



Leigh Creek Energy

Statement of Environmental Objectives

Geophysical Operations

Petroleum Exploration Licence 650



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05	28/10/19	Issued for submission to DEM	AM	SA	AM

Leigh Creek Energy acknowledge the Adnyamathanha people, the traditional owners of the land on which our operations occur and pay our respects to their Elders past and present.

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1 Introduction

1.1 Purpose

This Statement of Environmental Objectives (SEO) for geophysical operations in PEL650 has been prepared to meet the requirements of Sections 99 and 100 of the South Australian *Petroleum and Geothermal Energy Act 2000* (PGE Act) and Regulations 12 and 13 of the *Petroleum and Geothermal Energy Regulations 2013* (PGE Regulations).

The intent of the SEO is to outline the environmental objectives that Leigh Creek Energy Ltd (LCK) are required to achieve during geophysical operations on Petroleum Exploration Licence (PEL) 650, and the criteria upon which the achievement of these objectives will be assessed.

The objectives of this SEO have been developed on the basis of the information provided in the LCK Environmental Impact Report (EIR) for Geophysical Operations (LCK 2018), and are in keeping with the objectives of the PGE Act, which include:

- to avoid and minimise the environmental impact from exploration for, or recovery or commercial utilisation of, resources to which the PGE Act applies;
- to establish appropriate consultative processes involving people directly affected by regulated activities and the public generally; and
- to protect the public from risks inherent in regulated activities.

The PGE Act broadly defines the environment to include natural, social, cultural and economic aspects. The environmental objectives outlined in this SEO incorporate these aspects.

1.2 Scope

This SEO applies to all geophysical activities in PEL 650. These activities are described in the EIR (LCK 2018).

Activities associated with the geophysical operations that are covered by this SEO are as follows:

- line surveying
- line and access track preparation
- surface placement of geophysical instrumentation (i.e. geophones, ground penetrating radar, etc.)
- recording (seismic, gravimetric, ground magnetic, electromagnetic and others)
- campsites and associated activities (if required)
- monitoring and auditing of selected locations (before and after line preparation and after restoration)
- line access track and campsite restoration where required (after completion of recording).

The location of PEL650 is shown below in Figure 1-1.

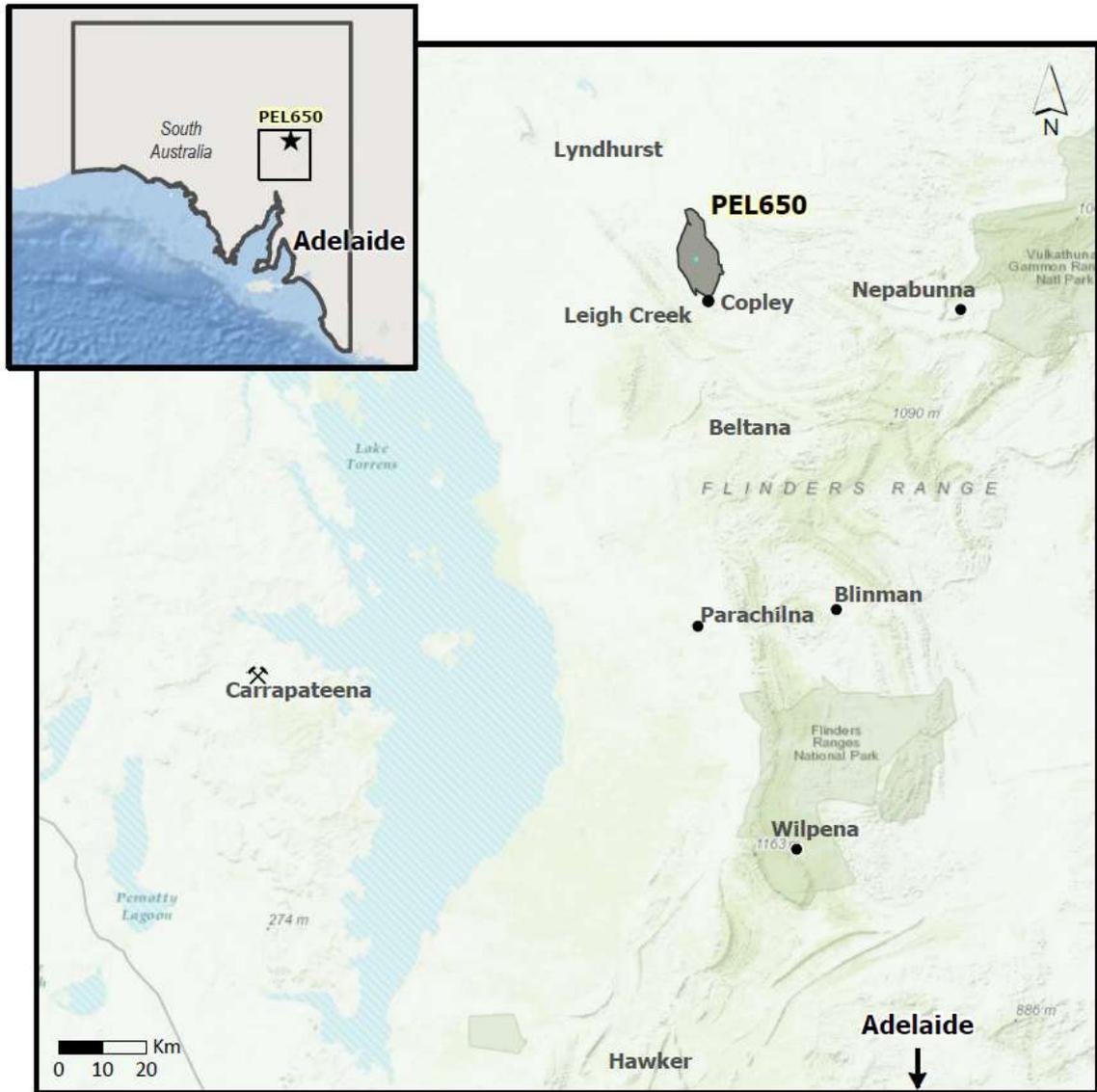


Figure 1-1: Project location

2 Environmental Objectives and Assessment Criteria

2.1 Objectives

Potential environmental hazards and consequences associated with the geophysical survey operations in PEL 650 have been identified in the EIR (LCK 2018).

LCK is committed to achieving a range of environmental objectives regarding these potential environmental hazards.

The environmental objectives for the geophysical operations are:

1. Avoid damage, disturbance or interference to Aboriginal heritage sites, objects and remains through undertaking risk mitigation strategies and where required, procuring authorisation under relevant legislation;
2. Minimise disturbance and avoid contamination to soil;
3. Avoid contamination of surface water and groundwater resources and minimize disturbance to surface drainage patterns;
4. Minimise disturbance to native vegetation and native fauna;
5. Avoid the introduction or spread of weeds, plant pathogens or pests (including feral animals);
6. Avoid or minimise disturbance to stakeholders and / or associated infrastructure;
7. Minimise risks to the safety of the public and other third parties;
8. Optimise (in order of most to least preferable) waste avoidance, reduction, reuse, recycling, treatment and disposal; and
9. Remediate and rehabilitate operational areas to agreed standards.

2.2 Assessment Criteria

The environmental objectives identified above are subject to an assessment to measure the level of achievement. The assessment criteria for each objective are set out in Table 1 and will be one of the following:

1. **Defined conditions** – in some cases, the achievement of an objective can be assessed through ensuring defined conditions are met or carried out. Such conditions may include for example, prohibitions on undertaking a specific action (e.g. ‘rare, vulnerable or endangered flora are not removed without necessary permits or approvals.’).
2. **Defined requirements** – the achievement of an objective can be assessed against the implementation of specific procedures or industry accepted standards required for an activity (e.g. ‘All wastewater is disposed in accordance with the *South Australian Public Health (Wastewater) Regulations 2013* or to the satisfaction of the Department of Health’).
3. **Goal Attainment Scaling (GAS) criteria** – Some environmental objectives are prone to subjective judgement from one observer to another. Therefore, in order to minimise the discrepancy from one observer to another, Goal Attainment Scaling (GAS) is used to measure the degree to which such objectives are met (Santos, 2018). Goal Attainment Scaling criteria are presented in Appendix A.
4. **Scientific Studies / Monitoring** – in some cases assessment of the environmental objectives may not be possible in the shorter term and may require longer term monitoring and scientific evaluation. In such cases, assessment criteria may be in the form of longer term data and information gathering.

Each objective for geophysical operations will be assessed using a selection of the assessment options outlined above. This will enable LCK to determine whether environmental objectives are being achieved. Comments on any variances will be recorded and reported where required as detailed in Section 3.

Table 1 also outlines the controls that are planned to be implemented to ensure that environmental objectives are achieved, in the “Guide to How Objectives Can be Achieved” column. These management measures provide a high-level overview of LCK systems, activities and / or procedures to achieve the environmental objectives.

Table 1: Environmental Objectives and Assessment Criteria

Environmental Objectives	Assessment Criteria	Guide to How Objectives Can be Achieved
<p>1. Avoid damage, disturbance or interference to Aboriginal heritage sites, objects and remains by undertaking risk mitigation strategies and, where required, procuring authorisation under relevant legislation.</p>	<p>By way of risk mitigation, areas of proposed geophysical activities will be subject to the request of a cultural heritage Work Area Clearance¹. Requests will be made in accordance with the existing Work Area Clearance Agreement (WACA)² between LCK and the Adnyamathanha Traditional Lands Association (ATLA) and exploration activities will then be undertaken in accordance with conditions of the Work Area Clearance.</p> <p>Any Aboriginal heritage sites, objects and remains discovered during operations have been appropriately reported and responded to, consistent with the <i>Aboriginal Heritage Act 1988</i>.</p>	<p>All new land disturbance is contained within the cultural heritage Work Area Clearance area as per the WACA.</p> <p>Areas of sensitivity (e.g. cultural heritage exclusion areas, if present) will be flagged and / or fenced off where necessary to prevent disturbance.</p> <p>Training for all personnel on Aboriginal cultural heritage as well as their obligations under the Aboriginal Heritage Act 1988.</p> <p>If suspected cultural heritage material is discovered during operations, immediately stop any further work in the area, secure the site and ensure no further ground disturbing activity takes place in the immediate area.</p> <p>Contact the Adnyamathanha Traditional Lands Association (ATLA) or any legally recognised body to identify an appropriate course of action. Options include risk managing the area in accordance with the agreed WACA between LCK and ATLA.</p> <p>If Aboriginal sites, objects and remains are discovered, the discovery is reported to the Department of Premier and Cabinet, Aboriginal Affairs and Reconciliation (AAR) division.</p> <p>Where possible, existing tracks, roads or seismic lines are used for access.</p>
<p>2. Minimise disturbance and avoid contamination to soil.</p>	<p><u>Land Disturbance</u></p> <p>Attainment of 0, +1 or +2 GAS criteria for 'Disturbance to land surface' objective, as listed in Appendix A.</p> <p>The extent of soil erosion as a result of geophysical survey activities is consistent with or less than surrounding land.</p> <p>Avoid highly sensitive landforms.</p> <p>Avoid disturbance to earthen bunds</p> <p>Refer to Objective 9 for rehabilitation criteria.</p>	<p><u>Land Disturbance</u></p> <p>Activities confined to defined work area sites and areas of new disturbance minimised.</p> <p>Where possible, existing tracks, roads or seismic lines are used for access.</p> <p>Topsoil stockpiled (where present) during site preparation for use in restoration.</p> <p>Areas where there is potential for (or signs of) soil erosion or sedimentation occurring, will be stabilised and control measures implemented.</p> <p>Areas where there has been disturbance to earthen bunds will be reprofiled/reinstated to their prior contours.</p>

¹ It is important to note that the term 'clearance' is sometimes used in the conduct of Aboriginal heritage surveys. Note that the term 'clearance' is not in the Aboriginal Heritage Act and therefore has no legal standing under the Act.

² the Work Area Clearance Agreement is a confidential document between LCK and ATLA.

Environmental Objectives	Assessment Criteria	Guide to How Objectives Can be Achieved
		<p>Training and induction for all personnel to educate them on the importance of remaining within designated / approved areas.</p> <p>Disturbed areas reinstated once they are no longer required e.g. by backfilling excavations, restoring natural contours, ripping areas of compacted soil and respreading topsoil and stockpiled vegetation.</p>
	<p><u>Waste Disposal</u> Refer to Assessment Criteria for Objective 8.</p>	<p><u>Waste Disposal</u> Refer to Objective 8.</p>
	<p><u>Fuel and Chemical Storage and Management</u> Appropriate spill response equipment is available on site.</p>	<p><u>Fuel and Chemical Storage and Management</u> No refuelling outside of designated refuelling/servicing areas. All hydrocarbons and chemicals are to be stored/contained within bunds in accordance with the appropriate Australian Standards, including AS1940, Safety Data Sheets and EPA guidelines. Spills and leaks are reported immediately and clean up actions initiated. A record of all spill/leak events and their corrective actions are maintained. Personnel have received training in the use of spill response equipment.</p>
<p>3. Avoid contamination of surface water and groundwater resources and minimize disturbance to surface drainage patterns.</p>	<p>No unauthorised discharge or escape of petroleum, processed substance, chemical or fuel to surface water or groundwater.</p> <p>No unauthorised modifications to watercourses.</p> <p><u>Campsite and survey line preparation</u> The attainment of 0, +1 or +2 GAS criteria for 'disturbance to land surface' objective listed in Appendix A.</p>	<p><u>Storage and Handling of Fuel, Chemicals or Produced Fluids</u> Refer to Objective 2.</p> <p><u>Modification to watercourses</u> Apply for a water affecting activity permit where relevant through the Natural Resources SA Arid Lands</p> <p><u>Waste Disposal</u> Refer to Objective 8.</p>

Environmental Objectives	Assessment Criteria	Guide to How Objectives Can be Achieved
4. Minimise disturbance to native vegetation and native fauna.	<p>The attainment of either 0, +1 or +2 GAS criteria for 'Impact on vegetation' objective listed in Appendix A.</p> <p>Vegetation clearing is limited to previously disturbed areas or areas of lowest sensitivity as far as practicable.</p> <p>Rare, vulnerable or endangered flora are not removed without necessary permits or approvals.</p> <p>No native fauna casualties that could have been reasonably prevented.</p>	<p>Activities confined to clearly defined designated approved work areas, specifically seismic lines, to minimise areas of new disturbance.</p> <p>Seismic lines have the grass slashed (if required) rather than cleared, to minimise disturbance.</p> <p>Areas of sensitivity (e.g. significant vegetation if present) identified and flagged and / or fenced off where necessary to prevent disturbance.</p> <p>If a temporary camp is required, it shall be set up on previously disturbed areas at the old Leigh Creek Coal Mine to minimise disturbance.</p> <p>Fencing installed where required around irrigation areas.</p> <p>Driver behaviour and vehicle speed limits included in compulsory induction.</p> <p>Appropriate fire-fighting equipment on site and appropriate fire breaks are maintained.</p> <p>Fire and Emergency Services Act 2005 requirements complied with (e.g. permits for 'hot work' on total fire ban days).</p>
	<p><u>Waste Management</u></p> <p>Refer to assessment criteria for Objective 8.</p>	<p><u>Waste Management</u></p> <p>Refer to Objective 8.</p>
	<p><u>Storage and Handling of Fuel, Chemicals or Produced Fluids</u></p> <p>Refer to assessment criteria for Objective 2.</p>	<p><u>Storage and Handling of Fuel, Chemicals or Produced Fluids</u></p> <p>Refer to Objective 2.</p>
5. Avoid the introduction or spread of weeds, plant pathogens or pests (including feral animals).	<p>The presence of weeds, plant pathogens or pests is consistent with or better than pre-disturbance conditions and/or adjacent land or where this is not the case, a management plan is implemented immediately.</p> <p>Declared plants occurring as a result of regulated activities are reported and managed in accordance with the <i>Natural Resources Management Act 2004</i> (NRM Act 2004) and regional NRM plans.</p>	<p>Pre-disturbance site inspection undertaken to document existing conditions.</p> <p>Earth moving equipment cleaned and inspected before commencing work at site or after operating in areas of known weed infestations.</p> <p>If project activities (e.g. line prep) result in the introduction or increased densities of weeds, a weed control plan will be developed and implemented.</p> <p>Note: Weeds are defined in this objective as any invasive plant that threatens native vegetation in the local area or any species recognised as invasive in South Australia.</p>

Environmental Objectives	Assessment Criteria	Guide to How Objectives Can be Achieved
<p>6. Avoid or minimise disturbance to stakeholders and / or associated infrastructure.</p>	<p>Any stakeholder complaints are documented, and reasonable steps taken to address them, which can be demonstrated.</p> <p>Where disturbance is unavoidable, infrastructure or land use is restored to the satisfaction of the owner or as near as practicable to undisturbed condition.</p>	<p>Line location and data acquisition is designed to minimise adverse impacts to existing drainage patterns and secondary impacts to mine site operations.</p> <p>Plant and equipment operated and maintained in accordance with design parameters and manufacturer specifications.</p> <p>Relevant stakeholders notified prior to undertaking operations, pursuant to PGE Regulations.</p> <p>Liaison with land owners regarding notification / management of works, traffic and site issues.</p> <p>Liaison with local community regarding operations.</p> <p>System in place for logging complaints to ensure that issues are recorded, addressed as appropriate and resolved in a timely manner.</p> <p>High standard of 'housekeeping' maintained.</p> <p>Induction for all employees and contractors covers stakeholder matters.</p> <p>Emergency services and potentially affected landholders / local community will be informed of significant activities (e.g. movement of large items of equipment) on public roads.</p>
<p>7. Minimise risks to the safety of the public and other third parties.</p>	<p>Reasonable measures implemented to ensure no injuries or health risks to the public and other third parties as a result of activities.</p> <p>No injuries, incidents or adverse health impacts involving the public or other third parties from regulated activities that could have been reasonably prevented by the operator.</p> <p>No uncontrolled fires as a result of activities.</p>	<p>Geophysical surveys designed, operated and maintained in accordance with relevant industry standards and best practice.</p> <p>Safety, testing, maintenance and inspection procedures are implemented.</p> <p>Recognised risk management processes implemented in design through to demobilisation to identify threats and controls to mitigate risks.</p> <p>Site Management Plan implemented as agreed with the third-party documenting health and safety management systems.</p> <p>Emergency response plan (scenario based) in place and practice drills conducted.</p> <p>Signage and site access control measures in place to warn of hazards and restrict access to the site of the geophysical survey.</p> <p>Appropriate fire-fighting equipment on site.</p> <p>Smoking only permitted in designated areas.</p> <p><i>Fire and Emergency Services Act 2005</i> requirements complied with.</p> <p>Appropriate firebreaks are maintained.</p>

Environmental Objectives	Assessment Criteria	Guide to How Objectives Can be Achieved
		<p>Compliance with relevant speed limits and restrictions on roads and tracks.</p> <p>Driver behaviour and vehicle speed limits included in compulsory induction.</p> <p>Traffic and journey management procedures followed.</p> <p>All required authorisations (e.g. DPTI, police) obtained where required for significant activities (e.g. movement of large items of equipment) on public roads.</p> <p>Emergency services and potentially affected landholders / local community will be informed of significant activities (e.g. movement of large items of equipment) on public roads.</p>
<p>8. Optimise (in order of most to least preferable) waste avoidance, reduction, reuse, recycling, treatment and disposal.</p>	<p>0, +1 or +2 GAS criteria are attained for 'Pollution or litter' objective listed in Appendix A.</p> <p>Wastes are segregated and transported to an EPA licensed facility for recycling or disposal in accordance with the facility's EPA licence conditions.</p> <p>Reasonable steps are taken to securely contain waste prior to removal from site.</p> <p>All wastewater is disposed in accordance with the <i>South Australian Public Health (Wastewater) Regulations 2013</i> or to the satisfaction of the Department of Health.</p>	<p>Waste generation minimised (e.g. by compliance with EPA's Waste Hierarchy model (avoid, reduce, reuse, recycle, recover, treat, dispose)).</p> <p>Secure systems used for storage and transport of waste (e.g. covered bins in designated area for waste collection and storage prior to transport).</p> <p>High standards of 'housekeeping' implemented.</p> <p>Waste removed off-site and disposed of at an EPA licensed waste handling facility.</p> <p>Hazardous wastes handled in accordance with relevant legislation and standards.</p> <p>Licensed contractors used for waste transport.</p> <p>Liquid waste (e.g. waste oil stored in appropriate tanks and transported off site to an EPA licensed facility).</p> <p>All wastewater (sewage) disposed in accordance with the <i>South Australian Public Health (Wastewater) Regulations 2013</i> or to the satisfaction of the Department of Health.</p>
<p>9. Remediate and rehabilitate operational areas to agreed standards.</p>	<p>The attainment of 0, +1 or +2 GAS criteria for:</p> <ul style="list-style-type: none"> • 'Visual impact' • 'Impact on infrastructure' • 'Uphole site restoration' • 'Pollution and litter' • 'Disturbance to land surface' <p>Measures/goals listed in Appendix A.</p>	<p>Any infrastructure at the surface removed and site rehabilitated following the completion of all activities.</p> <p>Disturbed areas reinstated once they are no longer required e.g. by restoring natural contours, ripping areas of compacted soil and respreading topsoil and stockpiled vegetation. Existing drainage patterns will be restored.</p> <p>Any areas of contamination are assessed and managed consistent with the principles of the NEPM³ and relevant EPA guidelines, in consultation with the Department for Energy and Mining (DEM).</p>

³ National Environment Protection (Assessment of Site Contamination) Measure (1999) amended in 2013

Environmental Objectives	Assessment Criteria	Guide to How Objectives Can be Achieved
	<p>Geophysical survey areas are rehabilitated to be reasonably consistent with the surrounding area (as per the following criteria) unless alternative agreement is reached with the regulator and stakeholders:</p> <ul style="list-style-type: none">- no evidence of waste on site- site contours are consistent with the surroundings- there has been appropriate preparation of the ground surface to promote revegetation. <p>Any areas of contamination are assessed and managed using a risk-based approach, consistent with the principles of the NEPM³.</p>	

2.3 Reporting

It is a requirement under Section 85 of the PGE Act that 'serious' and 'reportable' incidents must be reported to the Minister.

Serious Incidents must be reported as soon as practicable after the occurrence, as per Section 85 of the PGE Act and PGE Regulation 32.

Reportable Incidents must be reported on a quarterly basis within 1 month of the end of the quarter, as per PGE Regulation 32.

2.4 Incident Definitions

PGE Regulation 12 (2) requires an SEO to identify events that could, if not properly managed or avoided, cause a serious incident or a reportable incident within the meaning of Section 85 of the PGE Act. Table 2 identifies the potential serious and reportable incidents relevant to geophysical survey activities. These definitions are based on standard definitions for the industry and are intended to expand on definitions provided in Section 85(1) of the PGE Act and PGE Regulation 32(1) and provide consistency for Licensee reporting.

In accordance with Section 85 of the PGE Act and PGE Regulation 32(1):

Serious incident means an incident arising from activities conducted under the licence in which:

- (a) a person is seriously injured or killed; or
- (b) an imminent risk to public health or safety arises; or
- (c) serious environmental damage occurs, or an imminent risk of serious environmental damage arises; or
- (d) security of natural gas supply is prejudiced or an imminent risk of prejudice to security of natural gas supply arises.
- (e) some other event or circumstance occurs or arises that results in the incident falling within a classification of serious incidents under the regulations or a relevant statement of environmental objectives.

Reportable incident is defined in Section 85(1) of the PGE Act as incidents (other than a serious incident) arising from activities conducted under a licence that are classified under the PGE Regulations as a reportable incident. PGE Regulation 32(1) classifies the following as reportable incidents:

- (a) an unintended escape of petroleum, a processed substance, a chemical or a fuel that affects an area that has not been specifically designed to contain such an escape; and
- (b) an incident identified as a reportable incident under the relevant statement of environmental objectives.

Table 2: Potential Serious and Reportable Incidents

Serious Incidents	Reportable Incidents
<ol style="list-style-type: none"> 1. A person is seriously injured⁴ or killed. 2. An imminent risk to public health or safety arises. 3. Serious environmental damage occurs, or an imminent risk of serious environmental damage arises. For example: <ul style="list-style-type: none"> • Damage, disturbance or interference to sites of cultural and / or heritage significance without appropriate clearances, permits or approvals⁵. • An escape of petroleum, process substance, a chemical or a fuel to a water body, or to land in a place where it is reasonably likely to enter a water body by seepage or infiltration, or onto land that affects the health of native flora or fauna species. • Detection of a declared weed, animal / plant pathogen or plant pest species that has been introduced or spread as a direct result of activities. • Any removal of rare, vulnerable or endangered flora and fauna without appropriate permits and approvals⁶. 4. A regulated activity⁷ being undertaken in manner that involved or will involve a serious risk to the health or safety of a person emanating from an immediate or imminent exposure to a hazard⁸. 5. An uncontrolled release resulting in the activation of emergency response and/or evacuation procedures of an area in or adjacent to the release, and/or fire or explosion. 	<ol style="list-style-type: none"> 1. An escape of petroleum⁹, processed substance, a chemical or a fuel that affects an area that has not been specifically designed to contain such an escape¹⁰ (other than a serious incident). 2. An event that has the potential to compromise the physical integrity of an asset or facility. 3. Any event where an incursion outside a culturally cleared area has occurred or the conditions of a cultural heritage clearance have not been complied with (other than a serious incident).

2.5 Reporting Requirements

LCK will report any serious incidents to DEM as soon as practicable after the event, as per Section 85 of the PGE Act and Regulation 32 of the PGE Regulations.

Reportable Incidents will be reported to DEM on a quarterly basis within 1 month of the end of the quarter, as per Regulation 32 of PGE Regulations.

2.6 Reporting to EPA

Where applicable, incidents causing or threatening serious or material environmental harm under the Environment Protection Act 1993 must be reported to the EPA in accordance with section 83 or 83A of the Environment Protection Act 1993.

The reporting obligation under the EP Act does not apply to:

⁴ Includes an immediately notifiable incident pursuant to section 38(2) of the *Work Health and Safety Act 2012*.

⁵ Pursuant to *Aboriginal Heritage Act 1988* and *Heritage Places Act 1993*.

⁶ Pursuant to *Native Vegetation Act 1991* (flora) and *National Parks and Wildlife Act 1972* (fauna).

⁷ Regulated activity as defined in Section 10 of the *Petroleum and Geothermal Energy Act*.

⁸ Resulting in the issuing of a prohibition notice by SafeWork SA pursuant to Section 195 of the *Work Health and Safety Act 2012*.

⁹ In gaseous, liquid or solid state, as per *Petroleum and Geothermal Energy Act* definition.

¹⁰ An area assigned during a Hazard and Operability Process (HAZOP) study as a hazardous area for the purpose of gas venting, and designed as such, is considered to be an area specifically designed to contain a gas escape.

- petroleum exploration activity undertaken under the PGE Act; or
- wastes produced in the course of an activity (not being a prescribed activity of environmental significance) authorised by a licence under the PGE Act when produced and disposed of to land and contained within the area of the licence.

3 List of Abbreviations

AS 1940	Australian Standard <i>AS 1940 Storage and Handling of Flammable and Combustible Liquids</i>
ATLA	Adnyamathanha Traditional Lands Association
DEM	Department for Energy and Mining
DPTI	Department of Planning, Transport and Infrastructure
EIR	Environmental Impact Report for Geophysical Operations for PEL 650 prepared in accordance with Section 97 of the <i>Petroleum and Geothermal Energy Act 2000</i> and Regulation 10.
EPA	Environment Protection Authority
GAS	Goal Attainment Scaling
HAZOP	Hazard and Operability Process
LCK	Leigh Creek Energy Ltd
NEPM	<i>National Environment Protection (Assessment of Site Contamination) Measure (1999)</i> amended in 2013
NRM	Natural Resources Management
PEL	Petroleum Exploration Licence
SEO	Statement of Environmental Objectives
WACA	Work Area Clearance Agreement

4 References

Department for Manufacturing, Innovation, Trade, Resources and Energy (2013). Environmental Impact Report. Preliminary Exploration and Survey Activities in South Australia (Ground Based Geophysical (non-seismic), Pipeline Preliminary Survey and other Low-impact Survey Activities).

Department for Manufacturing, Innovation, Trade, Resources and Energy (2013). Statement of Environmental Objectives, Preliminary Exploration and Survey Activities in South Australia (Ground Based Geophysical (non-seismic), Pipeline Preliminary Survey and other Low-impact Survey Activities).

LCK (2018). Environmental Impact Report, Geophysical Operations January 2019. Leigh Creek Energy Limited, Adelaide.

Santos (2018). South Australia Cooper/Eromanga Basin Statement of Environmental Objectives: Geophysical Operations. Santos Ltd, Adelaide.

Appendix A: Goal Attainment Scaling (GAS) Criteria for assessing seismic lines

Land System	Measure	Score				
		+2 (b & d)	+1 (b & d)	0 (b & d)	-1 (a & d)	-2 (a, c & d)
Non-land system specific	Visual impact	No evidence of survey activities.	<ul style="list-style-type: none"> Only wheel tracks are evident. Line of sight is significantly impaired. 	<ul style="list-style-type: none"> Established roads and tracks have been re-shouldered. 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 100 m. Line of sight is impaired. Line follows route that is most conducive to access by utilising naturally clear areas through vegetation. 	<ul style="list-style-type: none"> No doglegs at established roads or tracks in vegetated areas. Weaving is not appropriate to terrain traversed. Line of sight is unimpaired. Uphole cuttings clearly visible in landscape. 	Line is clearly evident and dominates the landscape.
	Impact on Infrastructure	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.	<ul style="list-style-type: none"> 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.
	Uphole site restoration	No evidence of upholes.	<ul style="list-style-type: none"> No evidence of cuttings. Some evidence of activities 	<ul style="list-style-type: none"> Cuttings are evident but dispersed around hole. No subsidence. Hole has been plugged. 	<ul style="list-style-type: none"> Cuttings form mound. Subsidence is evident. Cuttings markedly discoloured compared to surface. 	Hole is open
	Pollution and litter	No pollution or litter	<ul style="list-style-type: none"> No evidence of water or oil pollution. Maximum of 1 pin flag/km. 	<ul style="list-style-type: none"> Wastewater and vehicle oil spills have been managed appropriately. Maximum of 2 pin flags / km. No other litter. 	<ul style="list-style-type: none"> Wastewater forms ponds. Vehicle oil spills have not been remediated. Maximum of 9 pin flags/km. Maximum of 4 items of other litter/km. 	<ul style="list-style-type: none"> Extensive wastewater ponding. Oil spills of more than 20L have not been remediated.

Land System	Measure	Score				
		+2 (b & d)	+1 (b & d)	0 (b & d)	-1 (a & d)	-2 (a, c & d)
						<ul style="list-style-type: none"> Ten or more pin flags/km. Five or more items of other litter/km.
Gibber plain and tableland	Impact on vegetation	No disturbance to vegetation.	No removal of vegetation.	<ul style="list-style-type: none"> Maximum of two trees 1-3m high have been unavoidably removed at creek crossings or escarpments Less than 10% of tree branches have been removed from individual trees Creek crossings are doglegged 	<ul style="list-style-type: none"> Vegetation has been removed where an appropriate detour is available Three or more trees 1-3m high have been removed at creek crossings or escarpments. 	<ul style="list-style-type: none"> Trees >2m have been removed where an appropriate detour is available Two or more trees >3m high have been removed at creek crossings or escarpments.
	Disturbance to land surface	<p>No evidence of survey line</p> <p>No disturbance to earthen bunds</p>	Only wheel tracks are evident	<ul style="list-style-type: none"> Line has been rolled or walked No blade work. Creek banks have been cut only where necessary Creeks are not blocked Areas where there has been disturbance to earthen bunds are reprofiled/reinstated to their prior contours. 	<ul style="list-style-type: none"> Creek banks 1-2m high have been cut and not restored Creeks are blocked by material <1m deep Windrows (e) exist but are <0.5m high Off line trafficking is evident Extensive wheel ruts exist 	<ul style="list-style-type: none"> Gibber mantle has been removed Creek banks >2m high have been cut and not restored Creeks are blocked by material >1m deep Windrows (e) are >0.5m high

Notes for GAS criteria for assessing seismic lines on completion of survey in the Telford Basin South Australia

- 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 levels 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.
- 'Windrows' in this context means mounding of gibbers through the action of wheel trafficking and associated dispersal of gibbers away from wheel tracks.