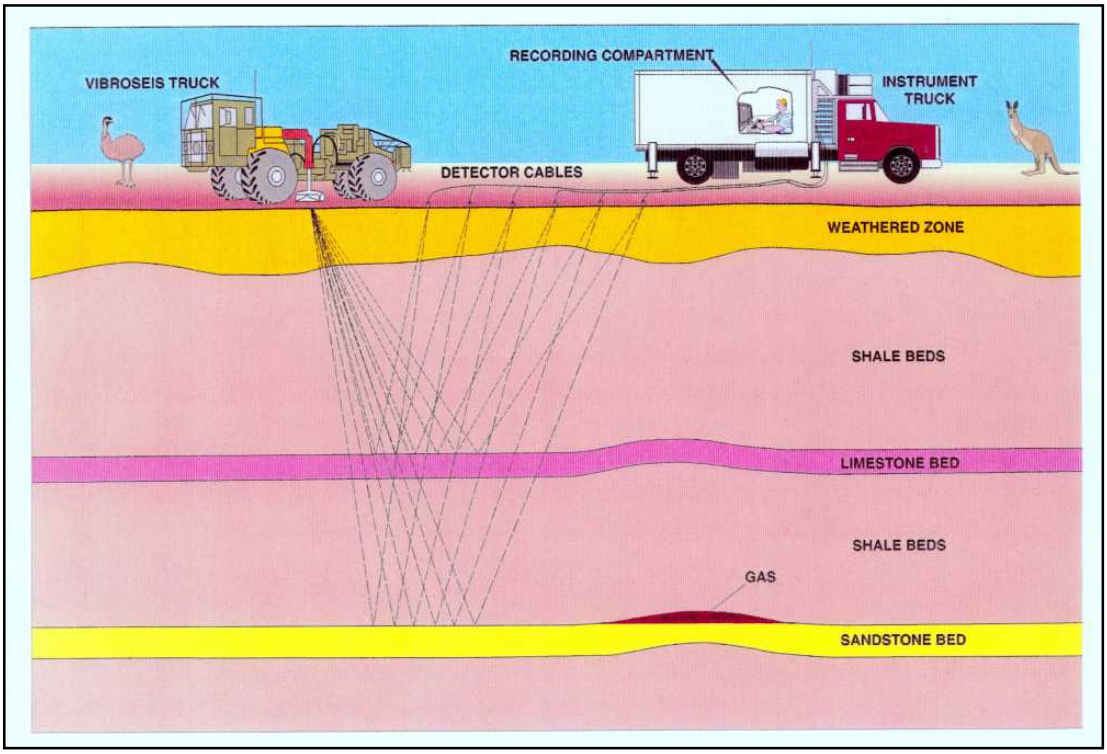

Figure 3-2: The principle of the seismic method

Seismic lines potentially impact a width of 4 to 5m. The seismic lines are laid out so as to avoid sensitive environmental sites, significant habitat, as well as cultural features such as buildings, dams, water wells and known Aboriginal heritage sites. Figure 3-3 shows line preparation with weaving and minimal cutting.

The key aspect of field acquisition is to get equipment (usually vehicular based) and personnel along the planned seismic lines and acquire sufficient data so as to adequately 'image' the subsurface. The safety of field personnel is a key consideration of any field seismic operation. This involves compromise between what is logistically, environmentally and economically possible.

Figure 3-3: Line preparation showing weaving and minimal cutting

3.2.2 Sacred Site Protection Procedures

As part of the seismic survey planning process, Santos has submitted an application for a Sacred Site Clearance Certificate (SSCC) to the Central Land Council (CLC). The application detailed the proposed project works activities including the project scope, definitive locations, proposed access routes, transportation and campsite locations.

The CLC has assessed the application and issued Santos with a CLC SSCC detailing Subject Land, Exclusion Zones, Restricted Work Areas and all conditions. The Santos Cultural Heritage team will implement all details of the SSCC, including providing a Cultural Heritage / Sacred Site assessment to Project Managers, issuing compliance actions to Project Managers, updating GIS with details of Sacred Sites, including conditions and will deliver Cultural Heritage and Sacred Site inductions to relevant personnel.

Santos will also incorporate the details of the archaeological and sacred sites provided by the Northern Territory Heritage Council and the Aboriginal Areas Protection Authority to the Cultural Heritage Assessment for the Southern Amadeus Seismic Program.

3.3 Line and Access track preparation

Line preparation will commence and be managed in line with the details of the SSCC and Cultural Heritage / Sacred Site assessment. This team operates from a small central campsite independent of the main camp (See Section 3.3.3). This camp site will most likely be moved weekly. The camp, on average, accommodates 13 personnel. The camp units are trailer mounted for ease of mobility. Campsites are set up, where possible, on sites previously used, or in areas naturally devoid of vegetation and always adjacent to any existing tracks to minimise impact on the terrain between the camp and tracks.

The line preparation crew usually operate simultaneously on different lines, characteristically using two D6 or equivalent bulldozers. Daily production of prepared line is approximately 30km (i.e. 15km per dozer) though this varies with terrain. The dozers will simply 'walk' with the blade up in easily traversable terrain, with the marks of the tracks being sufficient for the surveyors and recording crew to follow. The line position, plus tolerances for weaving the line around vegetation etc are pre-

programmed into GPS units housed in the dozers. These GPS units are kinematic dual frequency units that allow the dozer operators to get real time position fixes. These are plotted on a pilot display that also indicates the weaving tolerances for the dozer operators. The dozers weave around vegetation stands and on open ground the machines weave every 75-100m to reduce visual impact.

Blade work is kept to a minimum and generally restricted to sand dunes and flood plain crabhole country. Grader work is likewise kept to a minimum – graders are mainly used in flood plain crabhole country to smooth the tracks and knock down windrows in sand country.

All line preparation personnel are given environmental and cultural heritage inductions prior to commencing work. All machinery operators are required to observe for cultural heritage. Any sites discovered, must be avoided and reported to the Santos Representative onsite who will notify the Santos Cultural Heritage Team.

Access routes may be required in areas where there are no existing roads or petroleum activity has not been previously undertaken, but these will not require the same degree of preparation as for drilling or production operations.

The type and severity of potential impacts resulting from the preparation of access tracks and seismic lines is dependent to a certain extent on the land system in which the activities are being carried out. Disturbance to soils in some land systems, can lead to substantial erosion by water (Fatchen and Woodburn 2000) while other systems are generally more resilient and less likely to suffer any long-term impacts from soil disturbance. Due to the instability and erosion potential when disturbed, the steeper slopes and escarpments of tableland land systems are avoided.

The clearance of vegetation during access track preparation cannot be entirely avoided. During the preparation of seismic survey lines and access tracks, particular care is taken to ensure that minimal vegetation is cleared in heavily wooded areas as vegetation is likely to need active assistance to recolonise. Campsites are generally located at the nearest available naturally clear area or previously disturbed areas.

Current survey line and access track preparation techniques have been shown by a number of studies to have an insignificant impact on wildlife habitat and minimal impact on vegetation. This is due to the small and confined area of impact of survey lines and the rate of recovery of most vegetation types and surface morphology.

3.3.1 Line Surveying

Surveying commences shortly after line preparation. The field surveyors use real time kinematic GPS receivers to position receiver points for 2D surveys. Surveyors insert metal pins with numbered plastic tags to indicate the points. Selected points are marked by a wooden stake. Markers protrude about 30cm above ground level. All of these markers are removed on completion of the recording phase. Line detours are often marked with biodegradable flagging that is also removed. Each survey team (one surveyor in a light 4WD vehicle) generally makes only one pass over any given section of line. Back tracking may occur in areas where vehicle access routes have deviated from the true line position and markers have to be inserted by personnel on foot.

3.3.2 Recording

Recording normally commences two to three weeks after the start of line preparation. This operation is the largest part of the seismic operation in terms of personnel and vehicles. A recording crew would normally consist of up to 34 personnel and 16 vehicles. The size of the crew will vary depending on the recording technique used, terrain and season.

2D Seismic Operations

Work commences with the laying of cable and deployment of geophone bundles from light 4WD vehicles. Geophone strings normally consist of 12 interconnected geophones and are dropped off at each receiver station. These strings are looped onto metal hangers for ease of handling. The geophones are then pulled off the hanger and planted in the ground by personnel on foot. Once planted, the string (typically 20m or 25m in length to match the distance between receiver points) is connected to a “take out” on the recording cable.

The recording cable is spooled out from the side of the vehicle and offset to one side of the line to prevent damage from following vehicles.

Recording in 2D mode would normally commence when approximately 8km of cable and geophones have been laid. This layout is termed “the spread” and a preselected “live” section of it picks up the acoustic energy reflected from subsurface layers, converts it to electrical energy and transmits it to the instrument recording truck.

The instrument recording truck that collects, decodes and amplifies these signals, sets up at a suitable location approximately 100m from the spread and connects to it. Once the instruments and spread have been satisfactorily tested, recording is ready to commence.

The acoustic energy source is normally an array of three or four truck mounted vibrator units, electronically synchronised to vibrate in phase with each other. They line up along the seismic line, a few metres apart, centred on midway between two receiver points. Simultaneously each unit, on command from the instrument truck, inputs one or more frequency sweeps into the ground at each source point. Each sweep lasts for only a few seconds. Generally four seconds of reflected data is recorded. The source points are typically 20m or 25m apart. On completion of one source point the set of vibrators are moved to the next source point.

Figure 3-4: Vibrators & recorder truck

The “live” section of spread is generally about 12km in length. This is the only part of the spread where signal is recorded for any given source position. The live spread is moved (controlled by the recording truck operator) as the vibrators move up. As spread becomes redundant behind the vibrators (back end of line) it is picked up and transported to the front end of the line. This cycle continues until the line is completed. The recording truck may move once or twice during the day to keep pace with the spread.

All operational vehicles stay on the prepared line. Non-operational vehicles are required to park off line to avoid causing noise on the spread and interference with line traffic. Non-operational vehicles include:

- Parked vehicles;
- Spare vibrators;
- Vibrator service truck; and
- Instrument truck.

Along any single line, the following vehicle passes can be expected to occur during normal operations:

- Vibrators 1 pass for each truck
- Instrument truck 1 pass
- Light vehicles 15-20 passes in total
- Vibrator service truck 1 pass.

3.3.3 Camp Sites and Associated Supplies

There are generally only two campsites in operation, line preparation/survey camp and main camp. The former is briefly explained in the line preparation section. The main camp houses the recording crew, crew management team and the recording and mechanical back up teams.

Proposed main campsite locations are shown on Figure 3-6. These locations have received CLC clearance and have been chosen based on the following factors:

- Preference for pre-disturbed area wherever possible.
- Avoidance of clay pans or salt lakes.

- Located as near as practical to existing tracks or roads to avoid the need for clearance of native vegetation and subsequent disturbance fauna habitats.

Figure 3-5: Typical main camp

2D projects result in frequent camp moves but with tenure lasting only a few days. This camp often houses approximately 40 personnel and contains approximately 20 trailers and 36 vehicles.

The access routes from camp are clearly defined to restrict wheel track impact which results from vehicles transit to and from camp to the adjacent road at least once per day. Some campsites may require multiple access routes to minimise the potential of bull dust creation. Vehicles are restricted to the perimeter of the camp and parking areas are also defined.

Potable water is planned to be sourced from Alice Springs. Santos estimates water usage to be approximately 160 litres per person per day. Based on this assumption water use for the line preparation crew would be approximately 2,240 litres per day, and recording crew usage of approximately 5,120 litres per day. If suitable existing ground water can be located closer to the crew location and a commercial arrangement agreed with the local pastoralist, some of the usage may be sourced locally.

Wastewater from laundry, showers and kitchen is piped to an irrigation area about 50m outside the camp. Sewage management practices at all camps consist of the use of port-a-loos and grey water capture and disposal to a ground pit with the aim to minimise any risks to human health or the environment.

Wastepaper, cardboard and food scraps are disposed of into sealed bins set up adjacent to the camp area. The sealed bins are transported regularly for waste disposal at a licensed landfill. Recyclable materials, including tyres, are segregated on camp and regularly transported to a licensed waste depot in Alice Springs.

To minimise or eliminate the potential for spills fuel drums are stored within portable bunding and bulk fuel is stored within tankers, which have safety features such as double-skins (or temporary bunding), safety cut-off valves, top accessing etc. Spill leak and drip trays are used to address minor drips and spills resulting from re-fuelling operations. Any uncontained spillage will be treated in situ, and impacted areas remediated.

Once the campsite has been vacated, rehabilitation is undertaken including removal of rubbish and any man made items. When necessary, and terrain permitting, the area is tyne ripped to remove

compaction and wheel tracks. Photopoints are established at each campsite to document pre-disturbance and post-restoration condition (see Section 7.5).

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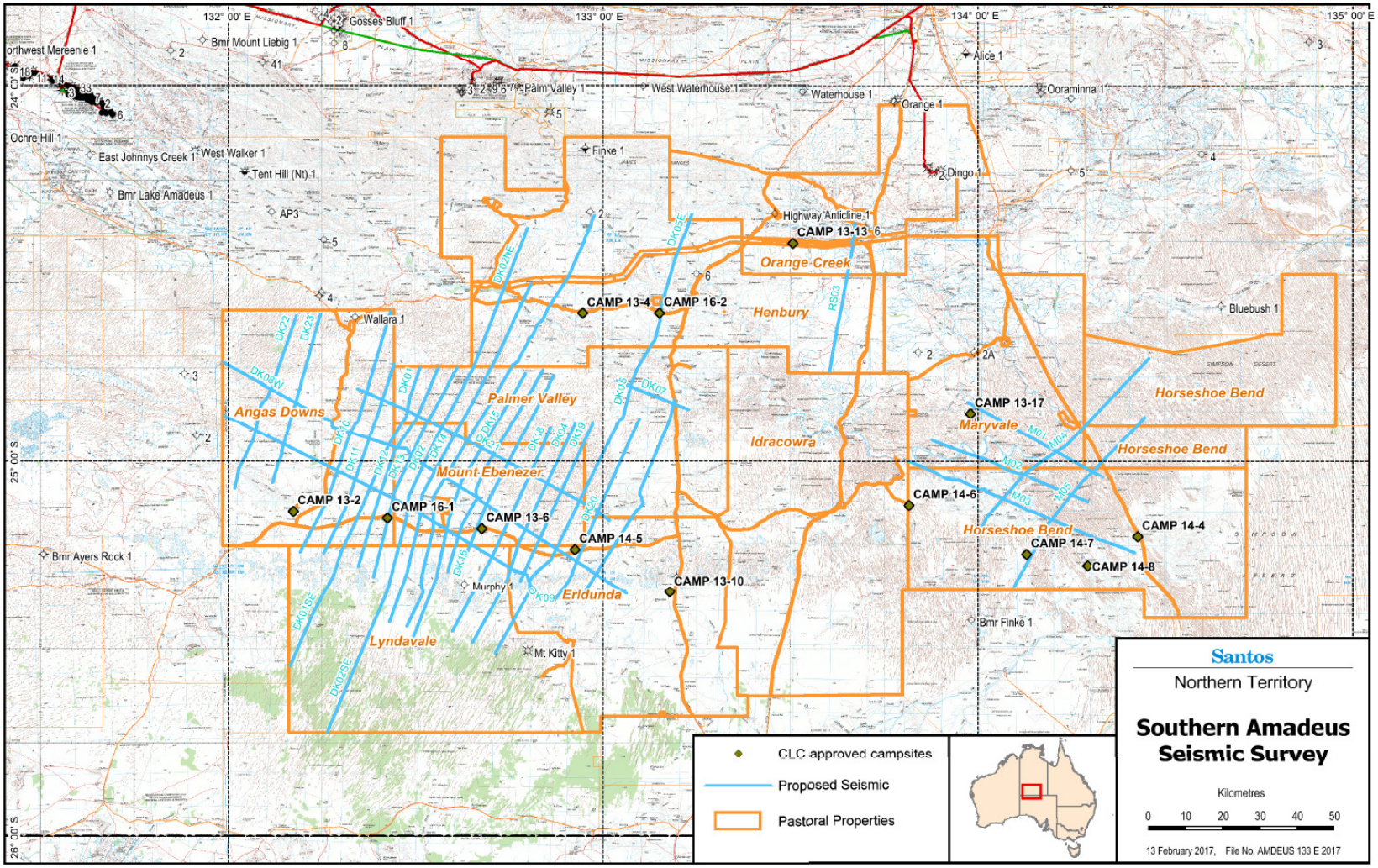

Figure 3-6 CLC Cleared Camp Locations

3.3.4 Line/Access Track and Campsite Restoration

The majority of seismic lines and access tracks and camp sites do not require restoration work, as one of the main objectives is to prepare and utilise them in a way that will facilitate rapid natural recovery. However, instances that can require restoration are:

- Wheel ruts caused after wet periods;
- Windrows not fully removed by grader;
- Windrows that have been created at intersection of lines and public tracks;
- Compaction of top soil at camp sites;
- Compaction of shoulders on public access tracks;
- Heavily trafficked routes between camp sites and nearest public track;
- Access tracks that have turned to bulldust due to extensive seismic traffic.

Normally a single dozer or grader or one of each is all that is required to carry out the restoration work. Methods used for rehabilitation include:

- Ripping of compacted areas with bulldozer rear tynes;
- Windrow material pushed onto line and smoothed;
- Public road shoulders reinstated;
- Wheel rut material used to infill affected areas; and/or
- Affected watercourse channels and creek banks reinstated.

3.3.5 Post Survey Monitoring and Auditing

Prior to the commencement of any survey, photopoints are established at nominally 5 km intervals. By establishing such a large number of photopoints it provides a balanced representation of the various landform and vegetation types encountered and enables rehabilitation success to be effectively monitored.

Photopoints are GPS coordinated prior to the start of line preparation and photographs are taken at each locations along the proposed line direction to give a view of the terrain prior to line-preparation. All photographs are digital for consistent comparison. The process is repeated after line preparation and again after recording. The revisit intervals are generally one year, two years and four years although the return period is determined by weather/road conditions and current activity in the region. Revisits may also be targeted, with emphasis on sensitive areas and areas potentially subject to erosion such that environmental impact of re-accessing remote locations is minimised.

A summary of the monitoring program is presented in Section 7.5.

Figure 3-7: Dune cut immediately after recording and four years after recording

3.3.6 Long-term Rehabilitation

Whilst the majority of areas will naturally regenerate following restoration works, there is the possibility that specific areas (sensitive areas or areas subject to erosion) may need additional rehabilitation following the first wet-season. Areas identified in post-survey photopoint monitoring, or by subsequent landholder liaison, as requiring additional rehabilitation works will be re-visited and rehabilitated accordingly.

Following completion of the final photopoint revisit and any required additional rehabilitation, Santos will submit the final Environmental Line Reports to DME along with the application to release the long-term Rehabilitation Security. It is anticipated that the final rehabilitation assessment and endorsement will be conducted by an appropriately qualified third party. Reporting requirements are discussed in Section 8.

3.4 Timeframe

Based on current seismic crew availability, Santos would expect to commence line preparation for the project in May 2016, with the seismic recording commencing approximately 3 weeks later. Recording for this project is expected to take approximately sixteen weeks to complete.

On-ground conditions, initial line preparation, wet weather, equipment and operator availability and delays in obtaining required approvals and consents may delay the commencement date and / or extend the duration of the planned works.

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4 ENVIRONMENT DESCRIPTION

4.1 Physical Environment

4.1.1 Climate

The Southern Amadeus seismic survey is located within the arid zone of Central Australia that experiences low and variable rainfall and high diurnal and seasonal temperature fluctuations.

Table 4-1 shows a summary of climate records for Alice Springs Airport (Station 015590), which is located approximately 140 kilometres (km) north of the Program area (Bureau of Meteorology [BoM] 2014).

The mean annual rainfalls for Alice Springs and Mereenie are 284 mm and 300 mm respectively, with the majority of rainfall in summer. Temperatures vary from very hot in summer to below freezing in winter, and frosts occur regularly during the winter months.

Average evaporation exceeds average rainfall for each month of the year and by some 1000% over an average year. The mean annual evaporation rate at Alice Springs is 3066 mm. The dominant wind directions are southeast to northeast with little seasonal variation.

Table 4-1 Temperature and rainfall records for BoM Station #015590

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual
Temperature													
Mean Daily Max (°C)	36.4	35.1	32.6	28.2	23.0	19.8	19.7	22.6	27.3	30.9	33.6	35.4	28.7
Mean Daily Min (°C)	21.5	20.7	17.5	12.6	8.2	5.0	4.0	6.0	10.3	14.8	17.9	20.2	13.2
Rainfall													
Mean monthly (mm)	38.5	43.9	31.8	17.3	18.7	13.6	15.4	9.0	8.4	21.1	28.7	36.8	284.0

4.1.2 Geology

The Southern Amadeus seismic survey is located within ted in the eastern, central and southern Amadeus Basin, an east-west trending structural depression extending across the southern part of the Northern Territory and into Western Australia. This basin covers an area of approximately 207,000 km² and contains up to 9100 m of late Proterozoic and Palaeozoic sediments. It is bound in the north by the Arunta complex and in the south by the Musgrave-Mann complex, both containing granite, gneiss and schists, with amphibolite and quartzite.

Geologically, rocks consist of sandstones that form resistant strike ridges and less resistant siltstones, commonly covered by superficial soils. Hydrocarbons occur in sandstones at depths ranging between 1200 and 1500 m.

4.1.3 Soils

The Project Area soils are dominated by tenosols soils, kandosols and rudosols asscoated with rugged rock terrain (DLRM 2013a). Smaller pockets of Calcarosols and Sodosols Soils are present in the Project Area and will be avoided by the proposed activities.

- Tenosols are weakly developed or sandy soils, commonly shallow (slightly more developed than Rudosols), although they can include the deep sand dunes of beach ridges, granitic soils and sand dunes of deserts. Tenosol soils show some degree of soil profile organisation (minor colour or soil texture changes in subsoil).
- Rudosols are very shallow soils or those with minimal soil development and includes very shallow rocky and gravely soils across rugged terrain.
- Kandosols are massive and earthy soils (formerly red, yellow and brown earths) that are widespread across the Sturt plateau regions.
- Calcarosols soils with calcium carbonate often formed on limestone are restricted to small pockets in Central Australia.
- Sodosols soils are generally high in sodium with an abrupt increase in clay content from the top soil to subsoil. They are dispersive and restricted to small occurrences in the southern region of the NT.

Within the Project Area the seismic lines will cross over the following dominate terrain:

Land Systems	General Terrain Description	Line Km	% of Total
Desert dunefields	Dunefields with parallel linear dunes, reticulate dunes and irregular or aligned short dunes; red sands	1,494	59.4
Desert sandplains	Level to undulating sandplains with red sands	234	9.3
Sandstone plains and rises	Plateaux, plains and rises on sandstone, claystone, shale and limestone; outcrop with shallow stony soils	226	9.0
Sandstone hills	Stony plateaux, tablelands and hills on sandstone, quartzite, siltstone and conglomerate (deeply weathered in places); outcrop with shallow stony soils	202	8.0
Limestone plains and rises	Plains, rises and plateaux on dolomite, limestone, chalcedony, shale and sandstone; red clayey sands, calcareous earths and outcrop with shallow, stony soils	193	7.7
Salt pans	Salt pans with waterlogged saline clays and fringing dunes	82	3.3
Sandstone ranges	Rugged ranges on quartzite, sandstone and conglomerate; outcrop with shallow, stony sandy soils	45	1.8
Alluvial floodplains	River plains, swamps and alluvial fans formed on Quaternary alluvium	24	0.9
Lateritic plains and rises	Plains and rises on weathered sedimentary rocks; red clayey sands, red earths and texture contrast soils	9	0.4

Land Systems	General Terrain Description	Line Km	% of Total
Granite plains and rises	Gently undulating to undulating plains with rises and low hills on schist, gneiss and granite (deeply weathered in places); red earths, red clayey sands and texture contrast soils with outcrop and shallow stony soils on steeper areas	5	0.2
Totals		**2,514**	**100%**

4.1.4 Hydrology

All catchments within the Amadeus Basin region drain internally towards Lake Eyre (within South Australia) (Figure 4-1). All surface water including rivers, streams and drainage lines are ephemeral and subject to short flow duration and high turbidity.

The dominant basin is associated with the Finke River system and its associated tributaries and feeder rivers.

4.1.5 Salt Lakes

The salt lakes of Central Australia are also maintained by groundwater and support specialised flora and fauna. Salt lakes are generally formed as a result of saline ground water discharging to the surface. Such salt lakes drain groundwater from both bedrock aquifers and aquifers made up of the river sands deposited on the valley floor. The water table is generally about 300 millimetres below the lake floor, shallow enough for the water to be evaporated. These lakes occasionally fill when heavy rains occur but they are usually dry. Ground water does not generally accumulate in the salt lakes as free standing water but is all lost to evaporation. The salts in the ground water are left behind and gradually accumulate forming deposits of common salt and gypsum.

Salt lakes are a significant landform in the southern part of the Northern Territory, covering an area of some 2800 square kilometres. Within the Project Area all salt lakes will be avoided by the proposed activities.

4.2 Biological Environment

4.2.1 Bioregions, Flora and Fauna

The Arid Lands region covers 49% of the land area of the Northern Territory (658,000 sq km). It includes all of the MacDonnell Ranges and Burt Plain bioregions, the Territory sections of the Great Sandy Desert, Simpson Strzelecki Dunefields, Finke, Central Ranges, Channel Country and Stony Plains bioregions, most of the Territory section of the Tanami bioregion and parts of Sturt Plateau, Mitchell Grass Downs and Davenport Murchison Ranges bioregions.

About 55% of the Arid Lands subregion is Aboriginal freehold and about 36% pastoral leases, on which cattle are grazed. Though accounting for a small total area, horticulture is an important land use in the Arid Lands subregion. Current and proposed protected areas make up 36% of the region; the vast majority of this is as proposed Indigenous Protected Areas.

The Project Area is covered by the bioregions of the Simpson Strzelecki Dunefields Bioregion in the east and Finke Bioregion in the west (Figure 4-2).

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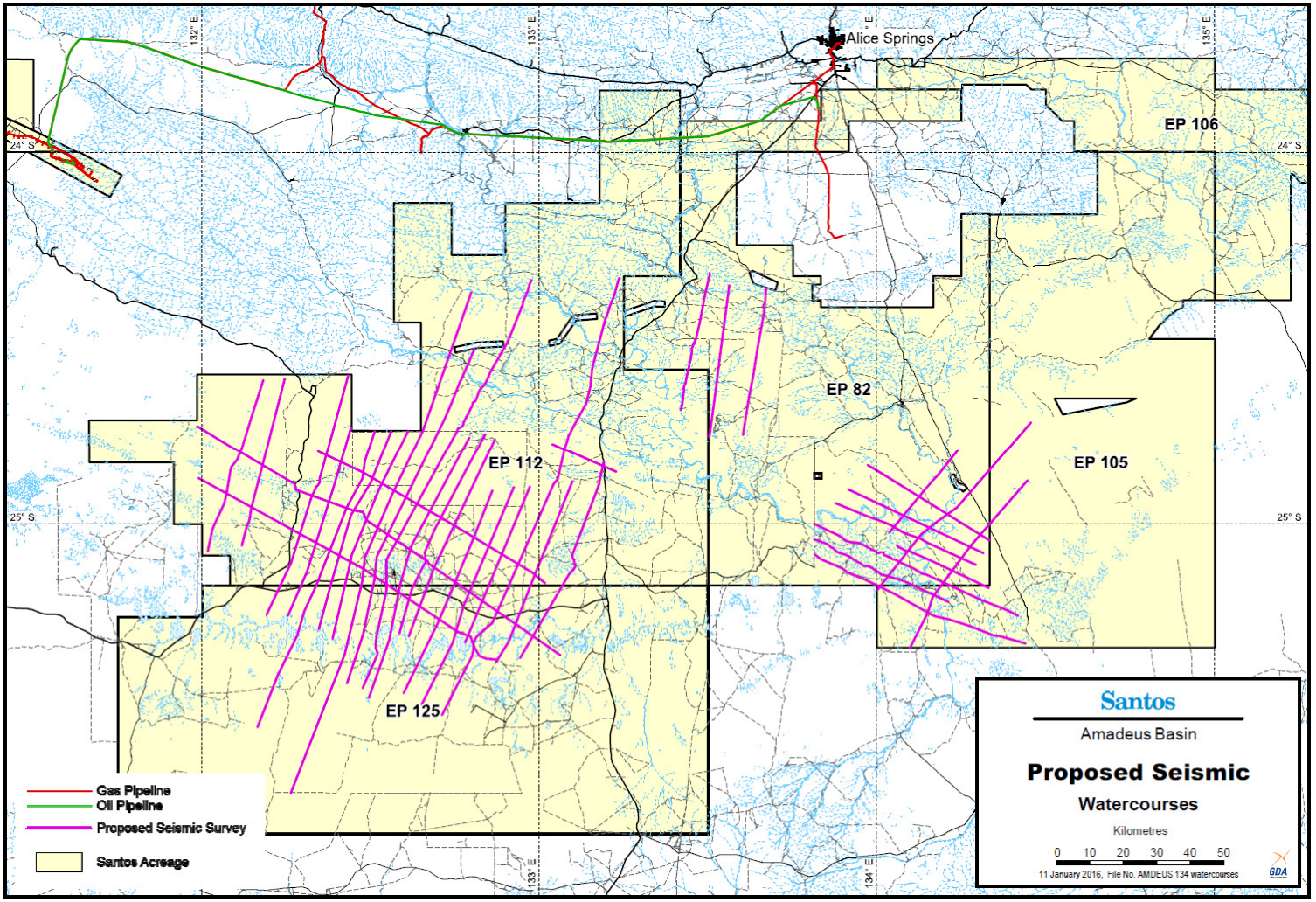

Figure 4-1: Watercourses

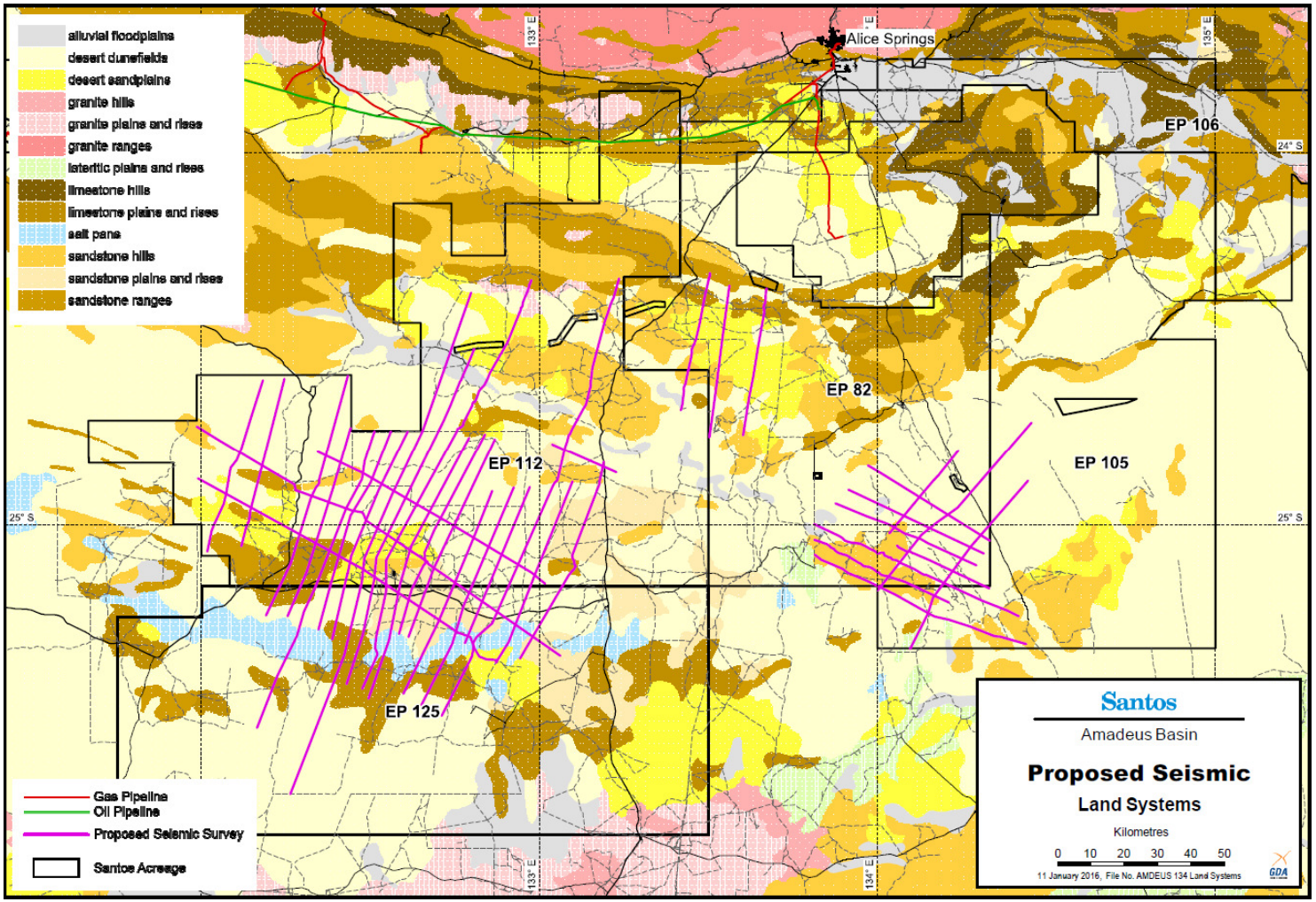

Figure 4-2: Land Systems

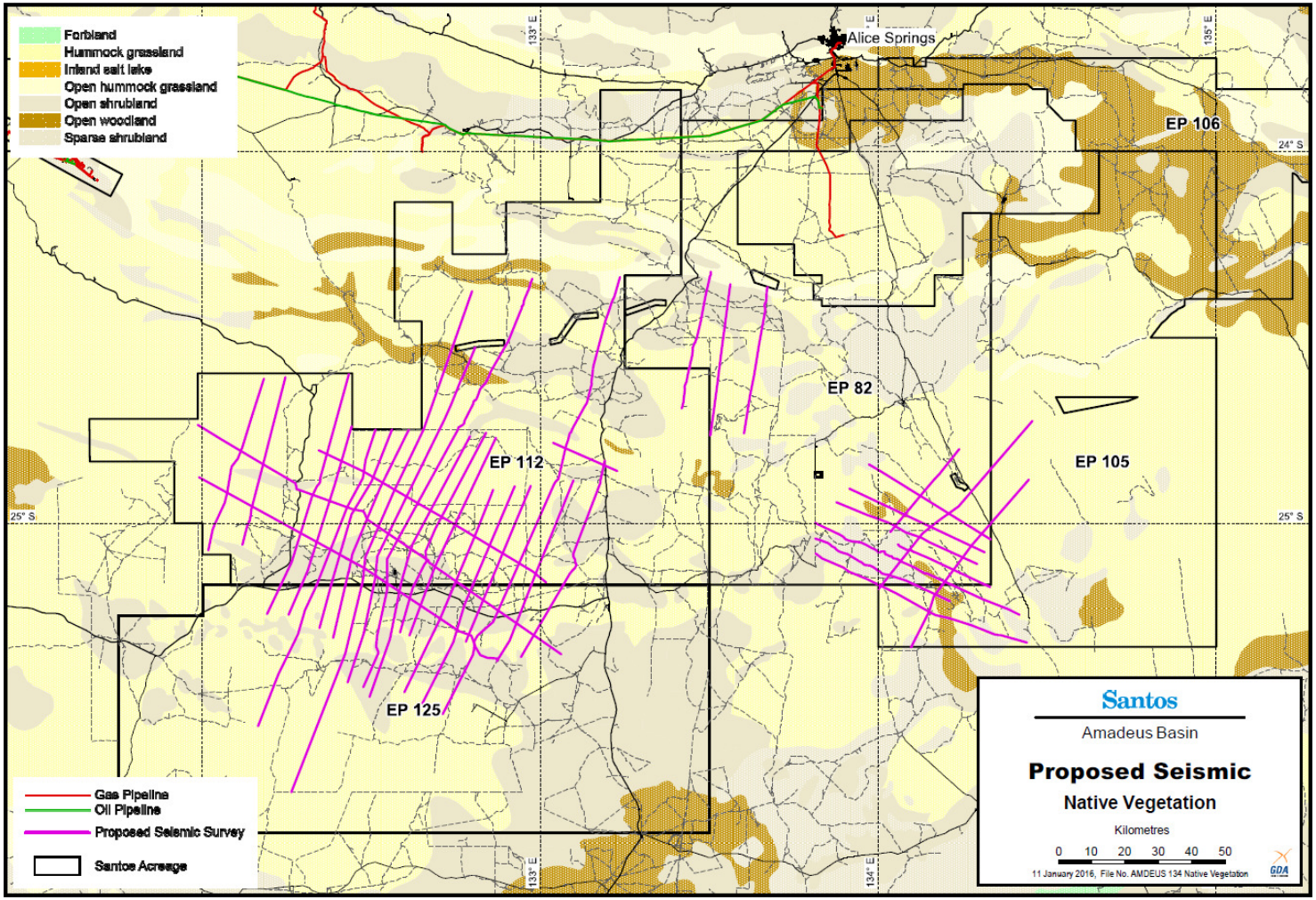

Figure 4-3: Native Vegetation

4.2.1.1 Simpson Strzelecki Dunefields Bioregion

The Simpson-Strzelecki Dunefields Bioregion covers an area of 297,227 km^2, and extends from the southeast of the NT, through the northeast of SA, with small areas in both Qld and NSW. The bioregion is part of the Australian continental dunefields, which consist of a huge anti-clockwise whorl of linear dunes in central Australia and thus dominated by high linear dunes of red sand.

Woodland communities are dominated by *Acacia ligulata*, mulga, needlewood (*Hakea leucoptera*), whitewood (*Atalaya hemiglauca*) and beefwood (*Grevillea striata*) with an understorey shrubland consisting of species of *Cassia*, *Eremophila* and *Dodonaea*. Mitchell Grass occurs on the dunes while temporary canegrass (*Glyceria ramigera*) - lignum (*Muehlenbeckia cunninghamia*) swamp communities occurring between them.

The sand dunes and sandplains communities support sandhill wattle (*Acacia ligulata*), turpentine (*Eremophila sturtii*), scattered mulga (*Acacia anuera*), rosewood (*Heterodendrum oleifolium*), whitewood (*Atalaya hemiglauca*), canegrass (*Eragrostis australasica*), the occasional white pine (*Callitris glaucophylla*) and various cassia and eremophila species.

Lignum (*Muehlenbeckia cunninghamia*), black box (*Eucalyptus largiflorens*) and river red gum (*Eucalyptus camaldulensis*) grow along the creeks and on the margins of freshwater claypans. Many of the same species are found in the more saline clays of the Cobham land system along with prickly wattle (*Acacia victoriae*) and chenopods. Bladder saltbush (*Atriplex vesicaria*), black bluebush (*Maireana pyramidata*), Mitchell grass (*Astrebla* sp.) and scattered mulga (*Acacia anuera*) are found on the tablelands and stony downs. Bimble box (*Eucalyptus populnea*), western bloodwood (*Eucalyptus terminalis*) and ironwood (*Acacia excelsa*) are present with denser mulga on the sands.

4.2.1.2 Finke Bioregion

The Finke Bioregion covers an area 73,800 km^2. The main land types are arid sand plains with dissected uplands and valleys, including some major rivers (Finke, Hugh and Palmer rivers). The bioregion is dominated mulga taking different forms on different soil types. The mulga is made up of various Senna, Eremophila and Acacia species (*S. nemophila, S. desolate, E. freeelingii, E. gilesii, A. kempeana, A. tetregonphylla*). The bioregion includes eucalypt low woodland with tussock and hummock grass understorey, acacia woodland, hummock grassland, and chenopod shrubland, associated with salt plains and floodouts on sand plains. The dominant chenopods are bluebush (*Maireana astroricha*) and bladder saltbush (*Atriplex vesicaria*).

Despite the lack of free-water the bioregions provide important habitat for a range of wildlife including a variety of small mammals, reptiles and birds.

Due to the mobility of animals in the arid region and the extensive habitat of the region together with the minimal impact on the habitat from the proposed activities the likely potential impact on fauna is low.

4.2.2 Socio-economic Environment

The Amadeus Basin has broad indigenous cultural and European historical significance. There is a range of current land uses throughout the area including conservation, tourism, oil and gas production and pastoral activities. While the regional population has decreased with time, tourist numbers are consistent. The region remains generally undeveloped in terms of infrastructure and roads.

Tourism centres such as Alice Springs and Yulara continue to be the main destinations.

The Amadeus Basin supplies gas within the Northern Territory and oil to South Australia. Additional discoveries are necessary to maintain supply in the future. Natural gas is a comparatively lower

carbon dioxide polluting fossil fuel, and therefore, its continued use in preference to coal and oil reduces greenhouse impacts.

4.3 Environmental and Cultural Sensitivities

4.3.1 Sacred Site Protection

Binding agreements are in place to manage the key values and sensitive aspects relating to the protection of Sacred and Cultural Heritage Sites, including information provided by the NT Heritage Council and Aboriginal Areas Protection Authority.

Implementation of the Sacred Site Protection Procedure obligations, set out in the Indigenous Land Use Agreement EP No.s 82, 112, 118 and 125 and EP 105, 106 and 107, contribute to minimising the risk of damage to Sacred Sites through seismic line preparation and recording activities. Refer to Section 2.2 and Section 3.2.2.

Santos and its subcontractors will ensure that conditions of the CLC SSCC are fully complied with, and if cultural heritage sites are identified during the course of the Program they will be reported to a member of the Cultural Heritage Team who will manage discoveries in line with the relevant agreement and legislation.

Environmental and cultural heritage inductions were implemented for the seismic program in 2013 and will be updated and delivered for the 2016 Program.

For the majority of the seismic program Santos has confirmed that there will be no impacts on areas listed on the National Heritage Register (National Heritage List (DSEWPaC 2014a) or NT Heritage Register (DLPE 2014). A new work program has been submitted to the CLC in December 2015 for the additional seismic lines that are included in the 2016 program.

4.3.2 Protected or Conservation Areas

There are protected or conservation areas within in Project Area (DLRM 2014a and Figure 4-4). A list of sites within the Permit Areas includes:

- Chamber's pillar historical reserve
- Mac Clark (*Acacia peuce*) Conservation Reserve
- Henbury meteorites conservation reserve
- Rainbow valley conservation reserve
- Illamurta springs conservation reserve
- Ewaninga rock carvings conservation reserve
- Owen spings reserve

These protected areas will all be avoided by the Program.

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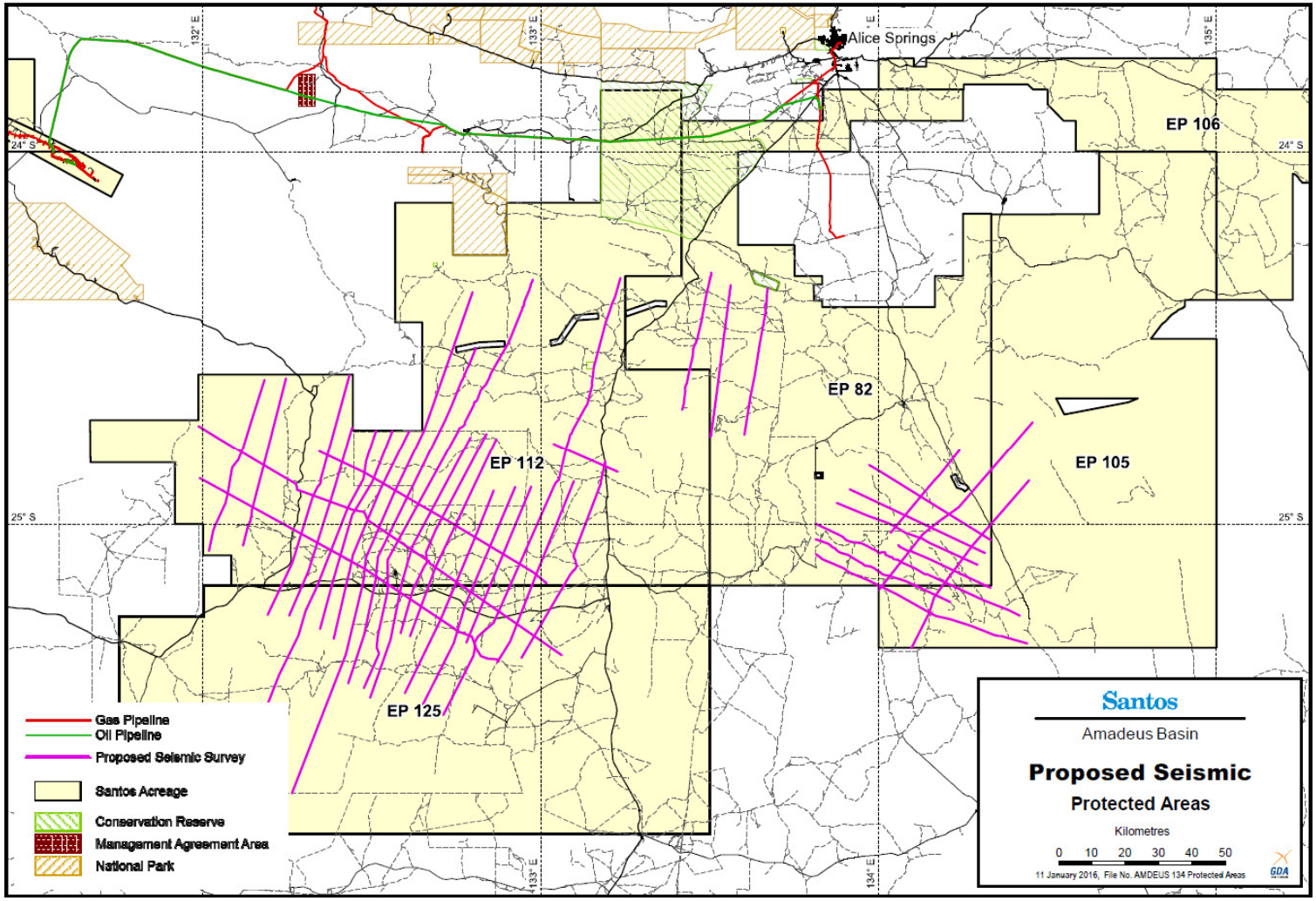

Figure 4-4: Protected and Conservation Areas

4.3.3 Threatened Flora and Fauna

Within the Arid Lands Region of the NT, there are 76 threatened species, 41 of which are listed as threatened nationally and 70 that are listed as threatened in the Territory. Bednall's Land Snail, listed as Critically Endangered in the NT, is the most severely threatened species that is still thought to occur in the region. The region has 47 species listed as migratory under international agreements.

Interrogation of databases and a review of published material indicate that a number of rare or threatened species have been recorded within the region. A search of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters database (DoE 2016) and a review of Northern Territory flora and fauna databases (DLRM 2014d) was undertaken to identify nationally listed threatened flora or fauna that may occur or are likely to occur. These searches identified 5 birds, 1 insect, 5 mammals, 3 reptiles, 9 plants, 1 cycad and 9 listed migratory species (all birds) and 10 listed marine species (also birds) that may or are likely to occur within the Project Area (Search results provided in Appendix A). The search did not identify any Threatened Ecological Communities in the area.

Due to the small nature and scale of the disturbance footprint associated with seismic activities no Matters of National Environmental Significance (MNES) relating to threatened flora or fauna will be significantly impacted by the proposed activities.

4.3.4 Significant Habitat

The EPBC Act matters search identified one nationally important wetland being the Karinga Creek Palaeodrainage System. This system is good example of a series of groundwater discharge lakes, of varied hydrological character, in a desert environment, which also function as episodic lakes. The lakes system will be avoided by the proposed activities.

No other significant habitat has been identified within the Project Area (DLRM 2014a). The habitat of the Project Area is consistent with and widespread within each Bioregion.

4.3.5 Fire Regime

Aboriginal people have traditionally used fire as a tool during hunting and gathering. These fires have shaped vegetation and faunal patterns across central Australia. The advent of pastoralism brought new approaches regarding fire use resulting in fewer but larger fires initiated during the warmer seasons.

Fire management or controlled burns within the region are a common occurrence. Controlled burns are undertaken to reduce the possibility of uncontrolled fires and to assist in land management (e.g. local Indigenous people in traditional hunting activities).

4.3.6 Pest Plant and Animal Control

Pest plant and animal control is considered to be a significant land management issue in the Northern Territory. The Amadeus Basin has three Weeds of National Significance (WoNS), which are also declared weeds in the Territory, and an additional 28 Territory declared weeds (DLRM 2014b). Thirteen introduced feral animal species are a problem in the region.

While the Amadeus Basin region is considered to be relatively free of pest plant species, weed distribution is more often related to environmental disturbances caused by the construction of roads and tracks, cattle grazing and feral animals. Weeds are most prevalent on land under pastoral lease with infestations generally concentrated around infrastructure such as water points, fence lines and tracks, and also along the banks of watercourses where cattle and feral animals tend to congregate.

Pest animals identified in the region include rabbits, feral cats, pigs, donkey and camels.

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5 ENVIRONMENTAL RISKS AND IMPACTS, DESCRIPTION AND ASSESSMENT

Activities (or elements of activities) that have the potential for environment impact[1] have been identified and assessed for the 2016 Southern Amadeus Seismic Program in accordance with *EHSMS 09 – Hazard Identification, Risk Assessment and Control*. The risk assessment process defined under EHSMS 09 includes:

- Identification of environmental hazards associated with the Program activities
- Consideration of the mode of impact upon the environment of each hazard and the potential maximum consequence if no control measures are implemented
- Consideration of controls that are appropriate and implemented to manage each hazard
- Consideration of the likelihood (probability) of the consequence occurring with these controls in place
- Re-consideration of the final maximum consequence that is credible
- Calculation of the environmental risk using the Santos Group Risk Matrix (see below)
- Assessment to determine if the risk is as-low-as-reasonably–practicable (ALARP). If it is not, then consideration of further risk control measures to be implemented to reduce the risk to ALARP, or to an otherwise acceptable risk level

The Santos Operations Risk Matrix is provided in Table 5-1.

Based on Santos' operational experience, the environmental hazards that have the potential to result in environmental consequences are identified as:

- Disposal of domestic and chemical wastes.
- Earthworks associated with seismic line and access track preparation and camps and rehabilitation.
- Operational induced bush fire.
- Seismic source activation.
- Spills or leaks associated with storage of oil, fuels and chemicals, refuelling operations and high pressure hydraulic systems.
- Vehicle movements.

Potential environmental consequences that may result from seismic operations include:

- Contamination of soil, groundwater and / or watercourses.
- Damage to landholder infrastructure.
- Damage to petroleum infrastructure.
- Damage to soil (erosion, contamination, compaction, generation of bulldust).
- Disturbance to natural drainage patterns.
- Disturbance to other cultural or environmentally sensitive sites.
- Disturbance to sites of sacred or cultural heritage significance to Aboriginal people.
- Disturbance, injury or death to livestock or native fauna.
- Introduction and or spread of weeds, pest plants, animals and pathogens.
- Loss of amenity (noise generation, airborne dust, visual impact).
- Loss of organic beef or cattle care certification.
- Loss of vegetation and habitat.
- Unauthorised third party access.

[1] An environmental impact is any change to the environment, whether adverse or beneficial, resulting from an activity.

- Uncontrolled discharge of artesian aquifer.

For each activity, the following information is summarised in Table 5-2:

- Environmental hazards
- Potential consequences
- Assessment of residual risk.

Table 6-1 shows the risk mitigation measures (operational controls) considered in the assessment of residual risk.

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Table 5-1: Santos Risk Matrix

CONSEQUENCE			I	II	III	IV	V	VI
	PEOPLE	P	**Minor injury** - first aid treatment or no effect. Process Safety Exception	Injury requiring **medical treatment** with no lost time. LOCI Tier 2 OR any loss of primary containment irrespective of the quantity	Medium term **reversible disability** to one or more persons. Significant medical treatment, disabling or lost time injury. LOCI Tier 1	Extensive injuries OR **irreversible disability** OR multiple lost time injuries. High Impact Process Safety Incident	**Single fatality** and/or severe irreversible disability to multiple people	**Multiple fatalities** or significant irreversible disability to 10's of people
	ENVIRONMENT	E	**Localised** and short term environmental or community impact – readily dealt with	**Localised and short term impact** to an area, plants or animals of environmental value. Readily treated.	**Localised and medium term impact** to areas, plants or animals of significant environmental value. Remediation may be difficult or expensive.	**Extensive and medium-term impact** to an area, plants or animals of recognised environmental value. Remediation possible but may be difficult or expensive.	**Destruction of an important population of plants or animals or of an area of significant environmental value.** Complete remediation not practical or possible.	**Regional and long term impact** on an area of significant environmental value. Destruction of an important population of plants and animals with recognised conservation value. Complete remediation impossible.
	FINANCIAL	A	< AUD 30K IMPACT	AUD 30K-300K IMPACT	AUD 300K-3M IMPACT	AUD 3-30 M IMPACT	AUD 30-300M IMPACT	> AUD 300M IMPACT
	REPUTATION	R	**Kept on site.** No media or community interest	**Local media coverage.** One or two community complaints.	**State media coverage.** Interest by regulator.	**State media coverage over several days.** Involvement by regulator and shareholders.	**National media coverage** over several days. Shareholders and Board exercise control. Potential for class action.	**Prominent international media coverage** over several days. Long term affect on share price Leads to changes at executive level management.
	LEGAL	L	Minor legal issues, non-compliances and breaches with regulation.	Breach of regulation with investigation or report to authority with possible prosecution and fine.	Major breach of regulation with punitive fine. Involvement of senior management.	Litigation or prosecution costing >$1M. Investigation by regulatory body. Litigation involving weeks of senior management time.	Major litigation or prosecution with damages or fines of >$10m+ plus significant costs.	Public inquiry taking up resources and executive time. Major litigation or prosecution with damages/fines of >$100m+ plus significant costs. Custodial sentence for a manager.

LIKELIHOOD	INCIDENT	THREAT		I	II	III	IV	V	VI
	Has occurred **three times or more during the last year**	**ALMOST CERTAIN** Occurs in almost all circumstances OR could occur within **days to weeks**	f	2	3	4	5	5	5
	Has occurred at least **once in the last year**	**LIKELY** Occurs in most circumstances OR could occur within **weeks to months**	e	2	3	4	4	5	5
	Has occurred **once in 3 years**	**OCCASIONAL** Has occurred before in Santos OR could occur within **months to years**	d	2	2	3	4	4	5
	Has occurred **once in 10 years**	**POSSIBLE** Has occurred before in the industry OR could occur within **the next few years**	c	1	2	2	3	4	5
	Has occurred **once in 30 years**	**UNLIKELY** Has occurred elsewhere OR could occur **within decades**	b	1	1	2	2	3	4
	Has occurred **once in 100 years**	**REMOTE** Requires exceptional circumstances and is unlikely even in the long term OR only occurs as a **"100 year event"**	a	1	1	1	2	3	3

RISK LEVEL	MITIGATION / INVESTIGATION FOCUS (ADD ADDITIONAL BUSINESS UNIT SPECIFIC REQUIREMENTS WHERE REQUIRED)	GOVERNANCE MECHANISM (ADD ADDITIONAL BUSINESS UNIT SPECIFIC REQUIREMENTS)	AUTHORITY FOR ACCEPTANCE OF PLAN TO ACHIEVE ALARP	AUTHORITY FOR ACCEPTANCE OF RESIDUAL RISK AT ALARP
5	- Intolerable risk level - Following verification of the residual risk at level 5, activity must stop - Activity cannot recommence until controls implemented to reduce residual risk to level 4 or lower - Dedicated multi-disciplinary incident investigation team - Management involvement in the investigation	- Top Level Operations Governance or EHS Forum/Committee - Sponsorship of incident investigation at Level 2 or 3 Manager level	Level 3 Manager (e.g. General Manager, Country President) Normally within 1 month	Intolerable Risk Level
4	- Assess risk to determine if ALARP - If ALARP, activities related to maintenance of controls/ barriers prioritised & managed - If not ALARP, Improve existing controls and/or implement new controls - Dedicated multi-disciplinary incident investigation team	- Value Stream level performance reviews or applicable EHS Forums - Sponsorship of incident investigation at level 3 Manager level	Level 3 Manager (e.g. General Manager, Country President) Normally within 1 month	Level 3 Manager (e.g. General Manager, Country President) Normally within 1 month
3	- Assess risk to determine if ALARP - If ALARP, activities related to maintenance of controls/ barriers prioritised & managed - If not ALARP, Improve existing controls and/or implement new controls - Full incident investigation	- Asset level performance reviews or applicable EHS forums - Sponsorship of incident investigation at Level 4 Manager Level	Level 4 Manager (e.g. Asset or Functional Manager) Normally within 3 months	Level 4 Manager (e.g. Asset or Functional Manager) Normally within 3 months
2	- Assess risk to determine if ALARP - If ALARP, activities related to maintenance of controls/ barriers prioritised & managed - If not ALARP, Improve existing controls and/or implement new controls - Incident investigations using simple tools	- Site level performance review or applicable EHS forums - Sponsorship for incident investigation at Level 5 Manager/Supervisor level	Level 5 Manager (e.g. Area Manager, Team Leader, Superintendent or equivalent)	Level 5 Manager (e.g. Area Manager, Team Leader, Superintendent or equivalent)
1	- Managed as stipulated by the related work processes - No incident investigation required	- Periodic reviews to identify patterns and underlying threats	Deemed ALARP	Deemed ALARP

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Table 5-2: Summary of residual risk for seismic operations

Activity	Hazard	Potential Consequence	Severity	Likelihood	Residual Risk
Line and access track preparation	Earthworks	•Loss of vegetation and habitat	Negligible	Possible	1
		•Damage to soil (erosion, contamination, compaction, generation of bulldust).	Minor	Unlikely	1
		•Disturbance to natural drainage patterns.	Minor	Unlikely	1
		•Disturbance, injury or death to livestock or native fauna.	Minor	Unlikely	1
		•Introduction and or spread of weeds, pest plants, animals and pathogens.	Minor	Unlikely	1
		•Loss of amenity (noise generation, airborne dust, visual impact).	Negligible	Possible	1
		•Damage to landholder infrastructure.	Minor	Unlikely	1
		•Damage to petroleum infrastructure.	Minor	Remote	1
		•Disturbance to sites of sacred or cultural heritage significance to Aboriginal people.	Major	Unlikely	2
		•Unauthorised third party access.	Minor	Unlikely	1
	Fire	•Damage to landholder infrastructure.	Minor	Unlikely	1
		•Damage to petroleum infrastructure.	Minor	Remote	1
		•Loss of vegetation and habitat.	Minor	Possible	2
	Vehicle movements	•Introduction and or spread of weeds, pest plants, animals and pathogens.	Moderate	Unlikely	2

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Activity	Hazard	Potential Consequence	Severity	Likelihood	Residual Risk
		•Loss of amenity (noise generation, airborne dust, visual impact)	Negligible	Possible	1
		•Disturbance to sites of sacred or cultural heritage significance to Aboriginal people	Major	Unlikely	2
		•Damage to landholder infrastructure	Minor	Unlikely	1
		•Damage to petroleum infrastructure	Minor	Remote	1
		•Disturbance, injury or death to livestock or native fauna.	Minor	Unlikely	1
		•Unauthorised third party access.	Minor	Unlikely	1
	Spills and leaks	•Contamination of soil, groundwater and / or watercourses.	Minor	Unlikely	1
		•Loss of organic beef or cattle care certification.	Major	Remote	1
Line surveying	Vehicle movements	•Introduction and or spread of weeds, pest plants, animals and pathogens.	Moderate	Unlikely	2
		•Loss of amenity (noise generation, airborne dust, visual impact)	Negligible	Possible	1
		•Disturbance to sites of sacred or cultural heritage significance to Aboriginal people	Major	Unlikely	2
		•Damage to landholder infrastructure	Minor	Unlikely	1
		•Damage to petroleum infrastructure	Minor	Remote	1
		•Disturbance, injury or death to livestock or native fauna.	Minor	Unlikely	1
		•Unauthorised third party access.	Minor	Unlikely	1

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Activity	Hazard	Potential Consequence	Severity	Likelihood	Residual Risk
Recording	Vibrator operations	•Damage to soil (erosion, contamination, compaction, generation of bulldust).	Minor	Unlikely	1
		•Loss of amenity (noise generation, airborne dust, visual impact)	Negligible	Possible	1
		•Disturbance, injury or death to livestock or native fauna.	Negligible	Unlikely	1
		•Introduction and or spread of weeds, pest plants, animals and pathogens.	Moderate	Unlikely	2
		•Disturbance to sites of sacred or cultural heritage significance to Aboriginal people	Major	Unlikely	2
		•Damage to landholder infrastructure	Minor	Unlikely	1
		•Damage to petroleum infrastructure	Minor	Remote	1
	Vehicle movements	•Introduction and or spread of weeds, pest plants, animals and pathogens.	Moderate	Unlikely	2
		•Loss of amenity (noise generation, airborne dust, visual impact)	Negligible	Possible	1
		•Disturbance to sites of sacred or cultural heritage significance to Aboriginal people	Major	Unlikely	2
		•Damage to landholder infrastructure	Minor	Unlikely	1
		•Damage to petroleum infrastructure	Minor	Remote	1
		•Disturbance, injury or death to livestock or native fauna.	Minor	Unlikely	1
		•Unauthorised third party access.	Minor	Unlikely	1
	Fire	•Damage to landholder infrastructure.	Minor	Unlikely	1

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Activity	Hazard	Potential Consequence	Severity	Likelihood	Residual Risk
		•Damage to petroleum infrastructure.	Minor	Remote	1
		•Loss of vegetation and habitat.	Minor	Possible	2
	Spills and leaks	•Contamination of soil, groundwater and / or watercourses.	Minor	Unlikely	1
		•Loss of organic beef or cattle care certification.	Major	Remote	1
Camp sites and associated supply logistics	Vehicle movements	•Introduction and or spread of weeds, pest plants, animals and pathogens.	Moderate	Unlikely	2
		•Loss of amenity (noise generation, airborne dust, visual impact)	Negligible	Possible	1
		•Disturbance to sites of sacred or cultural heritage significance to Aboriginal people	Major	Unlikely	2
		•Damage to landholder infrastructure	Minor	Unlikely	1
		•Damage to petroleum infrastructure	Minor	Remote	1
		•Disturbance, injury or death to livestock or native fauna.	Minor	Unlikely	1
		•Unauthorised third party access.	Minor	Unlikely	1
	Earthworks	•Damage to soil (erosion, contamination, compaction, generation of bulldust).	Minor	Unlikely	1
		•Disturbance to natural drainage patterns.	Minor	Unlikely	1
		•Disturbance, injury or death to livestock or native fauna.	Minor	Unlikely	1
		•Introduction and or spread of weeds, pest plants, animals and pathogens.	Moderate	Unlikely	2

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Activity	Hazard	Potential Consequence	Severity	Likelihood	Residual Risk
		•Loss of amenity (noise generation, airborne dust, visual impact).	Negligible	Possible	1
		•Damage to landholder infrastructure.	Minor	Unlikely	1
		•Damage to petroleum infrastructure.	Minor	Remote	1
		•Disturbance to sites of sacred or cultural heritage significance to Aboriginal people.	Major	Unlikely	2
		•Unauthorised third party access.	Minor	Unlikely	1
	Fire	•Damage to landholder infrastructure.	Minor	Unlikely	1
		•Damage to petroleum infrastructure.	Minor	Remote	1
		•Loss of vegetation and habitat.	Minor	Possible	2
	Spills and leaks	•Contamination of soil, groundwater and / or watercourses.	Minor	Unlikely	1
		•Loss of organic beef or cattle care certification.	Major	Remote	1
	Disposal of domestic and chemical waste	•Contamination of soil, groundwater and / or watercourses.	Minor	Unlikely	1
		•Loss of organic beef or cattle care certification.	Major	Remote	1
Line and access track preparation	Earthworks	•Damage to soil (erosion, contamination, compaction, generation of bulldust).	Minor	Unlikely	1
		•Disturbance to natural drainage patterns.	Minor	Unlikely	1

Activity	Hazard	Potential Consequence	Severity	Likelihood	Residual Risk
		•Disturbance, injury or death to livestock or native fauna.	Minor	Unlikely	1
		•Introduction and or spread of weeds, pest plants, animals and pathogens.	Moderate	Unlikely	2
		•Loss of amenity (noise generation, airborne dust, visual impact).	Negligible	Possible	1
		•Damage to landholder infrastructure.	Minor	Unlikely	1
		•Damage to petroleum infrastructure.	Minor	Remote	1
		•Disturbance to sites of sacred or cultural heritage significance to Aboriginal people.	Major	Unlikely	2
		•Unauthorised third party access.	Minor	Unlikely	1
	Vehicle movements	•Introduction and or spread of weeds, pest plants, animals and pathogens.	Moderate	Unlikely	2
		•Loss of amenity (noise generation, airborne dust, visual impact)	Negligible	Possible	1
		•Disturbance to sites of sacred or cultural heritage significance to Aboriginal people	Major	Unlikely	2
		•Damage to landholder infrastructure	Minor	Unlikely	1
		•Damage to petroleum infrastructure	Minor	Remote	1
		•Disturbance, injury or death to livestock or native fauna.	Minor	Unlikely	1
		•Unauthorised third party access.	Minor	Unlikely	1
	Spills and leaks	•Contamination of soil, groundwater and / or watercourses.	Minor	Unlikely	1

Activity	Hazard	Potential Consequence	Severity	Likelihood	Residual Risk
		•Loss of organic beef or cattle care certification.	Major	Remote	1
Post Survey Monitoring / Auditing	Vehicle movements	•Introduction and or spread of weeds, pest plants, animals and pathogens.	Moderate	Unlikely	2
		•Damage to landholder infrastructure	Minor	Unlikely	1
		•Disturbance, injury or death to livestock or native fauna.	Minor	Unlikely	1
		•Unauthorised third party access.	Minor	Unlikely	1

6 PERFORMANCE OBJECTIVES, STANDARDS AND MEASUREMENT CRITERIA

The objectives described in this EP are based on operational information detailed in the *South Australia Cooper Basin and Arid Regions, Environmental Impact Report: Geophysical Operations* (Santos, 2012a) (EIR), and while consistent with those contained in the *South Australia Cooper Basin and Arid Regions Statement of Performance objectives: Geophysical Operations* (Santos, 2012b), the objectives have, where appropriate, been amended to reflect the specific characteristics of the Southern Amadeus environment.

Table 6-1 details the performance objectives defined for this project; the measurement criteria that will be used to assess these objectives; the operational controls that will be implemented for the project; and the Santos Standards that apply to the project.

6.1 Performance Objectives

Santos has defined 10 performance objectives for all onshore seismic survey operations including the Southern Amadeus 2D seismic survey. The performance objectives are:

1. Minimise the visual impact of seismic operations;
2. Minimise disturbance to and contamination of soil resources;
3. Minimise disturbance to native vegetation and native fauna;
4. Avoid disturbance to sites of cultural, sacred and heritage significance;
5. Minimise disturbance to livestock, pastoral infrastructure and landholders;
6. Avoid the introduction or spread of exotic species and implement control measures as necessary;
7. Minimise disturbance to drainage patterns and avoid contamination of surface waters and shallow groundwater resources;
8. Optimise (in order of most to least preferable) waste avoidance, reduction, reuse, recycling, treatment and disposal;
9. Remediate and rehabilitate operational areas as necessary; and
10. To generate no fires from the Seismic Operations.

Appendix B provides a summary of the EP commitments.

6.2 Measurement Criteria

One of the implications of objective based regulation is the need for a means of identifying and assessing the level of achievement of performance objectives. This EP contains the measurement criteria that have been developed to address this. The measurement criteria are given in specific terms and clearly define what acceptable practice is for the seismic survey.

Each objective identified will be assessed using a selection of the measurement criteria. This will enable Santos, regulatory agencies and stakeholders to determine the level of achievement of the objectives. Criteria relevant to each performance objective are presented in Table 6-1. Specific Goal Attainment Scaling (GAS) criteria are presented in Table 6-2.

The criteria for measuring the achievement of performance objectives covered in the EP will use one or more of the following methodologies:

- Defined conditions;
- Goal attainment scaling;
- Photo monitoring; and/or
- Other techniques as appropriate.

6.2.1 Defined conditions

In some cases the achievement of an objective can be assessed through ensuring defined conditions are met or acted upon. Such conditions include:

- Prohibitions on the undertaking of specific actions that can have long-term consequences and can only be adequately managed through the avoidance of defined unacceptable activities. For example, bulldozing of mature trees has a long-term impact that is not acceptable or warranted.
- Requirements to carry out certain actions in accordance with approved procedures or industry standards. For example, compliance with the Australian Petroleum Production and Exploration Association (APPEA) *Code of Environmental Practice*.

6.2.2 Goal attainment scaling (GAS)

Some performance objectives are likely to be subject to a certain degree of subjective judgement. To minimise the discrepancy from one observer to another in this situation, GAS is used to measure the degree to which such objectives are achieved. A series of criteria is used, which is described in writing and / or photographically. GAS is particularly useful in measuring the achievement of objectives relating to disturbances to natural vegetation and soil.

6.2.3 Photo monitoring

Photographic evidence can provide visual documentation on the extent and nature of an impact. Re-occupation of photo points over time can also provide visual evidence of the level of recovery of vegetation and soils from the initial impact arising from the seismic survey (see Section 3.3.5).

6.2.4 Other techniques as appropriate

Other techniques may exist, or could be developed in the future, which could be beneficial. Use of other techniques should be incorporated where they are considered to be appropriate and effective.

6.3 Operational Controls

Santos has specific operating procedures in place for its operations that, along with the EHSMS, form a system of operational control (as defined in *AZ/NZS ISO14001*). The operational controls in place for the Program are based on requirements set out in:

- Seismic Program;
- Santos EHSMS (including Environment Hazard Standards and Safety Hazard Standards);
- The Santos (2011a) South Australia Cooper Basin and Arid Regions: Statement of Performance objectives: Geophysical Operations and Santos (2011b) South Australia Cooper Basin and Arid Regions: Environmental Impact Report: Geophysical Operations; and
- Australian Petroleum Production and Exploration Association (APPEA) *Code of Environmental Practice*.

6.4 Santos Standards

The Santos Environment, Health and Safety Management System (EHSMS) has been developed by Santos to provide a company-wide approach to effectively manage Environment, Health and Safety (EHS) risks and to allow for continual EHS improvement. An EHS Committee has been established in order to ensure an established protocol in relation to EHS is maintained. The EHSMS is readily available to employees and contractors via the Santos intranet 'The Well'.

The EHSMS Framework provides structured, comprehensive and efficient EHS practices for Santos' activities and operations and is consistent with both *AS 4801:2000 Occupational Health and Safety Management Systems – Specification with Guidance for Use* and *AS/NZS ISO 14001:2004 Environmental Management Systems – Specification with Guidance for Use.*

The relevant Santos standard to each performance objective is included in Table 6-1.

- EHS01 – Biodiversity and Land
- EHS02 – Underground Storage Tanks and Bunds
- EHS03 – Produced Water Management
- EHS04 – Waste
- EHS05 – Air Emissions
- EHS06 – Environmental Impact Assessment and Approvals
- EHS07 – Energy Efficiency
- EHS08 – Contaminated Sites
- EHS09 – Pest Plants and Animals
- EHS10 – Water Resources
- EHS11 – Cultural Heritage
- EHS12 – Noise Emissions

Health and Safety Hazard Standards include:

- HSHS02 – Land Transportation
- HSHS08 – Chemical Management
- HSHS12 – Occupational Noise

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Table 6-1: Performance objectives, measurement criteria, Operational Controls and Performance Standards

Performance Objective	Operational Controls	Performance Standards	Measurement Criteria
Objective 1: •Minimise the visual impact of seismic operations	•Pre-survey planning to minimise visibility of operations with the use of Santos' GIS. •Maximise use of vegetation or landforms to disguise operations. •Avoid extensive side cuts. •Lines are prepared to a single blade width only (approximately 4m to 5m). •Lines are weaved at least every 75m to 100m about the general line of traverse and stands of vegetation. •Lines are doglegged at road and track crossings preferably around vegetation. •Dozers are walked with blade up wherever possible. •All litter is to be managed and disposed of correctly.	•EHS01 – Biodiversity and Land •EHS04 – Waste	•Pre-survey planning has been undertaken to minimise visibility of operations and records are available for audit. •Seismic survey lines and campsites have been appropriately located and prepared to minimise the visual impact. •No litter remains at camps. •The attainment of 0, +1 or +2 GAS criteria for 'visual impact' objective as listed in Table 6-2. •EMPs are selected from photo points where additional monitoring is deemed appropriate.
Objective 2: •Minimise disturbance to and contamination of soil resource	•All windrows are removed either during or on completion of work. •Areas subject to inundation will be assessed for conduciveness to support vehicles. •Blade work is banned on naturally smooth surfaces or flat easy terrain. Minimal blade work is permitted elsewhere for access. •Camp sites are positioned close to existing roads where possible and are ripped, if necessary, on completion of work. •Creek bank vegetation is left intact and detours sought if too dense to pass through.	•EHS01 – Biodiversity and Land •EHS02 – Underground Storage Tanks and Bunds •EHS04 – Waste •EHS08 – Contaminated Sites •HSHS02 – Land Transportation	•Proposed survey lines and campsites have been appropriately located and prepared to minimise the disturbance to soil resources. •Survey planning has been undertaken to minimise impacts of operations and records are available for audit. •No refuelling occurred outside designated refuelling / servicing areas. •Spills or leaks were managed and clean up actions initiated.

Performance Objective	Operational Controls	Performance Standards	Measurement Criteria
	• Off line driving for the main crew is prohibited – no bush bashing or short cuts are permitted. • Operations are shut down during wet weather or flooding and only restarted once potential for extensive damage has passed. Unavoidable damage is reinstated on completion of work. • EMPs will be established to monitor and document soil disturbance and recovery. • Where required, access tracks will be watered and is reinstated after use. • The number of camp sites will be minimised with the aim being to share existing sites wherever reasonably practicable. • Unavoidable compaction in areas other than those susceptible to erosion, will be ripped on completion of work. • Where possible, existing tracks, roads or seismic lines will be used for access. • Use of road tanker fuel storage. • Use of drip trays for transfers. • Any spills have been contained and retrieved. • Oil spills areas will be ripped to an appropriate depth. • All fuel stored and used should be under the control of qualified or trained personnel. • Fuel and other lubricants will be appropriately stored and managed.	• HSHS08 – Chemical Management	• Records of spill events and corrective actions are maintained in accordance with company procedures. • Appropriate spill response equipment is available on site. • Fuel storage (>10,000L) contained within double skin tanker with safety valves. • Appropriate containment bunding for site drum storage (up to 200L) protection is implemented. • Attainment of 0, +1 or +2 GAS criteria for Disturbance to land surface' objective, as listed in Table 6-2. • EMPs are selected from photo points where additional monitoring is deemed appropriate.

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Performance Objective	Operational Controls	Performance Standards	Measurement Criteria
Objective 3: • Minimise disturbance to native vegetation and fauna	• Terrain and vegetation is considered in planning stage when designing layout of the survey. • Camp sites are established in locations where the preparation of a new access track is not necessary or is minimal in length. • Off line driving is banned – no bush bashing or short cuts are permitted. • Vehicle access to survey lines is to be via existing access tracks or pre-existing survey lines, except where they have rehabilitated. Other temporary access tracks may be utilised where such use is likely to result in less environmental impact than other options. • Vegetation is removed only when absolutely necessary - avoided by weaving lines through vegetated areas. • Root stock, topsoil and seeds are left on line during line preparation. • Creek bank vegetation is left intact and detours located if dense. • All vehicles are thoroughly cleaned prior to entry into the survey area. • No heavy line preparation machinery is used in wetlands areas. • Natural drainage channels are left clear at line crossings.	• EHS01 – Biodiversity and Land • HSHS02 – Land Transportation	• No mature trees are removed. • The attainment of 0, +1 or +2 GAS criteria for 'Impact on vegetation' objective listed in Table 6-2. • EMPs are selected from photo points where additional monitoring is deemed appropriate.

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Performance Objective	Operational Controls	Performance Standards	Measurement Criteria
Objective 4: •Avoid disturbance to sites of sacred or cultural and heritage significance	•Santos will obtain all necessary approvals and consents from CLC prior to commencement of line activities. •Santos will incorporate any sites identified by the Aboriginal Areas Protection Authority and the NT Heritage Council. •Santos and the Seismic Contractor will comply with approval conditions while undertaking all activities. •All line preparation personnel and crew supervisors will receive a project specific cultural heritage induction prior to commencing work. •All line preparation machinery operators are required to observe for cultural heritage sites that may have been missed during the Site Clearance process. •Known sites of sacred or cultural significance are identified, avoided and reported to a Cultural Heritage team member to ensure discoveries are managed in line with the relevant agreement and legislative requirements. •Any new sites identified during the survey operations will be reported to the Santos Cultural Heritage Team and avoided.	•EHS11 – Cultural Heritage	•No line preparation activities commence before receiving CLC SSCC, NT Heritage Council sites, AAPA Sites and assessment issued by Santos Cultural Heritage team. •Compliance with the conditions of the Cultural Heritage assessment issued by the Cultural Heritage team, this will include details of the SSCC. •All line preparation personnel and crew supervisors have completed the project specific induction before commencing work. •No known sites are disturbed by the operations. •Santos / Seismic Contractor has a mechanism in place to report and respond to any new sites discovered during survey operations. •Any new sites identified during operations were reported and avoided.
Objective 5: •Minimise disturbance to livestock, pastoral infrastructure and landholders	•Relevant landowners and occupiers are notified prior to survey of preparation of camp sites, preparation of survey lines and undertaking of operations.	•Landholder Agreements	•No reasonable concerns raised by stakeholders are left unresolved. •The attainment of 0, +1 or +2 GAS criteria for 'Impact on infrastructure' objective listed in Table 6-2.

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Performance Objective	Operational Controls	Performance Standards	Measurement Criteria
	• Relevant mineral and geothermal tenement holders shall be notified of survey of preparation of camp sites, preparation of survey lines and undertaking of operations. • Compliance with requirements of the Cattle Care and Organic Beef accreditation programmes or management as requested by the landholders, including full time monitoring by on field staff and inclusion in site inductions. • System is in place for logging landholder complaints to ensure that issues are addressed as appropriate. • Seismic sources are not to operate within the distance defined by Santos standards, of any pipeline, utility, installation or building. • Damage to station tracks is avoided. • All gates are left in the condition in which they were found (i.e. open / closed). • When necessary, all fences are restored to satisfaction of landowner / managers. • Inductions for all employees and contractors cover pastoral, conservation, legislation and infrastructure issues.		
Objective 6: • Avoid the introduction or spread of exotic species and implement control measures as necessary	• All vehicles, plant and equipment shall be cleaned and inspected prior to arrival at the project area. • A register of vehicle / equipment / machinery cleaning is kept.	• EHS09 – Pest Plants and Animals • HSHS02 – Land Transportation	• A register of machinery / vehicle wash down or cleanliness prior to arrival at the project site is available. • Weeds were not introduced into, or spread through project area as a result of seismic operations.

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Performance Objective	Operational Controls	Performance Standards	Measurement Criteria
	• Records of detection, monitoring or eradication of exotic weed or other pest or noxious species introduced by activities are.		
Objective 7: • Minimise disturbance to drainage patterns and avoid contamination of surface waters and shallow groundwater resources	• All access through watercourses are carefully assessed to determine the locations of least impact to channels and creek banks. • Any remediation work should be undertaken immediately upon completion of all activities. • If any contamination from spillage of oils or fuel occurs during vehicular operations, immediate effective clean-up procedures must be employed. • Storage and handling of hazardous substances shall be in accordance with HSHS08 – Chemical Management. • Supervisors shall ensure that all personnel are familiar with spill prevention measures including refuelling techniques (e.g. use of spill mats) and chemical storage and handling requirements. • Refuelling will not occur within 1km from major watercourses or sensitive ecological environments (wetlands). • Fuel and oil spills are reported, treated and or remediated and the ground ripped. • If any contamination from spillage of oils or fuel occurs during vehicular operations, immediate effective clean-up procedures must be employed. • All chemical and fuel storage areas shall be bunded.	• EHS01 – Biodiversity and Land • EHS02 – Underground Storage Tanks and Bunds • EHS04 – Waste • EHS08 – Contaminated Sites • EHS10 – Water Resources • HSHS02 – Land Transportation • HSHS08 – Chemical Management	• Camp sites and survey lines / traverses are located and constructed to avoid diversion of water flows. • The attainment of 0, +1 or +2 GAS criteria for 'disturbance to land surface' objective listed in Table 6-2. • There is no unnecessary interference with natural drainage features. • Fuel storage contained within double skin tanker with safety valves. • Appropriate containment bunding for site drum storage protection is implemented. • No spills occur outside designated refuelling/servicing areas. • Refuelling occurs at least 1km from watercourses or sensitive ecological environments (wetlands). • Appropriate spill response equipment is available on site. • Spills or leaks are cleaned up.

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Performance Objective	Operational Controls	Performance Standards	Measurement Criteria
	• Safety Data Sheets shall be obtained upon purchase of chemicals and kept on-site for all chemicals stored and handled. • Chemical use will be minimised where practicable and the minimum practicable volume will be kept on site. • Appropriate spill response equipment available on site. • Protective clothing, appropriate to the materials in use, will be provided. • Fuels, lubricants and chemicals shall be stored and handled within containment facilities away from the vicinity of watercourses and water storage areas. • Absorbent and containment material (e.g. absorbent matting) will be available where hazardous materials are used and stored and personnel trained in correct use. • Fuel storage contained within double skin tanker with safety valves.		
<u>Objective 8:</u> • Optimise (in order of most to least preferable) waste avoidance, reduction, reuse, recycling, treatment and disposal	• All empty drums will be stored on impervious areas with their closures in place, or transported immediately off-site. • All generated waste (including consumable rubbish such as lunch wrappers) shall be returned to the camp and placed in the appropriately waste receptacle. • All loads of rubbish are covered during transport.	• EHS04 – Waste	• Wastes are stored and transported to an approved waste disposal facility. • Waste register documents waste type, transportation contractor and disposal facility. • Waste register and transfer receipts to be provided to DME on completion of operations.

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Performance Objective	Operational Controls	Performance Standards	Measurement Criteria
	• Covered bins are provided for the collection and storage of wastes. • No incineration or open burning of waste materials shall occur on-site. • No liquid wastes will be released accidentally or routinely discharged to surface waters. • Refuse containers/bags will be available with each crew. • Waste shall be removed from the camp by an appropriately licensed contractor and disposed at an approved facility. Records shall be kept of disposal of waste oils and fluids and hazardous wastes.		• 0, +1 or +2 GAS criteria are attained for 'Pollution or litter objective listed in Table 6-2.
<u>Objective 9:</u> • Remediate and rehabilitate operational areas as necessary	• All access will be clearly identified and all vehicles and machinery shall remain within the designated access ways and surveyed seismic lines. • Proper use of access tracks involves travel at safe speeds, utilisation of designated parking areas, sensible use during wet weather, gates being left as found. • During rehabilitation operations, work will cease if weather conditions inhibit access. • All earthworks shall be confined to the survey lines, access tracks and camp sites. • All marking, flagging and signage not required will be removed.	• EHS01 – Biodiversity and Land	• Refer to assessment criteria for Objectives 2, 3, 7 and 8. • 0, +1 or +2 GAS criteria are attained for 'visual impact' and 'impact on vegetation' as listed in Table 6-2.

Performance Objective	Operational Controls	Performance Standards	Measurement Criteria
	• If contamination from spillage of oils or fuel occurs during vehicular operations, immediate effective clean-up procedures will be employed. • All gates are left in the condition in which they were found (i.e. open / closed). • Fences will be reinstated after all access is completed. • All windrows are removed either during or on completion of work. • Camp site areas are ripped, if necessary, on completion of work. • Operations are shut down during wet weather or flooding and only restarted once potential for extensive damage has passed. Unavoidable damage is reinstated on completion of work. • Unavoidable compaction in areas other than those susceptible to erosion, will be ripped on completion of work. • No heavy machinery is used in wetlands areas for rehabilitation. • Public access along survey lines will be discouraged by the use of signs at public roads. • Windrows/shoulders on public tracks are reinstated on completion of work. • Lines adjacent to public roads may also be blocked with timber as an access deterrent. • Photopoint monitoring incorporates post-survey re-visits with emphasis on sensitive areas and areas		

Performance Objective	Operational Controls	Performance Standards	Measurement Criteria
	subject to erosion such that additional restoration work can be implemented if required.		
Objective 10: •To generate no fires from the Seismic Operations.	•Include Fire Season education as part of the induction. •Appropriate fire prevention procedures in place. •Appropriate fire fighting gear available to the crew. •All vehicles will be equipped with portable fire extinguishers. •Machinery and vehicles should be parked in areas of low fire risk and be free of any combustible material, for example in the case of dry grass build up. •Open fires, including open barbecues, billy fires, and brush burning, are banned on the Project.	•EHS01 – Biodiversity and Land	•No fires were started due to operations. •All personnel were informed on the fire danger season and associated restrictions.

Table 6-2: Goal Attainment Scaling (GAS) criteria for assessing seismic lines on completion of survey in the Northern Territory[2]

[2] Based on the Santos (2011a) South Australia Cooper Basin and Arid Regions: Statement of Performance objectives: Geophysical Operations and Santos (2011b) South Australia Cooper Basin and Arid Regions: Environmental Impact Report: Geophysical Operations.

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LAND SYSTEM	MEASURE Associated goals	SCORE +2(b and d)	+1(b and d)	0(b and d)	-1(a and d)	-2(a, c and d)
Non land system specific	• Visual impact • (Obj 1)	• No evidence of survey operations	• Only wheel tracks are evident. • Line of sight is significantly impaired.	• Established roads and tracks have been reshouldered. • Doglegs have been placed at established roads and tracks in vegetated areas. • Dozer or grader has been walked 40m either side of established road or track. • Line weaves through vegetated areas at least every 100m. • Line of sight is impaired. • Line follows route that is most conducive to access by utilising naturally clear areas through vegetation.	• No doglegs at established roads or tracks in vegetated areas. • Weaving is not appropriate to terrain traversed. • Line of sight is unimpaired.	• Line is clearly evident and dominates the landscape

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LAND SYSTEM	MEASURE Associated goals	SCORE +2(b and d)	+1(b and d)	0(b and d)	-1(a and d)	-2(a, c and d)
Non land system specific	•Impact on infrastructure •(Obj 5)	•No impact to any pastoral, tourist or production infrastructure	•No observable repair or damage to infrastructure	•Any impact to infrastructure has been reported and reinstated or repaired.	•Repair to damaged infrastructure is incomplete or inappropriate. •Damage has not been reported	•Damage to any infrastructure has been left un-repaired and not reported.
Non land system specific	•Pollution or litter •(All Objectives)	•No pollution or litter	•No evidence of water or oil pollution. •Maximum of 1 pin flag/km	•Wastewater and vehicle oil spills have been managed appropriately •Maximum of 2 pin flags/km •No other litter	•Wastewater forms ponds or extensive boggy ground •Vehicle oil spills have not been remedied •Maximum of 9 pin flags/km •Maximum of 4 items of other litter/km	•Extensive waste water ponding •Oil spills of more than 20L have not been remedied •Ten or more pin flags/km. •Five or more items of other litter/km
	•Impact on vegetation •(Obj 1,2,3,5)	•No removal of vegetation	•Only grasses, herbs and shrubs less than 0.5m high removed where unavoidable	•No removal of large mature trees of Priority 1 •No removal of listed threatened species •No removal of Priority 2 vegetation or small immature	•Priority 1 vegetation <2m high has been removed where avoidable •Priority 2 vegetation has been removed where avoidable •More than the minimum possible	•Large / mature trees of Priority 1 or listed species have been removed •All rootstock has been removed

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LAND SYSTEM	MEASURE Associated goals	SCORE +2(b and d)	+1(b and d)	0(b and d)	-1(a and d)	-2(a, c and d)
				Priority 1 vegetation unless unavoidable •Minimum possible Priority 3 vegetation has been removed •Less than 30% of tree branches have been removed from individual trees •Rootstock is intact	Priority 3 vegetation has been removed	
Floodplain and wetlands	•Disturbance to land surface •(Obj 1-5 and 7)	•No windrows. •No interference with drainage channels.	•No windrows >0.1m high for more than 50% of line length •Only creek banks <0.5m high have been cut.	•Windrows are <0.1m high •Creek banks <1m high have been cut •Creeks are not blocked •Wheel tracks are <0.1m deep	•Windrows are <0.3m high •Windrows are generally continuous •Creek banks 1-2m high have been cut and not restored •Creeks are blocked by material <1m deep •Wheel tracks are >0.1m deep	•Windrows are >0.3m high •Windrows are continuous •Creek banks >2m have been cut •Creeks are blocked by material >1m deep.

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Notes for GAS criteria for assessing seismic lines on completion of survey:

- If any criterion (dot point) within a -1 or -2 cell occurs, then a score of -1 or -2 will be allocated.
- For 0, +1 and +2 cells, all relevant criteria (dot point) within the cell must be satisfied to score at that level.
- Some criteria at -2 level may also be subject to defined conditions, but are included in this table to ensure that they are clearly identified.
- All vertical measurements to be measured from normal ground surface.
- Priority classification refers to definitions in Table 6-3.

Table 6-3: Priority vegetation definitions

Priority	Typical Characteristics	Clearance
Priority 1	•Long time to reach maturity •Slow growth rate •Poor regeneration from seed or rootstock •Significant habitat value (e.g. numerous hollows)	•Avoid clearance of mature trees
Priority 2	•Long time to reach maturity •Slow growth rate •May regenerate from seed and/or rootstock	•Avoid clearance wherever possible
Priority 3	•Short to moderate time to maturity •Moderate growth rate •Regenerates from seed and/or rootstock •Relatively abundant	•Clear only the minimum necessary
Priority 4	•Short time to maturity •Fast growth rate •Good regeneration from seed and/or rootstock •Abundant •Short-lived annuals and ephemerals generally fall in this category	•May be cleared if necessary

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7 IMPLEMENTATION STRATEGY

7.1 Project Management Systems

The Santos EHS Management System (EHSMS) is a significant component in the management of Santos' environmental responsibilities, issues and risks associated with the proposed seismic survey in the Northern Territory. The EHSMS provides a framework for the co-ordinated and consistent management of environmental issues by ensuring the:

- Establishment of the Company's Environmental Policy;
- Identification of environmental risks and legal and other requirements relevant to seismic and other exploration, development and production operations;
- Setting of appropriate performance objectives and targets;
- Establishment of a structure and program to implement the Environmental Policy and achieve objectives and targets including the development of procedures and guidelines for specific activities and education and induction programs; and
- Facilitation of planning, control monitoring, corrective action, auditing and review of activities to ensure that the requirements and aspirations of the Environmental Policy (Figure 1-1) are achieved.

The Santos EHSMS applies to all Santos operations within Australia. The framework has been developed to ensure compliance with Australian Standard 4801:2001 *Occupational Health and Safety Management Systems - Specification with guidance for use*, and AS/NZS ISO 14001:2004 *Environmental Management Systems - Specification with guidance for use*.

Santos' seismic survey should achieve or establish accepted best practice and industry-accepted standards. Audits of management system should be regularly conducted using a risk-based approach to ensure that systems are maintained and operations are undertaken in accordance with industry-accepted practices and regulatory requirements.

Santos has specific operating procedures in place for seismic operations that, along with the EHSMS, form a system of operational controls (as defined in *AZ/NZS ISO14001*). The EHSMS framework consists of multiple layers, as shown in Figure 7-1. These operating procedures are maintained as controlled documents in electronic form on a central intranet server and are available through '*The Well*' to all Santos sites and employees.

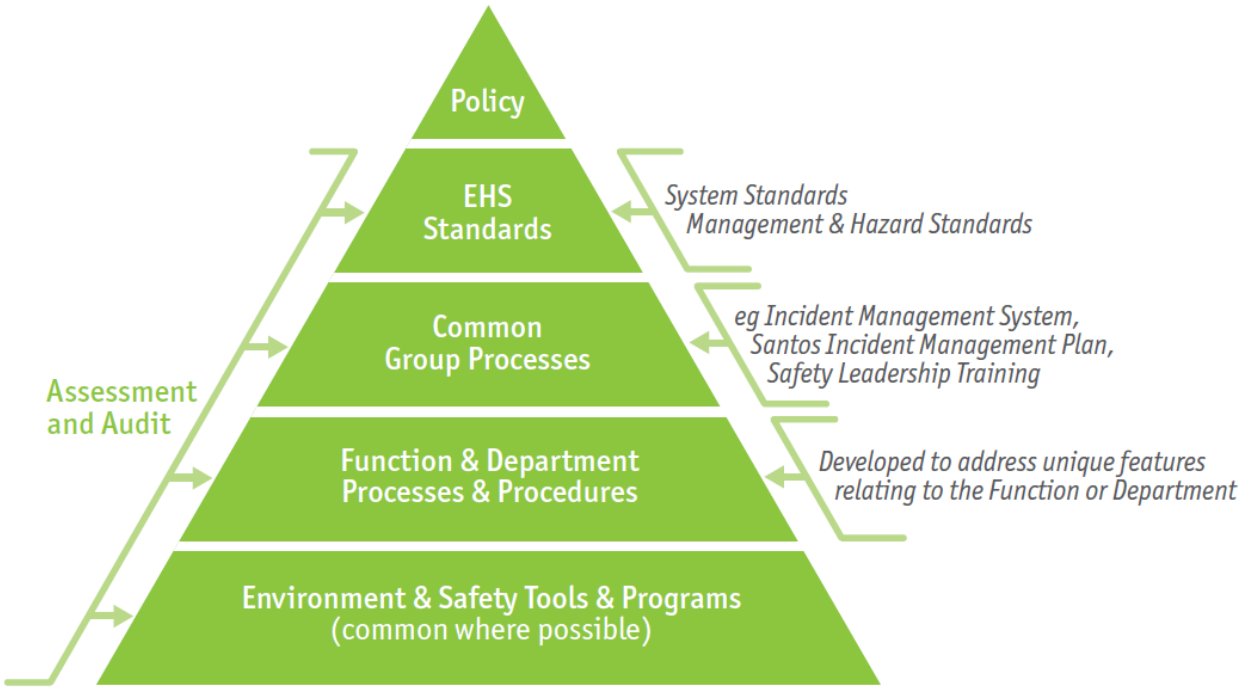

Figure 7-1: Santos EHSMS structure

7.2 Current operating procedures used to minimise impacts

Operational controls have been included in Table 6-1 to mitigate the identified risks and potential impacts of activities undertaken during the conduct of this seismic survey (as identified in this EP Section 5) and to achieve the performance objectives (see Section 1.2 and Table 6-1).

7.3 Chain of Command

The Manager, Operations Geophysics (Santos) and the Seismic Contractor Operations Manager are jointly responsible for implementation of this EP. Their responsibilities include:

- Conformance with the Santos EHSMS.
- Ensuring all required permits and approvals are in place and complied with.
- Management of non-compliances and non-conformances.
- Inductions of new staff.
- Monitoring and reporting.
- Incident management and reporting.
- Internal and external audits.
- Ensuring contractor competencies.

All personnel are responsible for the environmental performance of their activities and for complying with the general environmental duty as outlined in the Santos Environmental Policy (see Figure 1-1) and with any conditions of approval which may have been imposed on the survey.

Santos

Table 7-1: Key personnel roles and responsibilities

Position	Responsibility
Environmental Advisor – Santos	•Provide Environmental guidance and support to personnel in respect to implementing and complying with the EP.
Landholder Relations Field Supervisor – Santos	•The point of contact for the landholder with respect to the project, Santos and its contractors. •Provide guidance and support to all personnel in respect of implementing and complying with all landholder agreements and requests. •Responsible for receiving, recording and closing out any landholder complaints in respect of the project.
Operations Geophysics Manager – Santos	•Has overall responsibility for the management of the environment potentially impacted by operations. •Ensure the development, implementation and maintenance of the EMP and associated procedures. •Ensure the required monitoring is undertaken. •Oversee any updates of the EP and communicate changes. •Ensure contractors are made aware of EP requirements through inductions. •Ensure compliance with all environmental regulations and the EP. •Provide and maintain effective emergency response arrangements for all operations where there is potential environmental risk. •Ensure all required plans, audits and reviews are undertaken as required by this EP. •Report via the reporting system any event or incident which may result in a release of contaminant and / or impact upon the environment in relation to the project. •Notify all reportable incidents within the specified time frames. •Perform incident investigation
Authorised Representative – Seismic Contractor	•Monitor, assess and provide feedback on all data compiled from the survey. •Ensure effective data dissemination to management and workforce. •Monitor, assess and report on processes undertaken throughout the survey.

Position	Responsibility
	•Provide timely advice to management and the workforce on environmental aspects, this may include written and verbal reporting. •Coordinate environmental audits and inspections to monitor compliance against environmental commitments. •Report all incidents and high potential hazards to the Santos Operations Geophysics Manager within the required timeframe. •Ensure all equipment is maintained and in an operable condition. •Ensure appropriate emergency response plan is in place for the Project.
HSE Advisor – Seismic Contractor	•Reports to the HSE Manager (Seismic Contractor) and advises the Crew Manager on matters pertaining to Health, Safety and Environment. •Ensure effective data dissemination to management and workforce. •Present health, safety and environmental induction. •Provide timely advice to management and the workforce on health, safety and environmental aspects. •Liaise on the coordination of processes undertaken throughout the survey. •Coordinate timely health and safety database maintenance. •Coordinate health and safety activities. •Provide timely feedback to management and the workforce on health, safety and environmental aspects, this may include written and verbal reporting. •Coordinate health and safety audits and inspections to monitor compliance against health and safety commitments.
Project personnel and contractors	•All personnel are responsible for the environmental performance of their activities and for complying with the general environmental duty as outlined in the Santos Environmental Policy (see Figure 1-1).

7.4 Induction and Training

In accordance with *EHSMS 06 - Training and Competency*, all Santos personnel, contractors and visitors are required to undertake appropriate environmental training and induction programs.

Personnel undergo the following levels of training:

- Level 1 – Santos generic induction

- Level 2 – Site induction
- Level 3 – Activity specific induction (where applicable).

Training can be booked through *The Well*. Records of all training are maintained in '*Traccess*' as well as on the Human Resources Oracle database.

7.5 Monitoring

The Santos Management Standard *EHSMS 14: Monitoring, Evaluation and Reporting* requires that environmental monitoring, evaluation and reporting be considered and where appropriate implemented. Ongoing monitoring and auditing of geophysical operations is necessary to determine whether significant environmental risks are being managed, minimised and where reasonably possible, eliminated.

Operational monitoring for the activity is undertaken through a combination of planned monitoring through the establishment of photopoints, regular inspections / spot checks and ad-hoc monitoring in response to an incident or unplanned event.

Photopoints

Photopoints are established along each line and at each camp location, as shown in Table 7-2. Photopoints are used in an Environmental Line Report to document:

- Visual impact of the operations;
- Disturbance to flora, fauna and general biodiversity;
- Site condition following program completion and restoration activity;
- Long term rehabilitation success and site revegetation.

Table 7-2: Photopoint Monitoring Summary

Photopoint	**Location**	**Photo direction**	**Timing**				
			Pre-line prep (pre-camp)	**Post-line prep**	**Post-recording (post-camp)**	**Post-restoration**	**Revisit**
Seismic Lines	Approx 5km intervals	Along alignment (both directions)	✓	✓	✓	✓	1 - 4 years[3] (selected photopoints)
Campsites	All camps	Generally N, S, E, W	✓		✓	✓	

Post survey monitoring using photopoints is discussed further in Section 3.3.5.

Operational Inspections and Spot-checks

Environmental workplace inspections are coordinated throughout operations by the Authorised Representative of the Seismic Contractor. These inspections and spot-checks are aimed at monitoring compliance against environmental commitments and regulatory requirements. Inspection findings are communicated to the workforce and Santos Operations Geophysics Manager and remedial actions or improvements are implemented as necessary.

[3] Revisit timing is dependent on weather conditions throughout the year(s) to ensure the restoration is successful following a range of weather conditions.

Ad-Hoc (Reactive) Monitoring

Reactive monitoring may be undertaken in response to an unplanned event or incident. This type of monitoring is generally scoped following an incident, with the scope, extent and duration of monitoring dependant on the nature and scale of the incident.

Record Keeping

Monitoring records maintained through the project generally include:

- Environmental Line Reports;
- Photopoint data;
- Induction records;
- Waste register and records;
- Water usage, source location, dates and volumes;
- Equipment/vehicle wash-down/cleanliness records;
- Hazardous goods storage, handling and disposal records;
- Non-compliance and corrective actions records;
- Internal audit reports;
- Inspection records; and
- Equipment maintenance records.

7.6 Audits

The Santos Management Standard *EHSMS 16 - EHS Audit and Inspection* outlines the requirements to provide assurance that EHS systems and processes are effectively implemented, fit for purpose and are meeting relevant statutory requirements.

Assessments of Seismic operations against requirements of the EHSMS are performed periodically. Results of these assessments form the basis for targeted improvement initiatives.

Corrective actions raised during these audits and inspections are entered into the Audit and Inspection Manager (AIM) electronic database for action assignment and tracking of action progress to closure.

7.6.1 Santos internal audits

Prior to commencement of, or during a geophysical survey, the operator may nominate a representative sample of lines to be audited. Representative sample sites, ideally, should be easily accessible from existing roads or tracks. Other sites may be selected away from existing tracks or in less sensitive areas on a random basis to provide a check of standards throughout the licence area, and provide representative sampling of all land units. The geophysical survey crew is to be made aware that a sample of lines will be audited but the precise lines will not be made known.

The Santos field representative shall audit the nominated lines for compliance with the performance objectives within the period of the survey and any shortfall will be made good before the survey is completed and an audit report prepared.

7.6.2 Third party audits

Third parties may also undertake audits of the field outcomes of company geophysical operations. The audits may be commissioned by DME, or Santos, or by an independent party. If these audit findings are to be compared to those of Santos and/or DME, the same assessment criteria should be used.

7.7 Management of Non-conformance

The Santos Management Standard *EHSMS 15 - Incident Investigation and Response* requires that all incidents, hazards, near misses, property damage, significant process incidents, non-conformance events and third party complaints, including those related to environmental issues, are managed using the Santos Incident Management System (IMS).

The IMS is used to record, track and close out incidents and non-conformances. The system also provides a mechanism to analyse the collated data and identify areas requiring improvement. For each recorded incident, IMS records the date, location, volume, substance, root cause, event descriptions, reporting to regulatory bodies, and any remedial action taken.

Incident and non-conformance data are summarised weekly with management review against performance objectives and targets. Incidents and investigation findings are reviewed at regular site EHS communication meetings.

All incidents must be reported in accordance with the requirements of the NT *Petroleum Act 2011* and the *Schedule for Onshore Petroleum Requirements 2012*.

7.8 Emergency Response Plan

The Emergency Response Plan for the activity is to be prepared by the Seismic Contractor and will form part of the EP application.

Emergency response drills should be undertaken at least annually to ensure that personnel are familiar with the plans and the types of emergencies to which it applies and that there will be a rapid and effective response in the event of a real emergency occurring.

Emergency response plans must be reviewed and updated on a regular basis to incorporate new information arising from any incidents, near misses and hazards and learnings from emergency response drills. These plans would also include the facilitation of Fire Danger Season restrictions and requirements.

7.9 Inspection and Maintenance Activities

All operational equipment should be inspected and maintained in accordance with industry accepted standards and product operational requirements.

Seismic contracting companies will also have their own inspection and maintenance procedures.

7.10 Management of Change

Proposed changes associated with the activity are subject to a Management of Change (MoC) process in accordance with Santos Management Standard *EHSMS 12 – Management of Change*. The MoC process ensures that changes potentially affecting the integrity, EHS and regulatory compliance aspects of the

program are systematically reviewed, assessed, documented and communicated prior to implementation.

The standard applies to equipment, operations, organisation structure, personnel, process conditions, legal requirements and standards of operation.

Santos

8 REPORTING

Santos will implement internal and external reporting procedures to ensure that environmental issues and/or incidents are appropriately responded to, reported and actions tracked and closed out. Reporting may include:

- Weekly progress report to DME in accordance with clause 712 of the *Schedule of Onshore Petroleum Exploration and Production Requirements 2012*.
- Site EHS inductions and meetings
- Incident or near miss investigation (as required by EHSMS15 – Incident Investigation and Response).
- Number, severity and close out status of incident
- Progress against key performance indicators
- Audit schedule and findings; and
- External meetings and / or liaison with key stakeholders.

In accordance with *EHSMS 12 – Incident Investigation and Response* all incidents, hazards, near misses, property damage, significant process incidents, non-conformance events and third party complaints, including those related to environmental issues are reported internally through IMS.

Environmental Line Reports & Rehabilitation

Environmental Line Reports will be progressively prepared and provided to DME as live documents at various stages of the activity, such as:

- *Post-restoration Environmental Line Report*: Incorporating pre-line prep, post-line prep, post-recording and post-restoration photopoint monitoring.
- *Long-term Re-visit Environmental Line Report*: Incorporating all of above, plus the long-term revisit photopoint monitoring.
- *Final Rehabilitation Report*: Incorporating the Final Environmental Line Report and confirming the efficacy of line rehabilitation following at least one wet-season.

External Environmental Incident Reporting

External environmental reporting requirements are defined in the *Schedule of Onshore Petroleum Exploration and Production Requirements 2012*. As relevant to this EMP, reportable environmental incidents are defined in clause 289 and include:

- *A significant spillage of hydrocarbons which in areas of inland waters is in excess of 80L, in other areas is in excess of 300L and if in a gaseous form is in excess of 500 m^3.*
- *Any uncontrolled escape or ignition of petroleum or any other flammable or combustible material causing a potentially hazardous situation.*

Santos

9 CONSULTATION

Santos is committed to upholding its long-held reputation as a trusted Australian energy company. Santos seeks to establish and maintain enduring and mutually beneficial relationships with the communities of which it is a part; ensuring that Santos' activities generate positive economic and social benefits for and in partnership with these communities.

The Santos Environment, Health and Safety Management System Standard *EHSMS 07 – Consultation and Communication* details the requirements for appropriate communication and consultation mechanisms. The standard includes requirements to establish and maintain communication links with employees, contractors and external stakeholders, including local communities, government agencies and other organisations. Reporting and notification of EHS incidents to the appropriate government agency occurs if and as required.

9.1 Stakeholder Identification

Stakeholder identification was conducted early in the project. Stakeholders include:

- Community
- Landholders
- Traditional Owners and Aboriginal Peoples
- Representatives of Local Government
- Northern Territory Government departments
- Media
- Other key non-commercial external stakeholders (e.g. NGOs and industry bodies)
- Industrial Relations stakeholders
- Other commercial external stakeholders
- Internal stakeholders

9.2 Stakeholder Consultation

Santos has undertaken consultation to ensure that the key stakeholders are aware of the components of the exploration program. The purpose of the consultation has been to:

- Educate and inform key stakeholders of the elements of the Southern Amadeus Basin Exploration Program and possible future production
- Build and maintain stakeholder confidence through key relationships
- Gain trust and acceptance in the local communities as a responsible member of society
- Listen to and address concerns or queries
- Educate the community, landholders, business operators and Traditional Owners on why and how Santos operates

The key component of the engagement program has been face-to-face briefing sessions with key individuals and groups with timely feedback on issues and concerns.

Santos also participated in the information roadshow conducted by APPEA and the Department of Mines and Energy throughout the Northern Territory.

Issues addressed during consultation include:

- Environmental disturbance and the use of chemicals
- Cultural heritage issues
- Potential impact on the groundwater
- Impact to roads through increased traffic
- Hydraulic fracture stimulation activity
- Well integrity
- Economic benefits from increased activity - including local employment and training, funding sponsorships and capacity building for local businesses
- Local procurement of goods and services

Table 9-1 lists the stakeholders consulted in relation to the Program, the date of consultation, a summary of the stakeholder response and the current status and actions by Santos.

Table 9-1 Stakeholder consultation records

Information arising from stakeholder consultation contained within Table 9-1 is confidential to the stakeholders and has been redacted.

9.3 Ongoing Consultation

Santos will have 2 field based members of the LHRT based in Elrdunda and Alice Spring on back to back rotation. They will be the primary point of contact for all landholders and community members during the project planning and execution phases.

Prior to any land access, the LHRT will carry out onground scouting and consultation to ensure that any impact or interruption to landholders is minimised.

Santos will not access any person's land without prior consent in the form of a written agreement and in accordance with the DME policies and guidelines.

Where stakeholders have requested or Santos believes it would be beneficial to engage with stakeholders on an ongoing basis during the survey, communications will continue until the survey has concluded.

Santos

10 REFERENCES

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Santos

APPENDIX A EPBC Report – Protected Matters Search Tool Accessed on 14 January 2016.

Australian Government

Department of the Environment

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

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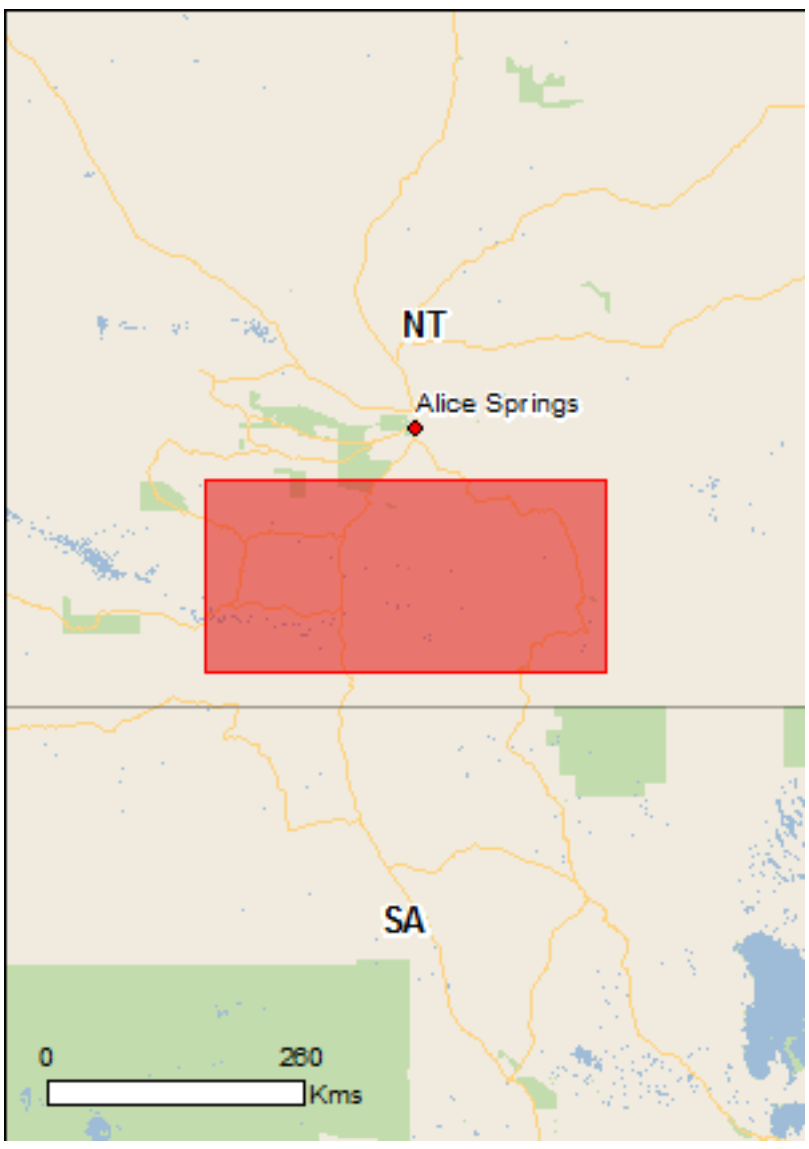

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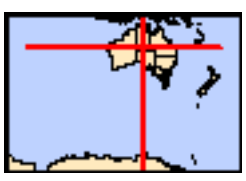

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	24
Listed Migratory Species:	9

Other Matters Protected by the EPBC Act

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

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

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	10
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

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

State and Territory Reserves:	8
Regional Forest Agreements:	None
Invasive Species:	17
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Amytornis modestus Thick-billed Grasswren [84121]	Vulnerable	Species or species habitat likely to occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat may occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area
Polytelis alexandrae Princess Parrot, Alexandra's Parrot [758]	Vulnerable	Species or species habitat known to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Insects		
Croitana aestiva Desert Sand-skipper, Aestiva Skipper [26238]	Endangered	Species or species habitat may occur within area
Mammals		
Dasycercus cristicauda Crest-tailed Mulgara [328]	Vulnerable	Species or species habitat likely to occur within area
Macrotis lagotis Greater Bilby [282]	Vulnerable	Species or species habitat known to occur within area
Petrogale lateralis MacDonnell Ranges race Warru, Black-footed Rock-wallaby (MacDonnell Ranges race) [66649]	Vulnerable	Species or species habitat known to occur within area
Pseudomys australis Plains Rat, Palyoora [108]	Vulnerable	Species or species habitat known to occur within area
Zyzomys pedunculatus Central Rock-rat, Antina [68]	Endangered	Species or species habitat may occur within area
Other		
Macrozamia macdonnellii MacDonnell Ranges Cycad [11843]	Vulnerable	Species or species habitat likely to occur

Name	Status	Type of Presence within area
Plants		
[Acacia latzii](#) Latz's Wattle [14275]	Vulnerable	Species or species habitat known to occur within area
[Acacia peuce](#) Waddy, Waddi, Waddy-wood, Birdsville Wattle [8301]	Vulnerable	Species or species habitat likely to occur within area
[Acacia pickardii](#) Birds Nest Wattle [17259]	Vulnerable	Species or species habitat likely to occur within area
[Eleocharis papillosa](#) Dwarf Desert Spike-rush [2519]	Vulnerable	Species or species habitat known to occur within area
[Eremophila prostrata](#) Rainbow Valley Fuchsia Bush [56749]	Vulnerable	Species or species habitat likely to occur within area
[Frankenia plicata](#) [4225]	Endangered	Species or species habitat likely to occur within area
[Livistona mariae](#) Central Australian Cabbage Palm [2036]	Vulnerable	Species or species habitat known to occur within area
[Minuria tridens](#) Minnie Daisy [13753]	Vulnerable	Species or species habitat known to occur within area
[Thryptomene wittweri](#) Mountain Thryptomene [16645]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
[Liopholis kintorei](#) Great Desert Skink, Tjakura, Warrarna, Mulyamiji [83160]	Vulnerable	Species or species habitat may occur within area
[Liopholis slateri slateri](#) Slater's Skink, Floodplain Skink [83163]	Endangered	Species or species habitat known to occur within area
[Ophidiocephalus taeniatus](#) Bronzeback Snake-lizard [1630]	Vulnerable	Species or species habitat likely to occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
[Apus pacificus](#) Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
[Merops ornatus](#) Rainbow Bee-eater [670]		Species or species habitat may occur within area
[Motacilla cinerea](#) Grey Wagtail [642]		Species or species habitat may occur within area
[Motacilla flava](#) Yellow Wagtail [644]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
Migratory Wetlands Species		
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur

Name	Threatened	Type of Presence within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Angas Downs	NT
Chamber's Pillar	NT
Finke Gorge	NT
Henbury Meteorites	NT
Illamurta Springs	NT
Mac Clark (Acacia peuce)	NT
Owen Springs Reserve	NT
Rainbow Valley	NT

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Camelus dromedarius Dromedary, Camel [7]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Equus asinus Donkey, Ass [4]		Species or species habitat likely to occur within area
Equus caballus Horse [5]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area

Plants		
Andropogon gayanus Gamba Grass [66895]		Species or species habitat likely to occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Parkinsonia aculeata Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area

Nationally Important Wetlands	[Resource Information]
Name	State
Karinga Creek Palaeodrainage System	NT

Caveat

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

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

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

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

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

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

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

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

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

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

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

Coordinates

-24.12915 131.96191,-24.12915 135.62036,-25.71325 135.62036,-25.71325 131.96191,-24.12915 131.96191

Acknowledgements

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

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Parks and Wildlife Commission NT, Northern Territory Government
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Atherton and Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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Santos

APPENDIX B Environment Plan Commitments Summary

Commitment	All	Planning	Line and Access Track Preparation	Seismic Operations (Line Surveying & Recording)	Camp sites and associated supplies	Line & Access Track Restoration	Monitoring of Selected Locations
Santos will ensure that prior to commencement of the Program, necessary consents and approvals will have been identified, obtained and be in place and the work will be undertaken in accordance with the terms and conditions as detailed in the CLC Agreement and the Sacred Site Clearance Certificate.	X						
Contractors will be required to comply with environmental standards, guidelines and codes of practice: • Santos Environmental Health and Safety Management System (EHSMS). • Santos environmental hazard standards (EHS). • Santos Health and Safety Hazard Standards (HSHS). • Conditions of Sacred Site Clearance Certificates. • Australian Petroleum Production and Exploration Association (APPEA) Code of Environmental Practice (2008).	X						
Campsites are set up, where possible, on sites previously used, or in areas naturally devoid of vegetation and always adjacent to any existing tracks.					X		
The dozers will simply 'walk' with the blade up in easily traversable terrain, with the marks of the tracks being sufficient for the surveyors and recording crew to follow.			X				
All line preparation personnel are given environmental and cultural heritage inductions prior to commencing work.			X				

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Commitment	All	Planning	Line and Access Track Preparation	Seismic Operations (Line Surveying & Recording)	Camp sites and associated supplies	Line & Access Track Restoration	Monitoring of Selected Locations
All machinery operators are required to observe for cultural heritage sites that may have been missed during the Site Clearance process. Any additional sites discovered, must be avoided and reported to the Santos Cultural Heritage Team.							
Campsites are sited on ground conducive to camping but never on clay pans or salt lakes. Camps are located as near as practical to existing tracks or roads to avoid the need for clearance of native vegetation and subsequent disturbance to animal habitats. The campsite is located on a previously disturbed area wherever possible.					X		
Vehicles are restricted to the perimeter of the camp and parking areas are also defined.					X		
Wastewater from laundry, showers and kitchen is piped to an irrigation area about 50m outside the camp.					X		
Wastepaper, cardboard and food scraps are disposed of into sealed bins set up adjacent to the camp area. The sealed bins are transported regularly for waste disposal at a licensed landfill. Recyclable materials are segregated on camp and regularly transported to a licensed waste depot in Alice Springs. Unusable tyres are returned to Alice Springs for recycling.					X		
Sewage management practices at all camps consist of the use of port-a-loos and grey water capture and disposal to a ground pit with the aim to minimise any risks to human health or the environment.					X		

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Commitment	All	Planning	Line and Access Track Preparation	Seismic Operations (Line Surveying & Recording)	Camp sites and associated supplies	Line & Access Track Restoration	Monitoring of Selected Locations
Fuel drums are stored within portable bunding and bulk fuel is stored within tankers, which have safety features such as double-skins (or temporary bunding), safety cut-off valves, top accessing etc. Spill leak and drip trays are used to address minor drips and spills resulting from re-fuelling operations. Any uncontained spillage will be treated in situ, and impacted areas remediated.					X		
Once the campsite has been vacated, rehabilitation is undertaken including removal of rubbish and any man made items. When necessary, and terrain permitting, the area is tyned ripped to remove compaction and wheel tracks. Shoulders of adjacent formed tracks are reinstated.					X		
Prior to the commencement of any survey, environmental monitoring point's (EMPs) are selected to give a balanced representation of the various landform and vegetation type encountered.							X
One nationally important wetland being the Karinga Creek Palaeodrainage System will be avoided by the proposed activities.	X						
Where relevant, weed management strategies are developed by Santos to ensure that vehicles and equipment are washed down if moving from areas of known weed infestations. Weed control measures are implemented as required.	X						

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Commitment	All	Planning	Line and Access Track Preparation	Seismic Operations (Line Surveying & Recording)	Camp sites and associated supplies	Line & Access Track Restoration	Monitoring of Selected Locations
A register of vehicle / equipment / machinery cleaning is kept.	X						
Absorbent and containment material (e.g. absorbent matting) will be available where hazardous materials are used and stored and personnel trained in correct use.	X						
All access through watercourses area carefully assessed to determine the locations of least impact to channels and creek banks.		X	X				
All access will be clearly identified and all vehicles and machinery shall remain within the designated access ways and surveyed seismic lines.	X						
All chemical and fuel storage areas shall be bunded.	X						
All cleared areas will be rehabilitated at the completion of Operations.						X	
All earthworks shall be confined to the survey lines, access tracks and camp sites.	X						
All empty drums must be stored on impervious areas with their closures in place, or transported immediately off-site.	X						
All fuel stored and used should be under the control of qualified or trained personnel.	X						
All gates are left in the condition in which they were found (i.e. open / closed).	X						

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Commitment	All	Planning	Line and Access Track Preparation	Seismic Operations (Line Surveying & Recording)	Camp sites and associated supplies	Line & Access Track Restoration	Monitoring of Selected Locations
All generated waste (including consumable rubbish such as lunch wrappers) shall be returned to the camp and placed in the appropriately waste receptacle.	X						
All litter is to be managed and disposed of correctly.	X						
All loads of rubbish are covered during transport.	X						
All marking, flagging and signage not required shall be removed.	X						
All vehicles are thoroughly cleaned prior to entry into the survey area.	X						
All vehicles will be equipped with portable fire extinguishers.	X						
All vehicles, plant and equipment shall be cleaned and inspected prior to arrival at the project area.	X						
All windrows are removed either during or on completion of work.						X	
Any remediation work should be undertaken immediately upon completion of all activities.						X	
Any spills have been contained and retrieved.	X						
Appropriate fire fighting gear available to the crew.	X						
Appropriate fire prevention procedures in place.	X						

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Commitment	All	Planning	Line and Access Track Preparation	Seismic Operations (Line Surveying & Recording)	Camp sites and associated supplies	Line & Access Track Restoration	Monitoring of Selected Locations
Appropriate spill response equipment available on site.	X						
Areas subject to inundation will be assessed for conduciveness to support vehicles.	X						
Avoid extensive side cuts.			X				
Blade work is banned on naturally smooth surfaces or flat easy terrain. Minimal blade work is permitted elsewhere for access.			X				
Camp site areas are ripped, if necessary, on completion of work.						X	
Camp sites are established in locations where the preparation of a new access track is not necessary or minimal.					X		
Camp sites are positioned close to existing roads where possible and are ripped, if necessary, on completion of work.					X		
Chemical use will be minimised where practicable and the minimum practicable volume will be kept on site.	X						
Compliance with requirements of the Cattle Care and Organic Beef accreditation programmes or management as requested by the landholders, including full time monitoring by on field staff and inclusion in site inductions.	X						

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Commitment	All	Planning	Line and Access Track Preparation	Seismic Operations (Line Surveying & Recording)	Camp sites and associated supplies	Line & Access Track Restoration	Monitoring of Selected Locations
Covered bins are provided for the collection and storage of wastes.	X						
Creek bank vegetation is left intact and detours sought if too dense to pass through.			X				
Damage to station tracks is avoided.	X						
Dozers are walked with blade up wherever possible.			X				
During rehabilitation operations, work will cease if weather conditions inhibit access.						X	
EMPs will be established to monitor and document soil disturbance and recovery.	X						
Fences will be reinstated after all access is completed.						X	
Fuel and oil spills are reported, treated and or remediated and the ground ripped.	X						
Fuel and other lubricants will be appropriately stored and managed.	X						
Fuel storage contained within double skin tanker with safety valves.	X						
Fuels, lubricants and chemicals shall be stored and handled within containment facilities away from the vicinity of watercourses and water storage areas.	X						

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Commitment	All	Planning	Line and Access Track Preparation	Seismic Operations (Line Surveying & Recording)	Camp sites and associated supplies	Line & Access Track Restoration	Monitoring of Selected Locations
If any contamination from spillage of oils or fuel occurs during vehicular operations, immediate effective clean-up procedures must be employed.	X						
Include Fire Season education as part of the induction.	X						
Inductions for all employees and contractors cover pastoral, conservation, legislation and infrastructure issues.	X						
Known sites of sacred or cultural significance are identified and where required flagged so the lines can be deviated around them.	X						
Lines adjacent to public roads may also be blocked with timber as an access deterrent.						X	
Lines are doglegged at road and track crossings preferably around vegetation.			X				
Lines are prepared to a single blade width only (approximately 4m to 5m).			X				
Lines are weaved at least every 75m to 100m about the general line of traverse and stands of vegetation.			X				
Machinery and vehicles should be parked in areas of low fire risk and be free of any combustible material, for example in the case of dry grass build up.	X						

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Commitment	All	Planning	Line and Access Track Preparation	Seismic Operations (Line Surveying & Recording)	Camp sites and associated supplies	Line & Access Track Restoration	Monitoring of Selected Locations
Materials Safety Data Sheets shall be obtained upon purchase of chemicals and kept on-site for all chemicals stored and handled.	X						
Maximise use of vegetation or landforms to disguise operations.			X				
Natural drainage channels are left clear at line crossings.			X				
No heavy line preparation machinery is used in wetlands areas.			X	X	X	X	
No heavy machinery is used in wetlands areas for rehabilitation.	X						
No incineration or open burning of waste materials shall occur on-site.	X						
No liquid wastes will be released accidentally or routinely discharged to surface waters.	X						
Off line driving for the main crew is prohibited – no bush bashing or short cuts are permitted.	X						
Oil spills areas will be ripped to an appropriate depth.	X						
Open fires, including open barbecues, billy fires, and brush burning, are banned on the Project.	X						
Operations are shut down during wet weather or flooding and only restarted once potential for extensive damage has	X						

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Commitment	All	Planning	Line and Access Track Preparation	Seismic Operations (Line Surveying & Recording)	Camp sites and associated supplies	Line & Access Track Restoration	Monitoring of Selected Locations
passed. Unavoidable damage is reinstated on completion of work.							
Pre-survey planning to minimise visibility of operations with the use of Santos' GIS.		X					
Proper use of access tracks involves travel at safe speeds, utilisation of designated parking areas, sensible use during wet weather, gates being left as found.	X						
Protective clothing, appropriate to the materials in use, will be provided.	X						
Public access along survey lines will be discouraged by the use of signs at public roads.	X						
Records of detection, monitoring or eradication of exotic weed or other pest or noxious species introduced by activities are.	X						
Refuelling will not occur within 1km from major watercourses or sensitive ecological environments (wetlands).	X						
Refuse containers/bags will be available with each crew.	X						
Relevant landowners and occupiers are notified prior to survey of preparation of camp sites, preparation of survey lines and undertaking of operations.	X						

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Commitment	All	Planning	Line and Access Track Preparation	Seismic Operations (Line Surveying & Recording)	Camp sites and associated supplies	Line & Access Track Restoration	Monitoring of Selected Locations
Relevant mineral and geothermal tenement holders shall be notified of survey of preparation of camp sites, preparation of survey lines and undertaking of operations.	X						
Root stock, topsoil and seeds are left on line during line preparation.			X		X		
Santos and the Seismic Contractor will comply with approval conditions while undertaking all activities.	X						
Santos will obtain all necessary approvals and consents CLC prior to commencement of line activities.	X						
Seismic sources are not to operate within the distance defined by Santos standards, of any pipeline, utility, installation or building.	X						
Storage and handling of hazardous substances shall be in accordance with HSHS08 – Chemical Management and Dangerous Goods.	X						
Supervisors shall ensure that all personnel are familiar with spill prevention measures including refuelling techniques (e.g. use of spill mats) and chemical storage and handling requirements.	X						
System is in place for logging landholder complaints to ensure that issues are addressed as appropriate.	X						

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Commitment	All	Planning	Line and Access Track Preparation	Seismic Operations (Line Surveying & Recording)	Camp sites and associated supplies	Line & Access Track Restoration	Monitoring of Selected Locations
Terrain and vegetation is considered in planning stage when designing layout of the survey.		X					
The number of camp sites will be minimised with the aim being to share existing sites wherever reasonably practicable.					X		
Unavoidable compaction in areas other than those susceptible to erosion, will be ripped on completion of work.						X	
Use of drip trays for transfers.	X						
Use of road tanker fuel storage.	X						
Vegetation is removed only when absolutely necessary - avoided by weaving lines through vegetated areas.			X		X		
Vehicle access to survey lines is to be via existing access tracks or pre-existing survey lines, except where they have rehabilitated. Other temporary access tracks may be utilised where such use is likely to result in less environmental impact than other options.	X						
Waste shall be removed from the camp by an appropriately licensed contractor and disposed at an approved facility. Records shall be kept of disposal of waste oils and fluids and hazardous wastes.	X						
When necessary, all fences are restored to satisfaction of landowner / managers.	X						

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Commitment	All	Planning	Line and Access Track Preparation	Seismic Operations (Line Surveying & Recording)	Camp sites and associated supplies	Line & Access Track Restoration	Monitoring of Selected Locations
Where possible, existing tracks, roads or seismic lines will be used for access.	X						
Where required, access tracks will be watered and is reinstated after use.	X					X	
Windrows/shoulders on public tracks are reinstated on completion of work.						X	
All Santos personnel, contractors and visitors are required to undertake appropriate environmental training and induction programs	X						
Prior to commencement of, or during a geophysical survey, the operator may nominate a representative sample of lines to be audited.		X					
The Santos field representative shall audit the nominated lines for compliance with the performance objectives within the period of the survey and any shortfall will be made good before the survey is completed and an audit report prepared.			X	X		X	X
Incident and non-conformance data are summarised weekly with management review against performance Objectives and Targets. Incidents and investigation findings are reviewed at regular site EHS communication meetings.	X						
Emergency response drills should be undertaken at least annually.	X						
Emergency response plans must be reviewed and updated on a regular basis.	X						

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Commitment	All	Planning	Line and Access Track Preparation	Seismic Operations (Line Surveying & Recording)	Camp sites and associated supplies	Line & Access Track Restoration	Monitoring of Selected Locations
Seismic contracting companies will also have the own inspection and maintenance procedures.	X						
Santos will implement internal and external reporting.	X						
Reporting may include: • Progress of line preparation, surveying, and recording activities • Site EHS inductions and meetings • Incident or near miss investigation (as required by EHSMS15 – Incident and Non-conformance Investigation). • Number, severity and close out status of incident • Progress against key performance indicators • Audit schedule and findings; and • External meetings and / or liaison with key stakeholders.	X						
Incident and non-conformance data are summarised weekly with management review against performance Objectives and Targets. Incidents and investigation findings are reviewed at regular site EHS communication meetings.	X						
All incidents must be reported in accordance with the requirements of the NT Petroleum Act 2011 and the Schedule for Onshore Petroleum Requirements 2012.	X						
Where stakeholders have requested or Santos believes it would be beneficial to engage with stakeholders on an ongoing basis during the survey, communications will continue until the survey has concluded.	X						