PEL 120

Exploratory Coal Seam Drilling

Statement of Environmental Objectives

July 2008

Prepared for:
SAPEX Ltd

2 Grenfell St
Kent Town SA 5067
(PO Box 108
Kent Town SA 5071)

ph: (08) 8363 3311
fax: (08) 8363 3399

info@sapex.com.au
www.sapex.com.au

Prepared by:
RPS Ecos
ABN 57 081 918 194

26 Greenhill Road
Wayville SA 5034

ph: (08) 8357 0400
fax: (08) 8357 0411

rpsecos@rpsecos.com.au
www.rpsecos.com.au

DOCUMENT CONTROL Env793- PEL120 Drilling Activities SEO						
Document Reference	**Revision Number**	**Revision Date**	**Compiled by**	**Checked by**	**Approved by**	**Comment**
793-PEL120 Drilling SEO	A	22Feb08	ZB/SM	SM	SM	Issued to client for review
	0	07Mar08	ZB/SM	SM	SM	Inclusion of client edits Issued to PIRSA
	1	10Apr08	ZB/SM	SM	SM	PIRSA comments addressed
	2	3Jul08	SM	ZB/AA	SM	Incorporation of stakeholder submissions

Contents

Figures

Appendices

1 Introduction

This Statement of Environmental Objectives (SEO) for exploration drilling activities in Petroleum Exploration Licence (PEL) 120 has been prepared to meet the requirements of Sections 99 and 100 of the South Australian *Petroleum Act 2000* and Regulations 12 and 13 of the *Petroleum Regulations 2000*.

This SEO is based on a number of existing SEOs, in particular the SAPEX *Arckaringa Basin Exploration Drilling Activities Statement of Environmental Objectives* (RPS Ecos 2007), the *Statement of Environmental Objectives Drilling, Completion and Initial Production Testing,* for PEL 73 (DMS Partners LP 2007) and the *South Australia Cooper Basin Operators Statement of Environmental Objectives: Drilling and Well Operations* (Santos 2003).

1.1 Purpose

The intent of this SEO is to outline the environmental objectives that SAPEX Limited (SAPEX) are required to achieve during drilling and initial production testing activities and the criteria upon which achievement of these objectives will be assessed.

The SEO has been developed based on the information and issues identified in the *PEL 120 Drilling Activities Environmental Impact Report* (EIR) (RPS Ecos 2008).

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

1.2 Scope

This SEO applies to all of SAPEX's drilling activities in PEL120, including exploration drilling for coal seam gas (CSG) and underground coal gasification (UCG) prospects and initial production testing, as described in the Environmental Impact Report.

Figure 1 shows the location of PEL 120.

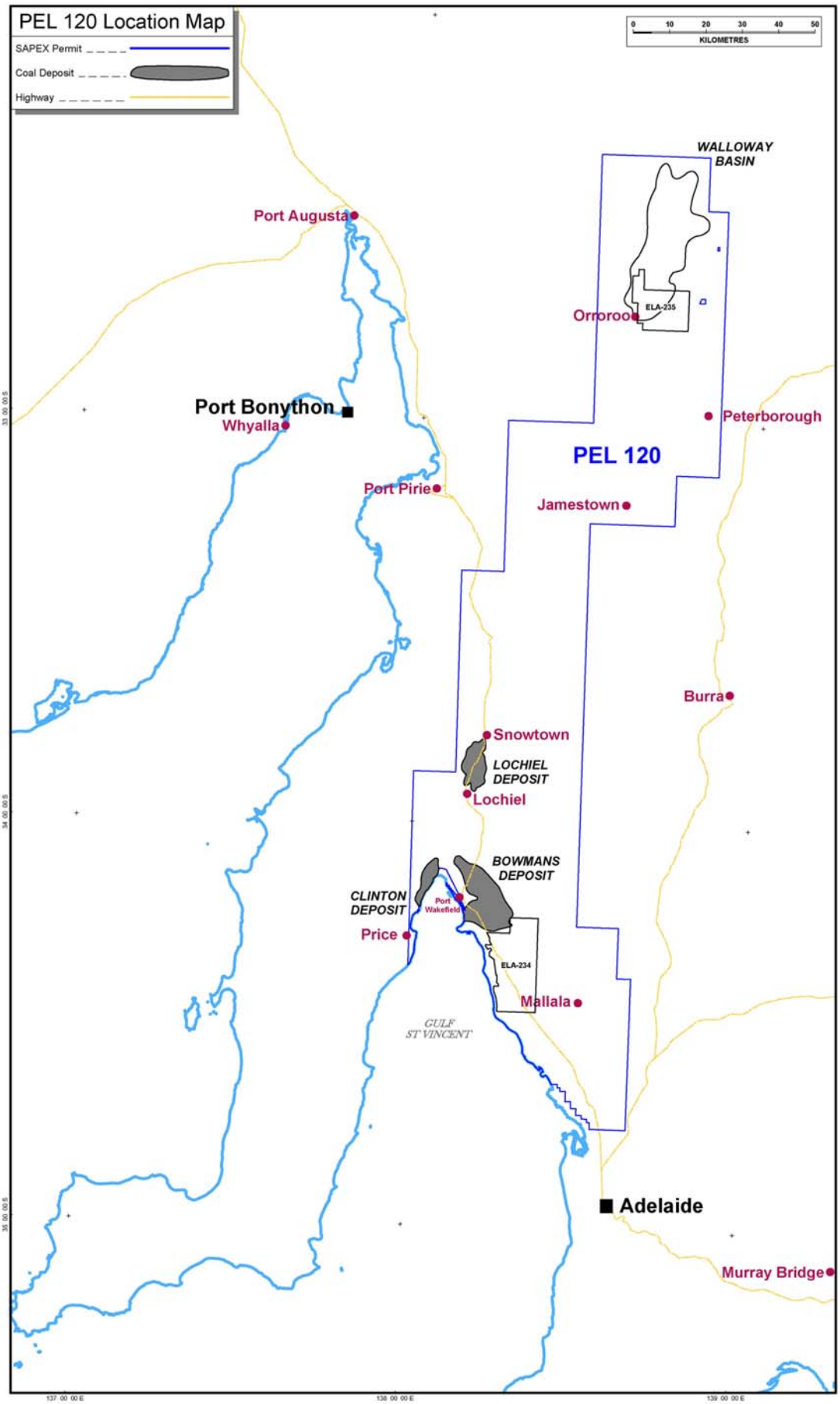
Activities covered by this SEO include:

- wellsite and access track construction
- coal seam gas drilling
- well completions and workovers
- initial production testing
- well and zonal abandonment
- site and access abandonment and remediation.

The following operations are not covered by this SEO:

- seismic exploration activities
- production and processing operations beyond initial production testing (e.g. extended production testing, underground coal gasification).

Figure 1: Location of PEL 120



2 Environmental Objectives

Relevant objectives in the Petroleum Act include:

- to minimise environmental damage from activities involved in exploration for, or the recovery or commercial utilization of, petroleum and other resources
- to establish appropriate consultative processes involving people directly affected by regulated activities and the public generally
- to protect the public from risks inherent in regulated activities.

Environmental hazards and risks of drilling and associated activities have been identified in the *PEL 120 Drilling Activities Environmental Impact Report* (RPS Ecos 2008).

The relevant environmental objectives for drilling and initial production testing which must be achieved to address the risks identified in the EIR are:

1. Avoid disturbance to sites of Aboriginal and non-indigenous heritage significance.

2. Minimise disturbance to native vegetation and native fauna.

3. Prevent the introduction or spread of weeds and undertake control measures where required.

4. Minimise impacts to soil.

5. Minimise loss of reservoir and aquifer pressures and avoid aquifer contamination.

6. Minimise disturbance to drainage patterns and avoid contamination of surface waters and shallow groundwater resources.

7. Minimise risks to the safety of the public, employees and other third parties.

8. Minimise disturbance to stakeholders and associated infrastructure.

9. Minimise visual impact.

10. Minimise the impact on the environment of waste storage, handling and disposal.

11. Remediate and rehabilitate operational areas to agreed standards.

3 Assessment Criteria

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

- defined conditions – objectives for activities that can only be managed through the prevention of unacceptable actions (e.g. "Weeds are not introduced into, or spread in, operational areas as a consequence of activities")
- defined requirements – the achievement of an objective can be assessed against the implementation of specific procedures or actions required for an activity (e.g. industry standards or Australian Standards)
- Goal Attainment Scaling (GAS) Criteria – objectives requiring visual assessment can be prone to uncertainties of subjective judgement. To minimise this occurring, GAS is used to measure such objectives against a series of criteria described by a written description and/or photographically. In this SEO, GAS is applied to wellsite construction and restoration.

Appendix 1 tabulates the objectives and corresponding assessment criteria.

4 Reporting

It is a requirement under Section 85 of the *Petroleum Act 2000* that any incidents that are determined to be 'serious' or 'reportable' incidents must be reported to the Minister.

4.1 Definitions

The following descriptions have been provided to help clarify and elaborate on the definitions given in Section 85(1) of the *Petroleum Act 2000* and Regulation 32(1) of the *Petroleum Regulations 2000*.

Serious Incidents

The Section 85(1) of the *Petroleum Act 2000* defines a 'serious incident' as an incident in which:

(a) A person is seriously injured or killed

(b) An imminent risk to public health or safety arises

(c) Serious environmental damage occurs or an imminent risk of serious environmental damage arises

(d) Security of natural gas supply is prejudiced or an imminent risk of prejudice to security of natural gas arises.

Pursuant to Regulation 12(2) of the *Petroleum Regulations 2000*, the events listed below, that may arise from drilling and initial production testing activities, are also considered to be serious incidents:

- explosion or fire at a well or loading facility
- any spill of fuel, oil or hazardous material which enters land off the wellsite or encroaches into surface water or groundwater
- transportation accident resulting in fire
- disturbance to sites of Aboriginal or non-indigenous heritage significance
- removal of rare, vulnerable or endangered flora and fauna species, without appropriate permits and approvals
- identification of crossflows in aquifers or uncontrolled flows to the surface.

Reportable Incidents

Reportable incidents are defined under Section 85(1) of the Act as an incident (other than a serious incident) arising from activities conducted under a licence that are classified under the regulations as a reportable incident.

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;

(b) an incident identified as a reportable incident under the relevant statement of environmental objectives.

Pursuant to Regulation 12(2) and Regulation 32(1) the following incidents are considered to be reportable incidents:

- a hydrocarbon or hazardous material spill that encroaches outside an area not specifically designed to contain such spills
- a reasonable complaint from a landholder in regard to drilling and initial production testing activities
- the introduction of weed species to the area as a result of drilling and production testing activities
- any detected unauthorised third party access to facilities and associated infrastructure.
- any other non-compliance with SEO objectives.

4.2 Reporting Requirements

Serious Incidents must be reported to the Minister as soon as practicable after the occurrence, as per Section 85 of the *Petroleum Act 2000* and Regulation 32 of the *Petroleum Regulations 2000*.

Reportable Incidents must be reported to PIRSA on a quarterly basis within 1 month of the end of the quarter, as per Regulation 32 of the *Petroleum Regulations 2000*.

5 References

DMS Partners LP (2007) *Statement of Environmental Objectives Drilling, Completion and Initial Production Testing. PEL 73 Stansbury Basin, Yorke Peninsula, South Australia*. January 2007.

EPA (2007) Bunding and Spill Management. EPA Guidelines 080/07. South Australian Environment Protection Authority. Updated June 2007. http://www.epa.sa.gov.au/guidelines.html

Fatchen T.J. and Woodburn J.A. (1997). Criteria for the abandonment of seismic lines and wellsites in the South Australian portion of the Cooper Basin: Identification and evaluation of assessment criteria. Report for MESA. South Australia. Department of Primary Industries and Resources. Open File, DME 389/1994 (unpublished).

PIRSA (2002) *Field Guide for the Environmental Assessment of Abandoned Petroleum Wellsites in the Cooper Basin, South Australia*. Petroleum Group, Office of Minerals and Energy Resources South Australia, February 2002.

RPS Ecos (2008). *PEL 120 Drilling Activities Environmental Impact Report.* Prepared for SAPEX Ltd, March 2008.

RPS Ecos (2007). *Arckaringa Basin Exploration Drilling Activities Statement of Environmental Objectives.* Prepared for SAPEX Ltd, October 2007.

Santos (2003) *South Australia Cooper Basin Operators Statement of Environmental Objectives: Drilling and Well Operations*. Prepared for South Australia Cooper Basin Operators, November 2003.

South Australian Health Commission (1995). *Standard for the Construction, Installation and Operation of Septic Tank Systems in South Australia.* South Australian Health Commission Code, March 1995.

Appendix 1:

Environmental Objectives and Assessment Criteria

Environmental Objectives and Assessment Criteria

Objective	Assessment Criteria	Guide to How Objectives Can Be Achieved	Comment
1. Avoid disturbance to sites of Aboriginal and non-indigenous heritage significance.	No impact to sites of Aboriginal or non-indigenous heritage significance without approval under the *Aboriginal Heritage Act 1988* and *Heritage Places Act 1993*.	Documents and/or reports of scouting for cultural/heritage are available for review. Known heritage sites have been identified and protected from operations (e.g. temporary flagging). A procedure is in place for the appropriate response to any sites discovered during drilling activities. Reports of any accidental discoveries during drilling activities are available for review. Records of sites forwarded to the Aboriginal Heritage Branch in compliance with the Aboriginal Heritage Act. Consult with Heritage Branch, DEH[1] regarding location of non-indigenous heritage sites.	The aim of this objective is to ensure that any sites of Aboriginal and European heritage significance are identified and protected. Newly discovered sites must be reported to the appropriate authorities.
2. Minimise disturbance to native vegetation and native fauna.	<u>Well Lease and Access Track Construction and Restoration</u> Any sites of rare, vulnerable and endangered flora and fauna have been identified, flagged and subsequently avoided. Significant remnant vegetation has not been cleared without specific consultation with PIRSA, Native Vegetation Council and DEH prior to activity approval. The attainment of either 0, +1 or +2 GAS criteria for 'Minimise disturbance to native vegetation' objective for wellsite construction listed in Appendix 2. The attainment of 0, +1 or +2 GAS criteria for "Re-establish native vegetation on abandoned wellsites and access tracks" objective where the re-vegetation of native species is required listed in Appendix 2. <u>Drilling and Initial Production Testing</u> No fires during drilling activities. <u>Fuel and Chemical Storage and Handling</u> Refer to Assessment Criteria for Objective 4. <u>Waste Management</u> Refer to Assessment Criteria for Objective 10.	<u>Well Lease, Access Track and Camp Site Construction and Restoration</u> Appropriately trained and experienced personnel have scouted proposed wellsites (including sump and flare pit) and access tracks and campsites for purpose of identifying and flagging significant (or rare, vulnerable and endangered) flora and fauna. Vegetation clearance has been minimised and the conservation needs of specific species have been considered. Exploration activity is avoided in significant remnant vegetation areas (including coastal saltmarsh and mangrove areas) or Vegetation Heritage Agreement areas unless there is consultation with PIRSA, Native Vegetation Council and DEH prior to activity approval. If drilling is in close proximity to a Conservation Park and indirect impacts are likely, consultation is undertaken with DEH to determine appropriate management measures. Well sites are not constructed in locations where they are likely to impact the marine environment. Documents and/or reports of scouting for flora/fauna are available for review. Facilities (e.g. well cellars) are designed and constructed as far as practicable to minimise fauna entrapment. Sumps and mud pits are fenced as appropriate to minimise wildlife access. <u>Drilling and Initial Production Testing</u> Confinement of flammable sources, restrictions on certain procedures	The predominant land use in the region is agriculture (broad acre cropping and livestock grazing) and as a consequence most of the region has been cleared of native vegetation. Remnant vegetation is still present in isolated areas (e.g. road corridors, reserves, etc) Wellsites will be located to minimise the clearing of native vegetation.

Objective	Assessment Criteria	Guide to How Objectives Can Be Achieved	Comment
		and ready access to suitable fire fighting equipment. Where necessary, construction of a fire break around wellsite area and access track. Response to fire included in Emergency Response Plan. All personnel are fully informed on the fire danger season and associated restrictions Fire risk included in induction. Fire equipment maintained at wellsite and camp. <u>Fuel and Chemical Storage and Handling</u> Refer to Objective 4. <u>Waste Management</u> Refer to Objective 10. <u>Fauna Management</u> No domestic pets allowed at worksites or camps. Feeding of wildlife not permitted.	
3. Prevent the introduction or spread of weeds and undertake control measures where required.	Weeds are not introduced into, or spread in, operational areas as a consequence of activities	Appropriate consultation regarding weeds undertaken in advance with landholders and NRM Board officers / General Manager. All vehicles and equipment appropriately cleaned prior to entering drill sites. Cleaning to be carried out in accordance with best practice guidelines. Records of vehicle and equipment cleaning are kept and available for review. The site and access will be monitored on a regular basis for new weed species and treated as necessary following discussions with the regional NRM Board and the landholder. Records of detection, monitoring or eradication of exotic weeds or noxious species introduced by industry activities are kept and are available for review.	The major potential source of weed introduction is from vehicles and equipment brought in from other regions of the state or interstate for the various well activities.
4. Minimise impacts to soil.	<u>Wellsite and Access Track Construction</u> The attainment of 0, +1 or +2 GAS criteria for 'Minimise impacts to soil' objective listed in Appendix 2. No construction activities are carried out on salt lakes, steep slopes or in areas of boggy coastal soils. <u>Drilling and Initial Production Testing</u> No soil contamination as a result of drilling activities.	Planning has been undertaken to minimise impacts of operations and records are available for review. There is no evidence of off-road driving or creation of shortcuts. <u>Wellsite and Access Track Construction and Restoration</u> Orientate site constructions to minimise soil removal Separate topsoil and sump spoil stockpiles Soil removed in construction to be stored on site and returned to its original stratigraphic level upon restoration of the drill site. Compacted soil areas ripped where appropriate and soil profile and	The impacts associated with soil disturbance include wind and water erosion and dust generation. The main impact to soil is caused by the removal of existing soil and/or the importation of foreign material for the construction of the site. The excavation and subsequent backfill of the sump may also lead to the inversion or mixing of topsoil and sub-soils. This creates a visual impact and can also alter the soil

Objective	Assessment Criteria	Guide to How Objectives Can Be Achieved	Comment
	Fuel and Chemical Storage and Handling Soil in areas affected by any spill is removed and/or bioremediated. No soil contamination as a result of fuel and chemical storage and handling. Waste Management Refer to Assessment Criteria for Objective 10.	contours are reinstated following completion of operations. Oil spill areas have been ripped to an appropriate depth. Drilling and Initial Production Testing Sump to have sufficient capacity. Camp and drill rig generators to be located in polyethylene lined bunded areas to contain any spills. Bunded areas must have sufficient freeboard (e.g. to hold a 1:25 year, 24hr rainfall event) All bunded areas will be in accordance with EPA guidelines *080/07 Bunding and Spill Management*. MSDS information readily available on the wellsite. Fuel and Chemical Storage and Handling Hazardous material stored, used and disposed of in accordance with relevant legislation on dangerous substances. All hazardous materials including fuels, oils and chemicals are to be stored in approved containers in polythene lined bunded pits or on bunded pallets. Initial production lines and tanks to be inspected prior to use. No refuelling outside designated refuelling/servicing areas. Appropriate spill response equipment is available on site. Personnel have received training in the use of spill response equipment. Spills or leaks are immediately reported and clean up actions initiated. All contaminated soil will either be treated in-situ or removed. Records of spill events and corrective actions are maintained. All fuel and chemical storage areas will be in accordance with EPA guidelines *080/07 Bunding and Spill Management*. Waste Management Refer to Objective 10.	characteristics that can in turn impact on the effective re-establishment of crops or native vegetation. Wellsites will be positioned and orientated to minimise soil removal. Removed soil will be stored according to its position in the ground and will be returned to the excavation in the correct order. Another potential impact to soil is soil contamination from accidental spillages of chemicals or hazardous substances during drilling operations. Precautions will be taken to prevent and contain spills at all sites where fuels are used or transferred (generators, vehicle refuelling). Bunds shall be used or constructed for the storage of hazardous materials (including fuel, oil and chemicals). All waste removal contractors will be licensed and will operate within EPA guidelines.
5. Minimise loss of reservoir and aquifer pressures and avoid aquifer contamination.	No aquifer contamination as a result of drilling, completion or production testing activities. Drilling and Completion Activities No uncontrolled flow to surface (i.e. blow out). Sufficient barriers exist in casing annulus to prevent crossflow between separate aquifers or hydrocarbon reservoirs. Initial Production Testing and Well Abandonment	Drilling and Completion Activities Observed volumes of cement return to surface match calculations. Where there is evidence of insufficient isolation, remedial action to be conducted. Well Abandonment Activities Isolation barriers to be set in place to ensure that crossflow, contamination or pressure reduction does not occur. Records of plug depths and intervals are kept.	This objective seeks to protect the water quality and pressure of any aquifers and to maintain pressure in potential hydrocarbon aquifers.

Objective	Assessment Criteria	Guide to How Objectives Can Be Achieved	Comment
	Activities No crossflow behind casing between aquifers, and between aquifers and hydrocarbon reservoirs unless approved by the Department of Water, Land and Biodiversity Conservation.		
6. Minimise disturbance to drainage patterns and avoid contamination of surface waters and shallow groundwater resources.	Well Lease and Access Track Construction and Restoration Wellsites and access tracks are located to maintain pre-existing water flows (i.e. channel contours are maintained on floodplains and at creek crossings). The attainment of 0, +1 or +2 GAS criteria for 'Minimise disturbance to drainage patterns' objective listed in Appendix 2. Drilling and Initial Production Testing No contamination of surface waters and shallow groundwater resources as a result of drilling activities. Fuel and Chemical Storage and Handling No contamination of surface waters and shallow groundwater resources as a result of fuel or chemical storage and handling. Waste Management Refer to Assessment Criteria for Objective 10.	Wellsite and Access Track Construction and Restoration All access through watercourses areas carefully assessed to determine the locations of least impact. Any soil removed during the construction of the drill pad will be respread over the disturbed area during restoration. Any required remediation work carried out as soon as possible after completion of all activities. If any contamination from spillage of oils or fuel occurs, immediate effective clean-up procedures must be employed. Well sites are not constructed in locations where they are likely to impact the marine environment. Drilling and Completion Activities Information on muds and chemicals to be readily available on the rig. All drill cuttings, muds and non-toxic drill fluids are to be contained within a designated sump with adequate freeboard at completion of operations to allow for a 0.5m cover of clean fill at remediation. On completion of drilling the sump will be allowed to dry out and then backfilled level with the surrounding landscape. Fluid losses will be controlled during drilling. Where shallow aquifers present mud pits will be lined with impervious material e.g. polyethylene. Drilling and Initial Production Testing Sump to have sufficient capacity. Camp and drill rig generators to be located in polyethylene lined bunded areas to contain any spills. Fuel and Chemical Storage and Handling Appropriate spill response equipment is available on site. Refer to Objective 4. Waste Management Refer to Objective 10.	The main threats to drainage patterns, surface waters and shallow groundwater resources are considered to be contamination, as a result of spills, and interruption to natural drainage flows as a result of earthworks and drilling operations. Access track and wellsite selection will aim to minimise impact to drainage systems, by avoiding sensitive areas and appropriate construction methods. There is potential for the contamination of chemical and fuel storage areas, well heads, during transportation of fuel and chemicals and during transportation of wastes. Localised contamination may result from spills or leaks during storage and handling. The major threat of spills is the threat to soil, vegetation and watercourses directly impacted by the spill. Avoidance of spills will be paramount in areas where the spill can be potentially spread beyond the immediate confines of the spill area into sensitive environments such as creeks and wetlands.

Objective	Assessment Criteria	Guide to How Objectives Can Be Achieved	Comment
7. Minimise risks to the safety of the public, employees and other third parties.	No injuries to the public or third parties as a result of drilling, completion and initial production testing activities.	Unauthorised Access by Third Parties "No Entry" signs warning of dangers associated with drilling operations placed at the entry to the site access track. Drilling and Completion Activities Drill rig, ancillary and any testing equipment to comply with Regulations, meet relevant industry standards and be "Fit for Purpose". Casing design carried out to meet worst case expected loads and environmental conditions determined for the specific geology intercepted by the well. Details of work to be performed are set out in the Drilling Program. Casing set in accordance with design parameters. Casing cemented to surface with visible return. Blow out prevention precautions / well control equipment in place in accordance with defined procedures and appropriate to the expected downhole conditions. Satisfactory kick tolerance in casing program design. Emergency Response Procedures in place. Confinement of flammable sources, restrictions on certain procedures and ready access to suitable fire fighting equipment. Well Abandonment Activities Downhole abandonment is carried out to meet worst case expected loads and downhole environmental conditions. Effective isolation maintained between any potential aquifers to prevent crossflow. Vehicle Movement Control production and dispersion of dust on unsealed roads and drilling lease areas. Compliance with relevant speed restrictions on access roads and tracks. Wellsite Restoration Activities Assessment of the threat to third parties from well completion / downhole abandonment. Necessary measures (e.g. fencing, signage) taken to prevent the public accessing the wellhead equipment or waste relating to the well. Effective rehabilitation of the wellsite so that potentially dangerous perturbations in ground level do not remain.	The guide to how to achieve this objective has been developed on the basis of the current understanding of the risks of wells to third party safety. Risks may span in time from immediate (e.g. unauthorised access, abandoned waste), to long term (e.g. breakdown over time of cement integrity around casing allowing crossflow). All reasonable steps will be taken to prevent unauthorised access to the site and warning signs will be appropriately located. The key to achieving the third party safety objective in relation to both downhole abandonment and surface wellsite restoration is to ensure that the visual prominence of the abandoned wellsite and access track is minimised to the extent where it is difficult for third parties to detect and therefore access the site. Fires or explosions at wellsites could result in complications resulting atmospheric emissions, disturbance of native vegetation and wildlife habitat and risk to employees, contractors and the public. The movement of heavy equipment associated with rig moves present a risk to the safety of employees, contractors and third parties (i.e. local residents). Abandonment plugs must be set to ensure long term isolation of any potential aquifers intersected or shallow zones may become over-pressured.

Objective	Assessment Criteria	Guide to How Objectives Can Be Achieved	Comment
8. Minimise disturbance to stakeholders and associated infrastructure.	No adverse impact (outside agreed disturbance/compensation areas) on livestock or crops as a result of activities. No reasonable concerns raised by stakeholders are left unresolved.	Induction for all employees and contractors to cover land use, infrastructure and legislation issues. Gates or stock grids are installed to a standard, consistent with farming infrastructure in fences where crossings are required for access. All gates left in the condition in which they were found (i.e. open/closed). Potential sources of contamination are fenced as appropriate to prevent stock access. System is in place for logging landholder complaints to ensure that issues are addressed as appropriate. In the event of an oil spill, contingency plan to be implemented after the spill event.	Communication and the establishment of good relations with landholders, stakeholders and community is fundamental to minimising disturbance to as low as practicably possible.
9. Minimise visual impact.	The attainment of 0, +1 or +2 GAS criteria for 'Minimise visual impact' objective for wellsite restoration listed in Appendix 2.	Soil removed in construction to be stored on site and returned to its original stratigraphic level upon restoration of the drill site. Compacted soil areas ripped and soil profile and contours are reinstated following completion of operations. Rehabilitation/abandonment plans for surface activities will be developed in consultation with relevant stakeholders. In some circumstances (e.g. where a landholder plans to utilise areas used for drilling for a specific purpose), agreed rehabilitation may vary from the outcomes indicated in Appendix 2.	Fatchen and Woodburn (1997) study concluded that the predominant impacts of wellsite and access track construction are predominantly visual and not ecological. On the basis of this study a set of assessment criteria was established for assessing rehabilitation of abandoned and restored wellsites and access tracks (PIRSA 2002 Field Guide) which have been used as the basis for criteria contained in Appendix 2.
10. Minimise the impact on the environment of waste storage, handling and disposal.	No soil, surface water or ground water contamination as a result of waste storage and disposal. All wastes have been disposed of at an EPA licensed facility with the exception of drilling fluids, drill cuttings and other fluids disposed during well clean-up. The attainment of 0, +1 or +2 GAS criteria for 'Site to be left in a clean, tidy and safe condition' objective for wellsite restoration listed in Appendix 2.	Covered bins are provided for the collection and storage of wastes. All loads of rubbish are covered during transport to an approved waste facility. Waste streams segregated on site and transported to appropriate facilities to maximise waste recovery, reuse and recycling. Sewage (e.g. from portable toilet) removed and appropriately disposed off site by a licensed waste contractor. Note: The *Public and Environmental Health (Waste Control) Regulations 1995* govern waste water disposal. Production of waste is minimised by purchasing reusable, biodegradable or recyclable materials where practical.	Bins are covered to prevent access by fauna and the spread of rubbish by wind. Waste reduction requires continual improvement in purchasing, efficiency of use and reuse. Ongoing review of recycling options is required to ensure that improvements are implemented as far as practical. Responsible handling and disposal of waste will reduce both short-term and long-term impacts of waste on the environment.

Objective	Assessment Criteria	Guide to How Objectives Can Be Achieved	Comment
11. Remediate and rehabilitate operational areas to agreed standards.	Well Lease and Access Track Restoration The attainment of 0, +1 or +2 GAS criteria for 'Minimise visual impact', 'Re-establish native vegetation on abandoned wellsites and access tracks' where the revegetation of native species is required and 'Site to be left in a clean, tidy and safe condition' objectives listed in Appendix 2.	Refer to Objectives 2, 4, 5, 6, 7, 8, 9, 10. Rehabilitation/abandonment plans for surface activities will be developed in consultation with relevant stakeholders.	Refer to Objectives 2, 4, 5, 6, 7, 8, 9, 10.

[1] DEH – Department for Environment and Heritage, South Australia

Appendix 2:

Goal Attainment Scaling Criteria

GAS Criteria for Wellsite Construction and Restoration

Objectives	Measure Associated Goals	Goal Exceeded +2	Goal Exceeded +1	Goal Attained 0	Minor Shortfall - 1	Significant Shortfall - 2
CONSTRUCTION						
Minimise impacts to soil	Topsoil stockpiled and separated from sump/trench spoil			Separate topsoil, cleared vegetation and spoil stockpiles present at well lease and campsite.	Topsoil and spoil stockpile mixing evident.	No stockpiled topsoil evident.
Minimise disturbance to native vegetation[(a)]	Impact on native vegetation			No native vegetation removed or native vegetation of low conservation significance removed in area where could not have been avoided.	Native vegetation of moderate conservation significance removed or native vegetation of low conservation significance removed in area where could have been avoided.	Native vegetation of high conservation significance or mature trees removed.
Minimise disturbance to drainage patterns	No obstruction of water flows			No obstruction of water flows or minor flows diverted around the well lease if required.	Minor channels only obstructed during well lease and access track construction.	Water flows obstructed as a result of earthworks.
RESTORATION						
Minimise visual impact	Wellsite restoration	The site contours and colour blend with the surroundings and earthwork disturbance is indistinguishable from the surroundings.	The earthwork disturbance is beginning to blend into the surroundings.	The site contours and colour blend with the surroundings; but earthwork disturbance (e.g. ripping or respreading of original material) is still prominent.	The site surface and edge have been contoured into the surrounding landscape, but the colour of foreign material contrasts with the surroundings.	The site remains as a prominent consolidated surface with a distinct edge.
	Access track restoration	The track contours and colour blend with the surroundings and the earthwork disturbance is indistinguishable.	The track contours and colour blend with the surroundings and the earthwork disturbance is beginning to blend also.	The track contours and colour blend with the surroundings, but the earthwork disturbance (e.g. ripping, rolling or respreading of original material) is still prominent.	The track surface has been contoured into the surrounding landscape, but the colour of foreign material contrasts with the surroundings.	The track is prominent because of a scraped surface, windrows along its edges or gully erosion.

Objectives	Measure Associated Goals	Goal Exceeded +2	Goal Exceeded +1	Goal Attained 0	Minor Shortfall - 1	Significant Shortfall - 2
Re-establish native vegetation on abandoned wellsites and access tracks[(b)]	For wellsites where it has been less than 5 years since restoration	The revegetation is extensive and mostly consists of annuals and short-lived species. Longer-lived species which are consistent with the surroundings are beginning to establish. There are very few or no weeds.	The revegetation is extensive and consists of annuals and short-lived species. In contrast to the surroundings, there are few or no longer-lived species. The presence of weeds is consistent with (or better than) surrounding areas.	Colonisation of the original species is starting to occur.	Very few or no native species are recolonising. Weeds are much more abundant than in surrounding areas.	No revegetation is occurring.
	For wellsites where it has been more than 5 years since restoration	The revegetation type, density and maturity is indistinguishable from the surroundings. There are very few or no weeds.	The revegetation is reasonably consistent with the surroundings, but there is contrast in maturity between them. The presence of weeds is consistent with (or better than) surrounding areas.	The revegetation consists of annuals and perennials but there are some bare or weedy patches which are inconsistent with the surroundings.	The revegetation mostly consists of annuals and short-lived species. In contrast to the surroundings, there are few long-lived species. Weeds are significantly more abundant and dominant than in surrounding areas.	No revegetation evident.
Site to be left in a clean, tidy and safe condition	Well marked and cellar backfilled			Cellar backfilled and marker installed.	Cellar backfilled but no marker installed.	Cellar not completely backfilled.
	Rubbish removed			No evidence of litter on site.	Small items of litter spread over less than 50% of the site (e.g. tin cans, nuts & bolts, rags, small pieces of cable, wood).	Large items of litter present across site (e.g. drums, pieces of casing, cables) or small items of litter spread over more than 50% of the site.

Notes:

(a) The categories of low, moderate and high conservation significance will need to be assessed on a site-specific basis, taking into account factors such as vegetation condition, conservation status of species and plant communities present, habitat value and level of native vegetation remnancy in the region. Vegetation containing species listed as threatened would be considered high conservation significance. In addition, departure from the GAS criteria would be acceptable if agreed during consultation with PIRSA, DWLBC and DEH (see Objective 2 in the SEO).

(b) These “Re-establish native vegetation...” criteria are only applicable where native vegetation has been cleared and do not apply to highly degraded or cleared sites. It may also be necessary to develop further GAS criteria for evaluating revegetation at specific sites or vegetation types.

(c) If any criterion within a -1 or -2 cell occurs, then a score of -1 or -2 will be allocated.

(d) For 0, +1 and +2 cells, all relevant criteria (dot point) within the cell must be satisfied to score at that level.

(e) 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.