



## **STATEMENT OF ENVIRONMENTAL OBJECTIVES**

### **Cooper Basin Petroleum Production Operations**



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# 1 Introduction

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

## 1.1 Purpose

The intent of the SEO is to outline the environmental objectives to which the petroleum production activities will conform.

The objectives of this SEO have been developed on the basis of information and issues identified in the Environmental Impact Report (EIR) (Beach 2016), and are in keeping with the objectives of the Petroleum and Geothermal Energy Act, which include:

- to minimise environmental damage from the activities involved in exploration and recovery or commercial utilisation of petroleum and other regulated 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.

## 1.2 Scope

Beach Energy Limited (Beach) has interests in a number of Petroleum and Geothermal Energy Act licences in the South Australian Cooper Basin, including Petroleum Exploration Licence (PEL), Petroleum Retention Licence (PRL) and Petroleum Production Licence (PPL) areas. Figure 1 shows the location of Beach's licence areas.

This SEO (and the EIR) have been written to address both current and potential future production activities in all land systems in the Cooper Basin, in order to develop a SEO that will encompass reasonably foreseeable future activities over the lifetime of the SEO.

This SEO applies to all Beach production operations in the South Australian sector of the Cooper and Eromanga basins. Operations that are covered by this SEO include:

- well operations (after drilling has finished) including completions and workovers, well integrity management, artificial lift and wellhead production equipment, gas well deliquification and downhole abandonment following production
- oil and gas production facility construction, operation, maintenance and abandonment (including extended production test facilities, camps and operational areas such as laydowns)
- produced formation water disposal operations
- waterflood activities (for enhanced oil recovery) and produced water reinjection
- pipeline, trunkline and flowline construction, operation and abandonment
- road construction, maintenance and restoration
- aircraft landing area construction, maintenance and restoration
- oil transport
- waste management, landfill and land treatment unit operations
- decommissioning / rehabilitation.

These operations are described in detail in the EIR (Beach 2016).

Well operations (after drilling has finished) have been specifically added to the scope of the revised EIR and this revised SEO. Well operations are managed by the Beach production team (which takes

over a well once a well is cased and the drilling rig leaves the site). Coverage of well operations in this SEO along with the other activities the production team manages, rather than coverage in another SEO, provides a more streamlined and internally consistent approach.

This SEO and corresponding EIR do not apply to:

- well site and access track construction
- drilling activities
- fracture stimulation
- downhole abandonment following drilling
- restoration of well sites and access tracks
- seismic operations.

These activities are covered by other SEOs. The relevant SEOs in place at the time of preparation of this document are:

- *South Australia Cooper Basin Statement of Environmental Objectives: Drilling, Completions and Well Operations* (Santos 2015)
- *Statement of Environmental Objectives for Geophysical Activities in the Cooper Basin, South Australia* (DSD 2014a)
- *Statement of Environmental Objectives: Fracture Stimulation of Deep Shale Gas and Tight Gas Targets in the Nappamerri Trough (Cooper Basin), South Australia* (Beach 2012).

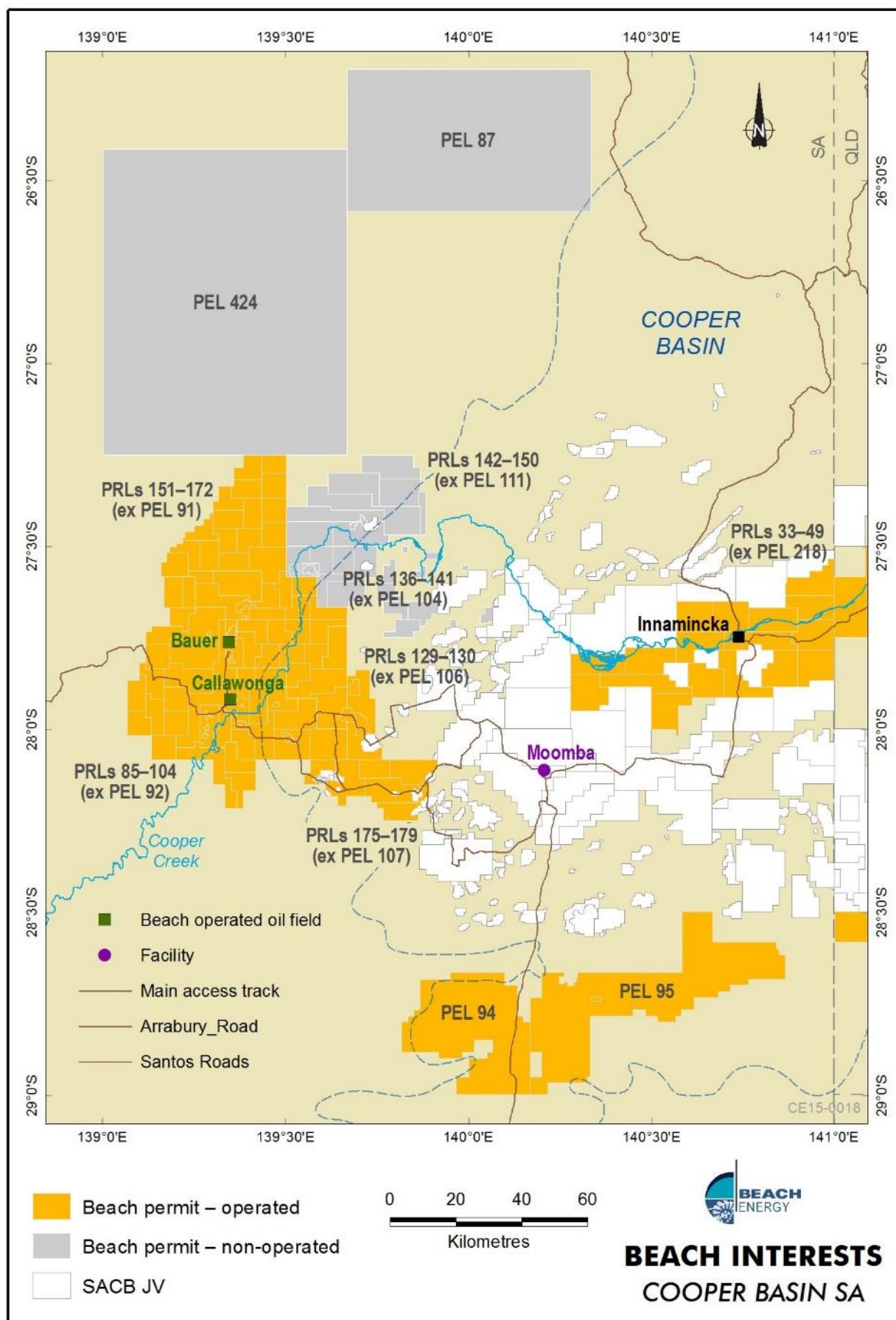


Figure 1: Beach Cooper Basin licence areas (April 2015)

## 2 Environmental Objectives

Potential environmental hazards and consequences associated with production operations in the Cooper and Eromanga Basins have been identified in the Environmental Impact Report (Beach 2016). Beach is committed to achieving a range of environmental objectives in regard to these potential hazards.

The objectives for the environmental management of petroleum production operations are provided in Appendix A.

## 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 operational activities that can only be managed through the prevention of unacceptable actions (e.g. ‘No production activities undertaken on salt lakes or steep tableland land systems’).
- Defined requirements - the achievement of an objective can be assessed against the implementation of specific procedures or actions required for an activity (e.g. ‘Terrain profiles at pipeline dune crossings have been restored consistent with surrounding profiles’).
- Goal Attainment Scaling (GAS) criteria – Environmental objectives requiring visual assessment are likely to 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. GAS is applicable to measuring objectives related to minimisation of disturbances in relation to the construction, management and rehabilitation of borrow pits (Appendix B).
- Scientific studies / monitoring – in some cases, the 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.

Appendix A tabulates the objectives and details management measures considered appropriate to meet the objectives and the appropriate assessment criteria to determine if compliance with the objectives has been achieved.

The management measures provide a high level overview of systems, activities and / or procedures that Beach have developed or implemented to achieve the environmental objectives. Detailed operational procedures (including environmental controls) are contained in Beach Health, Safety and Environment system documentation.

## 4 Reporting

It is a requirement under Section 85 of the Petroleum and Geothermal Energy Act that any ‘serious’ and ‘reportable’ incidents as defined under that Act must be reported to the Minister.

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

**Reportable Incidents** must be reported to the Department of State Development (DSD) on a quarterly basis within one month of the end of the quarter, as per Regulation 32 of the Petroleum and Geothermal Energy Regulations.

#### 4.1 Incident Definitions

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 Act. Table 1 identifies the potential serious and reportable incidents relevant to production activities. These definitions are based on standard definitions for facilities and pipelines developed by DSD, which are intended to expand on definitions provided in Section 85(1) of the Act and Regulation 32(1), and provide consistency for Licensee reporting.

In accordance with Section 85 of the Act and 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 Act as incidents (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 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.

#### 4.2 Reporting to the EPA

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

The Environment Protection Act and its reporting obligation do not apply to:

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



**Table 1: Incident descriptions**

Serious Incidents	Reportable incident
<ol style="list-style-type: none"> <li>1. A person is seriously injured<sup>1</sup> or killed.</li> <li>2. An imminent risk to public health or safety arises.</li> <li>3. Serious environmental damage occurs or an imminent risk of serious environmental damage arises. For example:               <ol style="list-style-type: none"> <li>a. Damage, disturbance or interference to sites of cultural and / or heritage significance without appropriate permits and approvals.<sup>2</sup></li> <li>b. 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 and fauna species.</li> <li>c. Detection of a declared weed, animal / plant pathogen or plant pest species that has been introduced or spread as a direct result of activities.</li> <li>d. Any removal of rare, vulnerable or endangered flora and fauna without appropriate permits and approvals.<sup>3</sup></li> <li>e. Identification of cross flows between aquifers in natural hydraulic isolation, or uncontrolled flows to the surface.</li> </ol> </li> <li>4. Security of natural gas supply is prejudiced or an imminent risk of prejudice to security of natural gas supply arises.<sup>4</sup></li> <li>5. An event that results in a rupture of a pressure containing asset or facility.</li> <li>6. A regulated activity<sup>5</sup> 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 hazard.<sup>6</sup></li> <li>7. Activity on a pipeline easement where the pipeline is contacted and repair action is required.<sup>7</sup></li> <li>8. An uncontrolled gas release resulting in the activation of emergency response and / or evacuation procedures of an area in or adjacent to the gas release, and / or fire or explosion.</li> </ol>	<ol style="list-style-type: none"> <li>1. An escape of petroleum<sup>8</sup>, processed substance, a chemical or a fuel that affects an area that has not been specifically designed to contain such an escape<sup>9</sup> (other than a serious incident).</li> <li>2. Any event where an incursion outside a culturally cleared area has occurred or the conditions of a Work Area Clearance have not been complied with (other than a serious incident).</li> <li>3. An event that has the potential to compromise the physical integrity of an asset or facility. For example:               <ol style="list-style-type: none"> <li>a. Activity on a pipeline easement with equipment that has been identified<sup>7</sup> as exceeding the pipeline's penetration resistance, determined in accordance with Australian Standard (AS) 2885.</li> <li>b. Identification of a through-wall defect on a pipeline<sup>10</sup> or plant component (other than a serious incident).</li> <li>c. Identification<sup>11</sup> of a partial through-wall defect (e.g. through visual inspection, inline inspection, non-destructive testing) that requires repair or replacement action, or a reduction of the Maximum Allowable Operating Pressure, to maintain safe operation (other than a serious incident).</li> <li>d. Activity on a pipeline easement with equipment or vehicles that have been identified<sup>7</sup> as exceeding allowable stress limits, determined in accordance with Australian Standard (AS) 2885.</li> <li>e. An unapproved<sup>12</sup> excursion outside of critical design or operating conditions / parameters.</li> <li>f. Failure of a critical procedural control in place to reduce a credible threat to low or as low as reasonably practicable (ALARP).<sup>13</sup></li> </ol> </li> <li>4. Unauthorised activity on a pipeline easement where the pipeline is contacted but repair action is not required.</li> <li>5. Malfunction or failure of critical plant or equipment that had (or still has) potential to cause a serious incident.</li> </ol>

<sup>1</sup> As per the definition in Section 36 of the *Work Health and Safety Act 2012*.

<sup>2</sup> Pursuant to *Aboriginal Heritage Act 1988* and *Heritage Places Act 1993*.

<sup>3</sup> Pursuant to *Native Vegetation Act 1991* (flora) and *National Parks and Wildlife Act 1972* (fauna).

<sup>4</sup> That is, after taking into account relevant factors on a day and rights and obligations under contracts, a significant curtailment of firm service that detrimentally impacts or is likely to impact upon the security of electricity supply to South Australia or to gas supplies to a significant number of commercial and/or domestic gas users in SA.

<sup>5</sup> Regulated activity as defined in Section 10 of the *Petroleum and Geothermal Energy Act*.

<sup>6</sup> Resulting in the issuing of a prohibition notice by SafeWork SA pursuant to Section 195 of the *Work Health and Safety Act 2012*.

<sup>7</sup> For the case where a detailed assessment is required to determine this, DSD recommends the incident be reported initially and amended at a later date if required.

<sup>8</sup> In gaseous, liquid or solid state, as per *Petroleum and Geothermal Energy Act* definition.

<sup>9</sup> 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.

<sup>10</sup> As per *Petroleum and Geothermal Energy Act* definition, the term 'pipeline' includes tanks, machinery and equipment necessary for, or associated with, operation of the pipeline.

<sup>11</sup> For reporting purposes, the incident is considered to have occurred at the time that a decision is made to repair or replace the defect, or reduce the Maximum Allowable Operating Pressure as defined in AS2885.

<sup>12</sup> "Approval" as per AS2885 definition. Note that there may be situations where excursions are allowable under AS2885.

<sup>13</sup> As per the Safety Management System process articulated in Australian Standard (AS) 2885.1-2012, or similar risk assessment process.

## 5 Glossary

ALARP	as low as reasonably practicable
ANZECC	Australian and New Zealand Environment Conservation Council (in reference to the <i>Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000</i> )
AS 1940	Australian Standard AS 1940 Storage and Handling of Flammable and Combustible Liquids
AS 2885	Australian Standard AS 2885 Pipelines – Gas and liquid petroleum
AS 3000	Australian Standard AS 3000: Electrical installations
BOP	blowout preventer
contamination	As defined by the <i>Environment Protection Act 1993</i> and the <i>National Environment Protection (Assessment of Site Contamination) Measure (1999) amended in 2013</i>
DEWNR	Department of Environment, Water and Natural Resources (formerly DWLBC)
DSD	Department of State Development (formerly DMITRE) (regulator of the Petroleum and Geothermal Energy Act)
EPA	Environment Protection Authority (South Australia)
EIR	Environmental Impact Report prepared in accordance with Section 97 of the <i>Petroleum and Geothermal Energy Act 2000</i> and Regulation 10
ERP	Emergency Response Plan
GAS	Goal Attainment Scaling
HSEMS	Health, Safety and Environment Management System
minimise	To reduce as far as reasonable practical, considering all other factors e.g. requirements for safe operations and accessibility
NEPM	<i>National Environment Protection (Assessment of Site Contamination) Measure (1999)</i> amended in 2013
NRM	Natural Resources Management
NVC	Native Vegetation Council
PFW	produced formation water
Pig	Device inserted into a pipe to clean the internal sections of a pipe or to detect damage or metal loss within the pipe
POM	Production Operations Manual
SEB	significant environmental benefit
SEO	Statement of Environmental Objectives prepared in accordance with Section 99 and 100 of the <i>Petroleum and Geothermal Energy Act 2000</i> and Regulations 12 and 13
THPS	TetrakisHydroxymethylPhosphonium Sulfate (a biocide)
TRH	total recoverable hydrocarbons
WAC	Work Area Clearance

## 6 References

ANZECC (2000). Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Environment Conservation Council.

Beach Petroleum (2003). *Environmental Impact Report: Cooper Basin Petroleum Production Operations*. Beach Petroleum, Adelaide.

Beach Petroleum (2008) *Addendum to the Environmental Impact Report: Cooper Basin Petroleum Production Operations. Five Year Review of the Statement of Environmental Objectives*. Beach Petroleum, Adelaide. September 2008

Beach (2012). Statement of Environmental Objectives: Fracture Stimulation of Deep Shale Gas and Tight Gas Targets in the Nappamerri Trough (Cooper Basin), South Australia. August 2012. Beach Energy, Adelaide

Beach (2016). Environmental Impact Report Cooper Basin Petroleum Production Operations, November 2016. Beach Energy, Adelaide.

DSD (2014). GAS Criteria Tables for the Construction, Maintenance and Rehabilitation of Borrow Pits in the Cooper Basin SA. Department of State Development, November 2014.

DSD (2014a). Statement of Environmental Objectives for Geophysical Activities in the Cooper Basin, South Australia. Department of State Development, Adelaide.

DWLBC (2005). Guidelines for a Native Vegetation Significant Environmental Benefit Policy for the Clearance of Native Vegetation associated with the Minerals and Petroleum Industry. Prepared for the Native Vegetation Council, September 2005. Department of Land, Water and Biodiversity Conservation.

Santos (2015). South Australia Cooper Basin Operators Statement of Environmental Objectives: Drilling, Completions and Well Operations, November 2015. Santos Ltd, Adelaide.

## **Appendix A**

### **Objectives and Assessment Criteria**

## Objectives and Assessment Criteria

Objective	Goal	Guide to How Objectives can be Achieved	Assessment Criteria
1. To avoid unnecessary disturbance to third party infrastructure, landholders or land use	1.1 To minimise disturbance or damage to infrastructure / land use and remediate where disturbance cannot be avoided	<p>Timely notification to adjacent landholders / third parties prior to and during new or significant works</p> <p>Appropriate site selection (e.g. avoid site establishment where there is likely to be significant disturbance (including visual impact) to pastoral residences or tourist sites)</p> <p>Procedures in the POM and HSEMS address removal of waste products, re-instatement of soil profiles and rehabilitation</p> <p>Incident reporting and corrective actions</p> <p>Inductions for employees and contractors covering pastoral, conservation, tourism, legislation and infrastructure issues</p> <p>Facilities, ponds and areas of contamination fenced as appropriate to exclude stock</p> <p>In recognised conservation reserves (e.g. Innamincka or Strzelecki Regional Reserve) excavations are left in a state as agreed with the responsible statutory body (e.g. DEWNR)</p>	Where disturbance is unavoidable or accidental, infrastructure or land use is restored to the reasonable satisfaction of the landholder / owner or as near as practicable to undisturbed condition
	1.2 To minimise disturbance to landholders	<p>Records of communications with landholders / third parties</p> <p>Landowner liaison regarding notification / management of works and site issues including livestock management</p> <p>Reasonable, practical measures implemented to comply with noise standards (e.g. EPA guidelines) where relevant</p> <p>Record of disturbance management through appropriate documentation</p>	Landholder complaints are documented and reasonable steps taken to resolve them can be demonstrated
2. To maintain soil stability / integrity	2.1 To minimise erosion as a result of production operations and remediate in a timely manner	<p>Preventative measures implemented and monitored in susceptible areas</p> <p>Inspections undertaken as part of regular operations or following specific works or following significant storm events to look at evidence of erosion, subsidence, vegetation loss and compare to adjacent land</p> <p>Incidents or environmental issues (including erosion) reported / actioned via the hazard alerts, relevant checklists or the Action Item Register</p> <p>Note: Assessment of compliance must take into account the timing for undertaking remedial works. For example, erosion along a road or pipeline right of way from a significant rainfall event would be recorded, added to an action register and remediated on the basis of priority in order to achieve compliance.</p>	The extent of soil erosion as a result of production operations is consistent with or less than surrounding land

Objective	Goal	Guide to How Objectives can be Achieved	Assessment Criteria
	2.2 To prevent soil inversion	<p>Inspections undertaken as part of regular operations to look for soil discolouration and the success of vegetation return as an indicator</p> <p>Top soil / subsoil are stockpiled separately and soil profiles appropriately reinstated following the rehabilitation of earthworks / excavations</p> <p>Staff and contractors must complete Earthworks Induction before undertaking any ground disturbing (e.g. first disturbance) activities</p>	No evidence of significant subsoil on surface (colour)
	2.3 To minimise and remediate soil disturbance	<p>Restrict activities (including vehicle access) to production areas and associated infrastructure and easements</p> <p>Minimise area required for safely undertaking activities in accordance with procedures</p> <p>Planning and assessment of proposed activities to minimise impact</p> <p>Design and construct roads with drainage features (e.g. culverts and off takes) to minimise erosion and sedimentation</p> <p>Rip areas of compacted soil (except on gibber plains and tableland environments)</p> <p>Removal of gibber mantle to be avoided where possible in gibber and tableland systems to minimise soil disturbance</p> <p>Restored borrow pits have topsoil / overburden replaced and pit re-profiled where necessary to prevent erosion</p> <p>Soil profiles appropriately reinstated following the rehabilitation of earthworks / excavations</p> <p>Borrow pits constructed to minimise water holding capacity</p> <p>Undertake a review of legacy borrow pits established prior to the introduction of the GAS criteria in November 2014 using a risk-based approach to identify pits that are a priority for management</p>	<p>No production activities undertaken on salt lakes or steep tableland land systems</p> <p>Terrain profiles at pipeline dune crossings have been restored consistent with surrounding profiles</p> <p>Abandoned areas are remediated and rehabilitated to be reasonably consistent with the surrounding area (refer to Objective 10)</p> <p>0, +1 or +2 GAS criteria for borrow pit construction, management and rehabilitation are attained (Appendix B) or where 0, +1 or +2 GAS criteria are not attained, plans for remediation are documented and implemented in a timely manner. (Note: see Objective 10 for final borrow pit rehabilitation (i.e. at relinquishment))</p>

Objective	Goal	Guide to How Objectives can be Achieved	Assessment Criteria
3. To minimise disturbance to native vegetation and native fauna	3.1 To minimise clearing of native vegetation as part of production activities	<p>Planning and assessment of proposed activities to minimise impact</p> <p>Avoid significant or priority<sup>14</sup> vegetation and ensure proposed construction areas have been scouted for rare or threatened species and significant native vegetation and wildlife habitats by appropriately trained and experienced personnel</p> <p>Use existing cleared areas for laydowns and turn-arounds</p> <p>Vegetation trimmed rather than cleared where possible</p> <p>Consideration of sensitive vegetation during vegetation trimming and / or clearing activities</p> <p>Vegetation or habitat with significant conservation value in vicinity of construction or operational activities is flagged and / or fenced off where necessary to prevent disturbance</p> <p>Minimise area required for safely undertaking activities in accordance with procedures</p> <p>Sensitive land systems (e.g. wetlands) avoided wherever possible. Where activities are undertaken in these areas (i.e. no practicable alternative), appropriate review, assessment and mitigation measures are in place</p>	<p>No unauthorised clearing of native vegetation</p> <p>Vegetation clearing is limited to previously disturbed areas or areas assessed to be of lowest sensitivity</p> <p>No clearance of plants of Priority 1 or 2 in areas where could have been avoided<sup>14</sup></p> <p>No rare, vulnerable or endangered flora removed without appropriate permits</p> <p>0, +1 or +2 GAS criteria for borrow pit construction and management and rehabilitation are attained (Appendix B) or where 0, +1 or +2 GAS criteria are not attained, plans for remediation are documented and implemented in a timely manner. (Note: see Objective 10 for final borrow pit rehabilitation (i.e. at relinquishment))</p>
	3.2 To achieve a significant environmental benefit for native vegetation clearance	<p>Work (or payment to Native Vegetation Fund) undertaken to achieve a significant environmental benefit (SEB) for native vegetation clearance, as required by Regulation 5(1)(zd) of the Native Vegetation Regulations</p> <p>Significant environmental benefit requirement either:</p> <ul style="list-style-type: none"> <li>▪ determined using the 'Methodology for calculating total SEB requirements' outlined in the Guidelines<sup>15</sup>, or</li> <li>▪ negotiated with DEWNR and the Native Vegetation Council (NVC) where SEB calculation differs from the standard methodology in the Guidelines. (Note: the Guidelines have provision for case-by-case assessment of significant environmental benefit by the NVC in some circumstances e.g. where SEB capping or additional mitigation measures apply)</li> </ul>	<p>Significant environmental benefit for native vegetation clearance approved by DSD (where delegated authority applies) or Native Vegetation Council</p> <p>Significant environmental benefit obligation satisfied / implemented</p>

<sup>14</sup> Priority vegetation is defined in the EIR (Beach 2016).

<sup>15</sup> 'Guidelines' refers to DWLBC (2005) *Guidelines For a Native Vegetation Significant Environmental Benefit Policy For the clearance of native vegetation associated with the minerals and petroleum industry* or their replacement (SEB guidelines were under review at the time of writing).

Objective	Goal	Guide to How Objectives can be Achieved	Assessment Criteria
	3.3 To ensure production activities are planned and conducted in a manner that minimises impacts on native fauna	<p>Planning and assessment of proposed activities to minimise impact</p> <p>Ensure that proposed sites have been assessed for rare, vulnerable and endangered fauna species before the commencement of construction</p> <p>Obtain regulatory approval prior to undertaking disturbance in aquatic habitat (contact should be initially made with DSD during the planning process)</p> <p>Positioning of facilities and infrastructure to minimise impacts on fauna habitat</p> <p>Open trenches are monitored daily</p> <p>Facilities, ponds and areas of contamination fenced as appropriate to exclude larger fauna</p> <p>Measures to facilitate escape of smaller fauna from ponds or below ground structures provided where required (e.g. geofabric or textile matting ‘ladders’)</p> <p>Excavations (e.g. open trenches) managed to minimise hazard to fauna (e.g. excavated areas left open for as little time as possible, regularly inspected for trapped fauna, fauna ladders and trench plugs used where appropriate to facilitate movement of fauna out of or across excavations)</p> <p>Structures installed to enable passage of fish and other aquatic fauna where required (e.g. elevated road construction across floodplains or watercourses)</p> <p>Routine surveillance monitoring undertaken to detect fauna incursions into facilities or ponds. Fauna mortality (if it occurs) to be captured by incident reporting system and advice from an ecologist sought if required</p> <p>No feeding of wildlife</p> <p>No domestic pets at camps or worksites</p>	<p>Vegetation clearing is limited to previously disturbed areas or areas assessed to be of lowest sensitivity</p> <p>No rare, vulnerable or endangered fauna removed without appropriate permits</p> <p>0, +1 or +2 GAS criteria for borrow pit construction, management and rehabilitation are attained (Appendix B) or where 0, +1 or +2 GAS criteria are not attained, plans for remediation are documented and implemented in a timely manner. (Note: see Objective 10 for final borrow pit rehabilitation (i.e. at relinquishment))</p> <p>No native fauna casualties that could have reasonably been prevented through management measures described in the guide</p>
	3.4 To facilitate regrowth of native vegetation on reinstated areas to be consistent with surrounding area	<p>Disturbance management to facilitate regrowth in rehabilitated areas</p> <p>Follow-up rehabilitation work undertaken where natural regeneration inadequate</p>	<p>Species abundance and distribution on the reinstated areas is reasonably consistent with the surrounding area</p> <p>Note: Assessment of the consistency with surrounding areas will take into account that regrowth is a time and rainfall dependent process</p> <p>0, +1 or +2 GAS criteria for borrow pit rehabilitation are attained (Appendix B) or where 0, +1 or +2 GAS criteria are not attained, plans for remediation are documented and implemented in a timely manner. (Note: see Objective 10 for final borrow pit rehabilitation (i.e. at relinquishment))</p>



Objective	Goal	Guide to How Objectives can be Achieved	Assessment Criteria
4. Avoid the introduction or spread of weeds, pest animals and pathogens as a consequence of regulated activities	4.1 To ensure that the presence of weeds, pest animals or pathogens is consistent with or better than pre-disturbance conditions and adjacent land	<p>Regular patrols undertaken to look for evidence of weeds on production site and adjacent land (if weeds on production facility or easement but not adjacent land must implement control to prevent spread)</p> <p>Records of outbreaks found, weed control activities and photo-monitoring of significant outbreaks undertaken</p> <p>Undertake vehicle and equipment washdown before entering Cooper Basin or after operating in areas of known weed infestations</p> <p>Avoid importation of material from areas of weed / pathogen infestation</p> <p>Following site construction, operations and equipment confined to existing cleared areas (e.g. access roads, well lease, ponds)</p> <p>Weed, pest animal or pathogen control plans prepared in consultation with the relevant NRM officer and the land manager where the actions of Beach or its contractors have led to the introduction or increase in density or abundance</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 SA</p>	<p>The presence of weeds, pest animals or pathogens is consistent with or better than pre-disturbance conditions and 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 Natural Resources Management (NRM) Act and applicable NRM plans</p> <p>0, +1 or +2 GAS criteria related to weeds for borrow pit management and rehabilitation are attained (Appendix B) or where 0, +1 or +2 GAS criteria are not attained, plans for remediation are documented and implemented in a timely manner. (Note: see Objective 10 for final borrow pit rehabilitation (i.e. at relinquishment))</p>
5. To minimise the impact of production activities on water resources	5.1 To maintain current surface drainage patterns	<p>Planning and assessment of proposed activities to minimise impact</p> <p>Construction activities are designed and managed to avoid significantly impeding or diverting water flows (e.g. road construction at or not significantly above natural surface level, installation of culverts or bridges across channels or flow paths where appropriate)</p> <p>Localised flows (e.g. minor channels or other water pathways) may be diverted around facility if required</p> <p>Production facilities are located to avoid areas subject to inundation as far as possible</p> <p>Regular patrols undertaken to look for evidence of erosion, abnormal vegetation growth or death and appropriate monitoring / remedial measures implemented where required</p>	<p>For pipeline easements and other reinstated excavations, surface drainage profiles restored to a state that is reasonably consistent with pre-existing conditions and the surrounding area</p> <p>All regulated activities are located and constructed to maintain pre-existing water flows as far as practicable (e.g. channel contours are maintained on floodplains and at creek crossings and overland flows diverted around site if required)</p> <p>No new 'water affecting activities' (as defined under the NRM Act and regional NRM Plan) are undertaken unless relevant permits have been obtained</p>
	5.2 To minimise impact to aquifers / groundwater volumes and flow patterns	<p>The volume / flow of water extracted is monitored, recorded and reported</p> <p>Water extraction for use in production operations (e.g. potable water supply) is in accordance with water licence</p> <p>Water usage is to be reviewed periodically and management strategies implemented to reduce overall water usage where practical</p> <p>Compliance with the Water Allocation Plan and water licence conditions (e.g. regarding the Southwest Springs Zone, GAB springs and State border)</p> <p>Refer to Objective 6.8 (well integrity) regarding prevention of crossflow in aquifers</p>	<p>No uncontrolled flow to the surface (i.e. no free flowing bores)</p> <p>Compliance with the industry-wide allocation for produced formation water (administered by DSD)</p> <p>Landholder complaints regarding impact on groundwater users are documented and reasonable steps taken to resolve them can be demonstrated</p>

Objective	Goal	Guide to How Objectives can be Achieved	Assessment Criteria
6. To minimise land contamination and avoid water contamination	6.1 To prevent spills occurring and if they occur minimise their impact	<p>All production facilities and flowlines are designed, risk assessed, constructed, operated and maintained in accordance with relevant standards e.g. AS 2885, AS 3000, AS 1200, AS 3788, AS 60079 and AS 4041</p> <p>Containment of all hazardous substances including hydrocarbons and liquid waste in appropriate vessels and bunds</p> <p>All personnel are trained to undertake their tasks effectively and safely</p> <p>All personnel must complete relevant inductions before commencing work activities</p> <p>Roads and causeways designed to minimise risk of vehicle accident and appropriate safety signage installed (e.g. at access to public roads)</p> <p>Transport procedures and restrictions in place (e.g. no transport in wet conditions and no wet wheel fording)</p> <p>Prevention program including inspection, maintenance and pigging where appropriate</p> <p>Location and design of production facilities to minimise risks posed by flooding</p> <p>Location, design and operation of facilities is consistent with the requirements of the <i>Environment Protection (Water Quality) Policy 2015</i></p> <p>Rainfall / flood likelihood taken into account in activity planning. Satellite imagery and upstream flood levels used to predict arrival of floodwaters</p> <p>Production operations will cease in event of flood inundation</p> <p>In floodplain land systems, if flooding of a facility is imminent, the following will be undertaken in accordance with flood response plan:</p> <ul style="list-style-type: none"> <li>▪ wellheads shut in and chemicals removed</li> <li>▪ storage tanks and above-ground flowlines drained, purged and filled with water to reduce buoyancy</li> <li>▪ interceptor pit skimmed to remove oil</li> <li>▪ fuel tanks drained, engines and all hydrocarbons (e.g. fuel and lubricants) removed off-site</li> </ul> <p><u>Fuel and Chemical Storage and Handling</u></p> <p>All fuel, oil and chemical storage, handling and secondary containment in accordance with the appropriate standards and guidelines e.g. Australian Standard AS 1940, EPA guideline 080/12 <i>Bunding and Spill Management</i>, the Australian</p>	<p>No adverse impact to rare or threatened plant species or Priority<sup>16</sup> 1 or 2 plant species outside pre-disturbed / operational areas due to an escape of petroleum, processed substance, chemical or fuel</p> <p>No unauthorised discharge or escape of petroleum, processed substance, chemical, fuel or solid wastes to surface water and/or groundwater.</p> <p>Any escape of petroleum, processed substance, chemical or fuel to land is either immediately contained and removed or assessed in accordance with NEPM<sup>17</sup> guidelines and remediated in a timely manner.</p>

<sup>16</sup> Priority vegetation is defined in the EIR (Beach 2016).

<sup>17</sup> *National Environment Protection (Assessment of Site Contamination) Measure (1999)* amended in 2013

Objective	Goal	Guide to How Objectives can be Achieved	Assessment Criteria
		<p>Dangerous Goods Code (ADG) and product Safety Data Sheets (SDSs)</p> <p>Fuel and chemical handling and emergency response procedures included in staff training, implemented and reviewed periodically</p> <p>Tanker load-out in lined area, with appropriate bunding to contain spills</p> <p>Appropriate spill response equipment is available on site</p> <p>Oil spill contingency plan is in place and regularly reviewed</p> <p>Spills or leaks are contained, cleaned-up, reported and cause investigated and corrective and / or preventative action implemented</p> <p>Assessment and remediation of uncontained spills with larger scale impact (e.g. greater than 200 litres to land, or any volume to water) is consistent with the National Environment Protection (Assessment of Site Contamination) Measure and relevant SA EPA guidelines.</p> <p>Fencing of contaminated areas if threat is posed to stock or wildlife</p> <p>Patrols to look for evidence of soil discolouration, vegetation or fauna death</p> <p>Incident record system (preventative and post incident review)</p> <p><u>Well Operations</u></p> <p>Blowout preventers (BOP) installed where required and regular BOP drills, testing, certification and maintenance undertaken</p> <p>Tanks used for onsite storage of fluids generated during completions and workover activities</p> <p>Appropriate containment installed at well sites (e.g. for jet pumps and gas well skids)</p>	
	6.2 To remediate and monitor areas of known contamination arising from production activities (salinisation, hydrocarbons, other production chemicals)	<p>Areas of potential contamination (e.g. from spills or leaks, including serious or reportable incidents as outlined in Section 4) assessed to determine level of contamination, and appropriate remediation measures developed in accordance with criteria developed with the principles of the National Environment Protection Measure for contaminated sites, and in consultation with DSD and EPA</p> <p>Use of groundwater monitoring bores where there is an identified risk to groundwater. Number and positioning of monitoring bores will be in accordance with relevant industry practice to ensure adequate coverage of any potential underground water contamination and movement</p>	<p>Contaminated sites are assessed and rehabilitated (where required) using a risk-based approach, consistent with the principles of the NEPM<sup>18</sup></p> <p>In situ remediation of spills is monitored and decrease in hydrocarbons over time can be demonstrated</p>

<sup>18</sup> National Environment Protection (Assessment of Site Contamination) Measure (1999) amended in 2013

Objective	Goal	Guide to How Objectives can be Achieved	Assessment Criteria
		<p>Stockpiled contaminated soil is appropriately contained and treated / disposed of in a timely manner</p> <p>Use of soil farms / land treatment units for remediation where appropriate</p>	
	6.3 To ensure that rubbish and waste material is disposed of in an appropriate manner	<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 collection, storage and transport of waste (e.g. covered bins in designated area for waste collection and storage prior to transport, transported waste is adequately secured / covered)</p> <p>Prevent wildlife accessing refuse materials</p> <p>No evidence of rubbish or litter on easements or at facilities</p> <p>Design and operation of any waste disposal facility in accordance with EPA licence conditions</p> <p>Regular patrols undertaken to look for evidence of rubbish, spills (soil discolouration)</p> <p>Contractors used for any waste transport and disposal are appropriately licensed and records are maintained for all hazardous waste (e.g. waste tracking certificates)</p>	<p>Wastes are segregated and transported to an EPA licensed facility for recycling or disposal</p> <p>Reasonable steps are taken to securely contain waste prior to removal from site</p> <p>No waste material disposal to sumps and flare pits (with the exception of drilling fluids, drill cuttings and other benign fluids produced during well clean-up)</p>
	6.4 To prevent impacts as a result of hydrotest water and washdown water disposal	<p>Water disposed of in a manner that prevents discharge or runoff to watercourses, surface waters or environmentally sensitive areas</p> <p>Water discharged into existing ponds, or where quality is suitable, onto stable ground, with no evidence of erosion as a result of discharge</p> <p>Discharged water (e.g. washdown or hydrotest water) assessed to ensure that water quality is consistent with relevant guidelines (e.g. ANZECC or EPA guidelines) for the disposal site</p> <p>Use of biocides and toxic chemicals are kept to a minimum and where practicable UV-degradable biocides (e.g. THPS) shall be used</p> <p>Records kept on source of water and discharge method / location</p>	<p>No evidence of significant impacts to soil, water and vegetation as a result of water disposal (i.e. soil erosion, dead vegetation, water discolouration)</p> <p>No unauthorised discharge of hydrotest water and washdown water to a waterway or an area reasonably likely to enter a water way</p>
	6.5 To ensure the safe and appropriate disposal of wastewater (sewage)	<p>All wastewater disposal is in accordance with the <i>South Australian Public Health (Wastewater) Regulations 2013</i> (which requires that the waste water disposal system must either comply with the SA Health <i>On-site Wastewater Systems Code</i> or be operated to the satisfaction of the Department of Health) and in accordance with the <i>Environment Protection (Water Quality) Policy 2015</i></p> <p>Treated effluent irrigated or disposed to land or ponds in area with appropriate fencing / signage, in a location where it will not enter surface waters</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>

Objective	Goal	Guide to How Objectives can be Achieved	Assessment Criteria
	6.6 To minimise impacts as a result of produced formation water treatment and disposal and restrict to defined areas	<p>Produced formation water (PFW) treatment and disposal in accordance with Beach approved procedures in POM and HSEMS and requirements of <i>Environment Protection Act 1993</i>, <i>Environment Protection (Water Quality) Policy 2015</i>, relevant conditions of any EPA Authorisations and <i>Natural Resources Management Act 2004</i></p> <p>Site, construct and operate ponds appropriately<sup>19</sup> to minimise potential impacts and with regard to EPA Guideline 509/14 <i>Wastewater lagoon construction</i></p> <p>Locate PFW ponds and free form areas away from areas which are inundated during floods where possible (preferably above the 100 year flood level)</p> <p>Interceptor ponds are not located in areas prone to inundation by flooding</p> <p>Ponds constructed using appropriate materials and suitable design criteria (freeboard, depths, lining etc.)</p> <p>Interceptor ponds are appropriately lined with an impermeable liner (e.g. HDPE)</p> <p>Surface of interceptor ponds to be regularly skimmed</p> <p>No evidence of overflow of product from interceptor ponds</p> <p>No evidence of visible hydrocarbons outside interceptor pond walls</p> <p>No salinisation or seepage evident outside designated disposal area (e.g. adjacent dune corridor)</p> <p>Pond operation monitored (e.g. pond wall integrity) and repair undertaken if required</p> <p>Monitor evaporation pond water quality annually</p> <p>Undertake appropriate water quality monitoring where shallow groundwater exists in the vicinity of PFW ponds</p> <p>Monitoring bores installed at all new facilities</p> <p>Records of volumes of PFW maintained and reported annually</p> <p>Use of process chemicals (e.g. biocides, emulsion breakers) is minimised and biodegradable or UV degradable chemicals used where available</p> <p>Quality of water assessed prior to secondary use to confirm that it is consistent with relevant guidelines (e.g. ANZECC or EPA guidelines) for the intended site / use</p> <p>Relevant approvals for secondary use obtained where required (e.g. DSD, landholder)</p>	<p>Water monitoring results indicate levels of Total Recoverable Hydrocarbons (TRH) below 30mg/L in holding / evaporation ponds and 10mg/L in freeform disposal / evaporation areas</p> <p>No evidence of overflow of produced formation water from PFW ponds</p> <p>Disposal of produced water is restricted to defined areas in accordance with activity approval conditions</p> <p>No observed adverse impact to vegetation outside of the designated disposal area</p>

<sup>19</sup> 'Appropriately' means to take into consideration and assess relevant environmental factors (including location of surface water, shallow groundwater, potential flooding, location of vegetation, etc.) and take measures to reduce the potential impact on these factors as far as reasonably practicable.

Objective	Goal	Guide to How Objectives can be Achieved	Assessment Criteria
	6.7 To minimise impacts of gas well deliquification	<p>Water produced during gas well deliquification managed based on the level of environmental risk (e.g. proximity to surface water bodies or presence of sensitive shallow groundwater receptors). Measures may include:</p> <ul style="list-style-type: none"> <li>▪ impermeable or clay lined flare pit to flare / contain any hydrocarbons present</li> <li>▪ separators</li> <li>▪ flare tanks</li> </ul> <p>Assessments undertaken where relevant to identify potential environmental sensitivities and specify required containment measures</p> <p>Wells that are frequently blown down are reviewed to evaluate whether measures to minimise deliquification are appropriate (e.g. installation of small ID tubing or plunger lift installation)</p> <p>Gas well deliquification undertaken only when prevailing environmental conditions (e.g. wind speed and direction) are suitable</p>	<p>Gas well deliquification does not result in contamination of surface water and / or shallow groundwater resources</p> <p>No soil contamination due to gas well deliquification that would compromise off-site land use or post-activity land use</p>
	6.8 To maintain well integrity to minimise loss of aquifer pressure and minimise aquifer contamination	<p><u>Completions / Workover Activities</u></p> <p>Downhole production equipment and wellhead equipment designed to meet pressure, temperature, operational stresses and loads. Pressure testing, either inflow (negative test) or positive testing to be performed on barrier envelopes / components where feasible</p> <p>Operational reports (i.e. barrier installation, testing and verification) for activities to be submitted and retained</p> <p>Inhibited static packer fluid, where applicable</p> <p>Note: Controls for design, running and cementing of casing are covered under the relevant Drilling SEO</p> <p><u>Producing / Injection and Inactive wells</u></p> <p>Monitoring programs implemented (e.g. through well logs, pressure measurements / testing and, or corrosion monitoring programs) to aid in the assessment of wellbore barrier conditions</p> <p>Where monitoring identifies potential issues, working within the Beach Management Systems, a risk assessment will be undertaken to identify the hazards / scenarios and propose recommendations and mitigation controls where appropriate to reduce or monitor the risk</p> <p>Casing annulus pressures are routinely checked and reported, if accessible</p> <p><u>Downhole Abandonment Following Production (i.e. non-Drilling)</u></p> <p>Appropriate barrier controls are put in place to prevent crossflow, contamination or further pressure reduction occurring between formation groups, listed in the</p>	<p>There is no uncontrolled flow to surface (e.g. blow out)</p> <p>Appropriate controls exist to protect separate aquifer systems and / or hydrocarbon reservoirs that are typically in natural hydraulic isolation from each other</p> <p>Note: Geological aquifer formation groups are listed in the relevant Drilling SEO</p>

Objective	Goal	Guide to How Objectives can be Achieved	Assessment Criteria
		<p>Drilling SEO, within the wellbore</p> <p>Barriers established to meet or exceed oilfield requirements or those set by relevant regulatory bodies for the abandonment of a petroleum well</p> <p>Pressure testing, either inflow (negative test) or positive testing, performed on barrier envelopes / components where feasible</p> <p>Wells where it is identified that the required formation groups cannot be practicably isolated dealt with on a case-by-case basis in conjunction with regulatory body agreement</p> <p>Operational reports for barrier installation and testing submitted and retained</p> <p>Inhibited fluid placed between barriers, where applicable</p>	
	6.9 To minimise adverse impacts from water injection for waterflood or disposal	<p>Compatibility studies regarding water chemistry conducted prior to injection</p> <p>Filtering of water to promote efficient injection into formation</p> <p>Water treatment (e.g. in a hydro-cyclone) to achieve required water quality</p> <p>Frequent quality testing of injection waters</p> <p>Aquifer water quality monitored where appropriate through testing carried out during waterflood or reinjection activities</p> <p>Cement bond logs run to test for poor cement bonds</p> <p>Routine testing of the wellbore and packer integrity</p> <p>Regular pressure measurements undertaken to ensure well integrity is maintained (e.g. to ensure there is no unintended and uncontrolled crossflow of fluids between any reservoir or aquifer)</p> <p>State controls on radiotracer substances followed (e.g. <i>Radiation Protection and Control Act 1982</i>)</p>	No significant change in aquifer water quality as a result of water reinjection activities
	6.10 To minimise impacts as a result of land treatment units and restrict to defined areas	<p>Land treatment areas constructed and operated in accordance with procedures and DSD and EPA approvals / requirements</p> <p>Records of soil added to land treatment areas to be maintained and reported annually (including quantity, location of source)</p> <p>Monitoring of surrounding soil and groundwater for contaminants annually as required by licence</p> <p>Monitoring and reporting of remediation</p> <p>Periodic reports, as required, detail quantity, level of contamination and proposed ongoing operation of the land treatment area</p> <p>Ultimate reuse or disposal of treated soil consistent with the principles of the NEPM for contaminated sites and relevant EPA guidelines</p>	Refer to Objectives 6.1 and 6.2

Objective	Goal	Guide to How Objectives can be Achieved	Assessment Criteria
7. To minimise the risk to public health and safety	7.1 To protect public safety during production operations	<p>All production facilities and pipelines are designed, constructed, operated and maintained in accordance with relevant standards (e.g. AS 1940, AS 2885, AS 3000, AS 1200, AS 3788, AS 60079 and AS 4041)</p> <p>Safety, testing, maintenance and inspection procedures are implemented</p> <p>Risk assessments and inspections of facilities are routinely conducted</p> <p>Use of signage, fencing, bunting and traffic management practices to identify all potentially hazardous areas and to warn of access restrictions to operational areas</p> <p>Pipelines designed and constructed with appropriate external interference protection measures, including physical and procedural controls, to mitigate threats identified in the Safety Management Study, in accordance with AS 2885.</p> <p>All reports of unauthorised activity are reported and investigated</p> <p>Records of regular emergency response training for employees and review of procedures</p> <p>Incident record system (preventative and post incident review)</p> <p>Development, implementation and periodic review of Emergency Response Plan (ERP)</p> <p>All personnel are trained to undertake their tasks effectively and safely</p> <p>Safe work permits must be obtained to ensure only individuals with proper clearance can conduct works</p> <p>Transportation and driving procedures implemented to improve driving safety</p> <p>Compliance with relevant speed restrictions on access roads and tracks</p>	<p>Emergency procedures implemented and personnel trained</p> <p>Reasonable measures implemented to ensure no injuries or health risks to the public</p> <p>No injuries, incidents or adverse health impacts involving the public from regulated activities that could have been reasonably prevented by the operator</p>
	7.2 To avoid uncontrolled fires associated with production activities	<p>Regular fire safety and emergency response training for all operations personnel and review of procedures</p> <p>Established procedures for minimising fire risk during operations</p> <p>All production facilities are designed, constructed, operated and maintained in accordance with relevant standards</p> <p>Appropriate fire fighting equipment on site</p>	<p>No uncontrolled operations related fires</p> <p>Emergency procedures implemented and personnel trained</p>



Objective	Goal	Guide to How Objectives can be Achieved	Assessment Criteria
8. Air pollution and greenhouse gas emissions reduced to as low as reasonably practical	8.1 To minimise atmospheric emissions	<p>Conduct all production activities in accordance with appropriate industry accepted standards and legislative requirements</p> <p>Compliance with relevant legislation regarding air quality</p> <p>Record and report annual emission volumes in accordance with statutory requirements (e.g. National Pollutant Inventory)</p> <p>Compare emissions data from year to year and identify and implement strategies to minimise volumes if needed</p> <p>Equipment operated and maintained in accordance with manufacturer specifications</p> <p>Facilities and piping designed, constructed, pressure tested, operated and maintained in accordance with relevant standards and guidelines including AS 2885</p> <p>Gas flared rather than vented to atmosphere where possible</p> <p>Well flow diverted to separator as soon as practicable during gas well testing to minimise gas not being captured and sent to flare</p> <p>Flaring during production testing kept to minimum length of time necessary to establish resource and production parameters</p> <p>Greenhouse gas emissions are estimated, recorded and reported in accordance with NGER requirements</p>	Reasonable practical measures implemented in design and operation to minimise emissions
	8.2 To minimise the generation of dust	Compliance with procedures (vehicle movement, dust suppression, etc.)	Any stakeholder complaints related to dust nuisance are documented and reasonable steps taken to resolve them can be demonstrated

Objective	Goal	Guide to How Objectives can be Achieved	Assessment Criteria
9. To adequately protect areas of cultural and heritage significance and values during operations and maintenance	9.1 No damage, disturbance or interference to Aboriginal and non-Aboriginal heritage sites, objects, remains and places unless prior approval under relevant legislation obtained <sup>20</sup>	<p>Petroleum Operations must be conducted within a Work Site (both capitalised terms as defined in the applicable NT Agreement<sup>21</sup>) which has been cleared as required by that applicable NT Agreement<sup>22</sup></p> <p>All damage, disturbance or interference is contained within areas subject to a cultural heritage Work Area Clearance (WAC)<sup>23</sup> and undertaken in accordance with conditions of the WAC</p> <p>Training and induction for all personnel to educate them on the importance of remaining within designated / approved areas, and of their obligations under the <i>Aboriginal Heritage Act 1988</i>, and the applicable NT Agreement</p> <p>Where necessary, areas of cultural and heritage significance or exclusion zones in the vicinity of work site flagged and / or fenced off to prevent damage, disturbance and interference</p> <p>Procedures consistent with the relevant obligations under the NT Agreement and <i>Aboriginal Heritage Act 1988</i> are in place to appropriately report and respond to any areas of significance discovered during operations</p> <p>In addition to obligations under the NT Agreement and the <i>Aboriginal Heritage Act 1988</i>, if suspected Aboriginal sites, objects or remains are discovered during operations or incursions occur outside the area cleared by the WAC, investigations are undertaken with the native title holders to determine whether there has been any damage, disturbance or interference and identify an appropriate course of action</p> <p>Records of site locations within information systems</p>	<p>In the event the conditions of a Work Area Clearance(s) are not complied with, the incident is appropriately reported<sup>24</sup>, investigated and remediated in consultation with the relevant Native Title holders and in accordance with any applicable NT Agreement</p> <p>Damage, disturbance or interference to any Aboriginal sites, objects and remains (all as defined under the <i>Aboriginal Heritage Act 1988</i>) is avoided unless authorisation has been obtained under the <i>Aboriginal Heritage Act 1988</i></p> <p>Non-Aboriginal heritage sites identified and avoided</p> <p>No impact to non-Aboriginal heritage places and related objects protected under the <i>Heritage Places Act 1993</i> unless approval has been obtained under the <i>Heritage Places Act 1993</i></p> <p>Any Aboriginal and non-Aboriginal heritage sites, objects and remains discovered during operations have been appropriately reported and responded to, consistent with the applicable NT Agreement and the <i>Aboriginal Heritage Act 1988</i></p>

<sup>20</sup> In respect of land within the Yandruwandha/Yawarrawarrka native title determination area, this includes an authorisation from the Minister for Aboriginal Affairs and Reconciliation's delegate, the Yandruwandha Yawarrawarrka Traditional Land Owners (Aboriginal Corporation), in relation to Sections 21, 23, 29 and 35 of the *Aboriginal Heritage Act 1988*.

<sup>21</sup> An NT Agreement means an agreement established pursuant to the *Native Title Act 1993* or *Aboriginal Heritage Act 1988* which includes a process to inspect or clear land for the purpose of protecting Aboriginal sites, objects or remains and native title rights and interests.

<sup>22</sup> This relates to the Yandruwandha/Yawarrawarrka native title determination area only.

<sup>23</sup> A reference to a Work Area Clearance (WAC) means an area identified pursuant to a process as required and described in an agreement established under the *Native Title Act 1993* or *Aboriginal Heritage Act 1988* for the inspection or clearance of land for the purpose of protecting Aboriginal sites, objects or remains.

<sup>24</sup> This may include compliance with reporting obligations pursuant to s20 of the *Aboriginal Heritage Act 1988*.

Objective	Goal	Guide to How Objectives can be Achieved	Assessment Criteria
10. Rehabilitate operational areas to agreed standards	10.1 Rehabilitate operational areas to agreed standards	<p><u>Contaminated Site Remediation</u></p> <p>Refer to Objective 6.2</p> <p><u>Redundant Areas</u></p> <p>Rehabilitation of redundant areas (e.g. laydowns, construction sites, camps, roads and tracks) where not required for ongoing activities</p> <p>Compacted soil areas have been ripped (except on gibber and tablelands) and soil profile and contours are reinstated following completion of operations</p> <p><u>Production Facility Abandonment</u></p> <p>The following steps will typically be undertaken unless otherwise agreed with the regulator and stakeholders:</p> <ul style="list-style-type: none"> <li>hydrocarbon and contaminants will be reduced to an acceptable level in buried structures (e.g. pipelines, tanks, pits)</li> <li>hazardous materials will be stabilised or removed including ground contamination</li> <li>surface infrastructure will be removed and re-used / recycled where appropriate</li> <li>waste will be removed and recycled where appropriate (refer to Objective 6.3)</li> <li>foundations will be levelled and covered (the standard to which they will be restored will be defined as a result of stakeholder consultations)</li> <li>disturbed areas will be re-contoured consistent with surrounding landform, natural drainage restored and compaction relieved where required to assist site regeneration</li> <li>contour banks and energy dissipating structures will be constructed where necessary to protect disturbed areas from erosion prior to stabilisation</li> </ul> <p><u>Pipeline Abandonment</u></p> <p>Pipeline abandonment undertaken in accordance with AS 2885</p> <p>The following steps will typically be undertaken unless otherwise agreed with the regulator and stakeholders:</p> <ul style="list-style-type: none"> <li>all aboveground pipes and supports will be assessed for the condition of the pipe for either salvage or for dismantling and re-use</li> <li>all underground pipe work will be cut-off at a minimum depth of 750 mm below the natural surface or at pipeline depth, removed and blinded below the surface</li> <li>all aboveground signs and markers will be removed</li> </ul>	<p><u>Contaminated Site Remediation</u></p> <p>Refer to Objective 6.2</p> <p><u>Redundant Areas</u></p> <p>Refer to assessment criteria for Objectives 1, 2, 3 and 6</p> <p>The attainment of 0, +1 or +2 GAS criteria for final borrow pit rehabilitation (i.e. at relinquishment) as listed in Appendix B unless alternative agreement is reached with the regulator and stakeholders</p> <p><u>Production Facility Abandonment</u></p> <p>Site rehabilitation undertaken in accordance with site-specific decommissioning and reinstatement plan as agreed with relevant stakeholders and regulators</p> <p>Surface structures are removed and the ground surface re-contoured consistent with pre-existing contours unless alternative agreement is reached with the regulator and stakeholders</p> <p>0, +1 or +2 GAS criteria are attained for production facility abandonment as listed in Appendix C, unless alternative agreement is reached with the regulator and stakeholders</p> <p>Refer to assessment criteria for Objectives 1, 2, 3 and 6</p> <p><u>Pipeline Abandonment</u></p> <p>Attainment of the following (unless otherwise agreed with stakeholders and approved by the regulatory authority):</p> <ul style="list-style-type: none"> <li>No evidence of waste, redundant equipment / infrastructure or signs and markers on abandoned pipelines</li> <li>Refer to assessment criteria for Objectives 1, 2, 3 and 6</li> </ul> <p><u>Well Abandonment Following Production</u></p> <p>Refer to Objective 6.8</p> <p>Note: Surface restoration of well sites is covered by the Cooper Basin Drilling SEO (see Section 1.2 above)</p>

Objective	Goal	Guide to How Objectives can be Achieved	Assessment Criteria
		<ul style="list-style-type: none"><li>▪ all pipeline protection systems will be removed to allow the pipeline to degrade in situ</li><li>▪ monitoring and auditing of abandoned pipelines will be undertaken</li></ul> <p>All pipelines which are partially or wholly left in-situ will be accurately mapped and recorded. Records will be prepared and submitted to the appropriate authority</p> <p><u>Well Abandonment Following Production</u></p> <p>Refer to Objective 6.8</p>	

## **Appendix B**

### **Standard GAS Criteria for Borrow Pits (DSD 2014)**

Note: Borrow pits which were established prior to the introduction of the following GAS criteria in November 2014 and are suspended (i.e. not yet rehabilitated) may not achieve a 0, +1 or +2 score under these GAS criteria until immediately prior to licence relinquishment. This should not be considered a non-compliance in the interim. Beach is undertaking a review of existing borrow pits using a risk-based approach to identify pits that are a priority for management.

During 2013, the Department for Manufacturing, Innovation, Trade, Resources and Energy (DMITRE) now the Department of State Development (DSD) contracted Jacobs SKM to undertake a review of the Goal Attainment Scaling (GAS) criteria for borrow pit construction and rehabilitation within the South Australian portion of the Cooper Basin. The review identified that an amendment of the GAS criteria would provide positive environmental outcomes particularly to address potential cumulative impacts associated with both legacy pits and the ongoing construction of new pits across the basin.

The full report as titled below, can be viewed on the DSD website at: [http://www.pir.sa.gov.au/petroleum/environment/research\\_projects](http://www.pir.sa.gov.au/petroleum/environment/research_projects)

Jacobs SKM, (March 2014). Review of Current Goal Attainment Scaling (GAS) criteria for borrow pit construction, use and rehabilitation within the Cooper Basin. Report prepared for the Department for Manufacturing, Innovation, Trade, Resources and Energy.

Following the recommendations in the Jacobs SKM report, the tables below were developed by DSD in consultation with other relevant government agencies and industry and released in November 2014 for incorporation into relevant Statement of Environmental Objectives.

**Table 1. GAS criteria for Borrow Pit Construction**

Objectives	Goals	Goal Exceeded +2	Goal Exceeded +1	Goal Attained 0	Minor Shortfall - 1	Significant Shortfall -2
Minimise impacts on soil	Pit sited and designed to minimise erosion and facilitate rehabilitation	<b>Gibber plain and tableland</b>				
		-	Pit located on flat terrain	Pit located on low sloping terrain but constructed with erosion control measures evident (e.g. contour banks or bunds above the batter slope)  Gibber mantle around pit intact (rolling only)  No wind rows on tracks	Pit located on low sloping terrain and constructed with no erosion control measures evident  Gibber mantle around pit intact (rolling only)  No wind rows on tracks	Pit located on sloping terrain  or:  Pit located in any terrain where gibber mantle around pit removed and/or wind rows on tracks
		<b>Dunefields</b>				
		-	Pit located on flat terrain	Pit located on low sloping terrain	Pit located on moderate sloping terrain and constructed with no erosion control measures evident	Pit located on high sloping terrain
Minimise impacts on vegetation	Perennial vegetation clearance minimised	<b>Floodplain</b>				
		-	-	Pit located a suitable distance away from any creek channel, waterhole, terrace or levee so as not likely to cause erosion or flow impediment	Pit located within a distance from any creek channel, waterhole, terrace or levee that is potentially likely to cause erosion or flow impediment	Pit located within a distance from any creek channel, waterhole, terrace or levee that is likely cause erosion or flow impediment
		Pit located in bare (including previously disturbed) area – no clearance required	No trees or shrubs removed	Trees or shrubs removed where clearance could not have been avoided  No trees or shrubs with hollows removed	Medium trees or shrubs (between 15 and 30cm diameter) removed where clearance could have been avoided	Large trees (over 30 cm diameter) removed  and/or  Trees or shrubs with hollows removed
		Topsoils and seed source retained		Topsoil and vegetative material stockpiled and stable (i.e. unlikely to present erosion issues)		No topsoil and vegetative material stockpile evident
Protect sites of natural, scientific or heritage significance	Avoid sites	Heritage surveys undertaken, significant sites identified, flagged, recorded and avoided		Heritage surveys undertaken, significant sites avoided		Heritage surveys not undertaken  or  significant sites disturbed
Minimise visual impacts – public roads (e.g. Strzelecki Tracks, Della Rd, Dillon's Hwy, Cordillo Rd, Walkers Crossing, 15 Mile Track, Merty – Cameron Cnr, etc.)	Pits sited appropriately	Pit not visible from public road	Pit not clearly visible from public road due to some screening by vegetation or other landform	Pit more than 50m from public road	Pit less than 50m from public road	Pit less than 20m from public road

**Table 2. GAS Criteria for Borrow Pit Management**

Objectives	Goals	Goal Exceeded +2	Goal Exceeded +1	Goal Attained 0	Minor Shortfall - 1	Significant Shortfall -2
<b>Minimise water retention in pit</b>	<b>Minimal or no water retention in pit footprint</b>	No evidence of water retention	-	Minor retention - pit retains water for less than 1 month following rainfall event or drawdown of floodwaters (as a guide - max. water depth up to 0.2 metres)  Or  Water retention in pit consistent with surrounding land	Pit retains water for up to 3 months following rainfall event or drawdown of floodwaters (as a guide - max. water depth < 1 metre)*  And  Water retention in pit inconsistent with surrounding land	Pit holds water for more than 3 months following rainfall event or drawdown of floodwaters (as a guide - max water depth > 1.0 metre)*  And  Water retention in pit inconsistent with surrounding land
<b>Minimise impacts on soil</b>	<b>Minimise soil erosion</b>	<b>Gibber plain and tableland</b>				
		Gibber layer in situ (apart from pit base and sides)  Pit footprint soil surfaces stable  No accelerated erosion on pit footprint	-	Gibber layer in situ  Run-off controlled (e.g. contour banks or bunds above the batter slope)  Localised minor erosion (typically pit sides)*	Gibber layer disturbed or removed in areas  Run-off uncontrolled  Minor gullyng around pit and/or access tracks*	Widespread disturbance of gibber layer  Run-off uncontrolled  Moderate to severe gullyng around pit and/or access tracks*
		<b>Other land units</b>				
		Soil surfaces stable  No accelerated erosion on pit footprint	-	Run-off controlled (e.g. contour banks or bunds above the batter slope)  Minor erosion of pit sides or up-slope from pit*	Areas of pit footprint unstable with some uncontrolled runoff  Moderate erosion*	Uncontrolled run-off  Large areas of pit footprint unstable  Active severe erosion*
<b>Minimise impacts on vegetation</b>	<b>No weed** infestations on pit footprint</b>	No weeds on pit footprint	-	Presence of weeds** on pit footprint consistent with pre-disturbance conditions and adjacent land	Weeds** present on pit footprint which is inconsistent with pre-disturbance conditions and adjacent land	Declared weeds*** present on pit footprint which is inconsistent with pre-disturbance conditions and adjacent land



**Table 3. GAS Criteria for Borrow Pit Rehabilitation**

<b>Objectives</b>	<b>Goals</b>	<b>Goal Exceeded +2</b>	<b>Goal Exceeded +1</b>	<b>Goal Attained 0</b>	<b>Minor Shortfall - 1</b>	<b>Significant Shortfall -2</b>
<b>Minimise water retention in pit</b>	<b><u>Predictive</u></b>  <b>Minimal or no water retention in pit footprint</b>	-	-	Measures to minimise water retention implemented (e.g. upslope runoff diverted by contour banks or bunds, rip base, etc.)	-	No measures to minimise water retention evident
	<b><u>Ongoing</u></b>  <b>Minimal or no water retention in pit footprint</b>	No evidence of water retention	-	Minor retention - pit retains water for less than 1 month following rainfall event or drawdown of floodwaters (as a guide - max. water depth up to 0.2 metres)  or  Water retention in pit consistent with surrounding land	Pit retains water for up to 3 months following rainfall event or drawdown of floodwaters (as a guide - max. water depth < 1 metre)*  and  Water retention in pit inconsistent with surrounding land	Pit holds water for more than 3 months following rainfall event or drawdown of floodwaters (as a guide - max water depth > 1.0 metre)*  and  Water retention in pit inconsistent with surrounding land
<b>Minimise impacts on soil</b>	<b><u>Predictive</u></b>  <b>Minimise soil erosion</b>	-	-	Measures to minimise erosion implemented (e.g. upslope runoff diverted by contour banks or bunds)	-	No measures to minimise erosion evident
	<b><u>Ongoing</u></b>  <b>Minimise soil erosion</b>	Soil surfaces stable  No accelerated erosion	-	Minor erosion of pit sides or up-slope from pit*	Moderate erosion*  Areas of pit footprint unstable with some uncontrolled runoff	Active severe erosion*  Large areas of pit footprint unstable  Uncontrolled run-off
<b>Minimise impacts on vegetation</b>	<b>Pit footprint revegetated with indigenous species (subject to time and preceding climatic conditions)</b>	Vegetation community re-established with species and cover typical for land unit	Pit footprint revegetated with perennial species mix and cover levels typical for land unit	Pit footprint revegetated with species mix similar to surrounding area, some bare patches still present	Revegetation confined to base of pit, pit sides bare, species mix differs from surrounding area, annual species dominate	No revegetation evident
	<b>No weed** infestations on pit footprint</b>	No weeds on pit footprint	-	Presence of weeds** on pit footprint consistent with pre-disturbance conditions and adjacent land	Weeds** present on pit footprint which is inconsistent with pre-disturbance conditions and adjacent land	Declared weeds*** present on pit footprint which is inconsistent with pre-disturbance conditions and adjacent land

Objectives	Goals	Goal Exceeded +2	Goal Exceeded +1	Goal Attained 0	Minor Shortfall - 1	Significant Shortfall -2
Minimise visual impacts	Borrow pit effectively contoured and ripped	Pit contours indistinguishable from surrounding landscape  Access tracks ripped	Pit contours blend in with surrounding landscape, although still evident	Pit sides battered and ripped along contours but pit still highly visible  Topsoil and vegetative material re-spread over disturbed area	Pit sides battered but not ripped	No re-contouring of pit has occurred – pit sides very steep  Topsoil and vegetative material not re-spread
Site to be left in a clean and tidy condition	Litter and other foreign materials removed	-	-	No litter and other foreign materials on pit footprint or surrounds	Scattered litter and/or other foreign materials on pit footprint or surrounds	Litter and/or other foreign materials common on pit footprint or surrounds

\* As described in Appendix B – Descriptive and Photographic Standards for GAS Criteria - of Review of Current Goal Attainment Scaling (GAS) criteria for borrow pit construction, use and rehabilitation within the Cooper Basin (Jacobs SKM, March 2014). See: [http://www.pir.sa.gov.au/petroleum/environment/research\\_projects](http://www.pir.sa.gov.au/petroleum/environment/research_projects)

\*\* Weeds are defined in these tables as any invasive plant that threatens native vegetation in the local area or any species recognised as invasive in South Australia.

\*\*\* Declared weeds are defined in these tables as any exotic plant species that are currently declared under the *Natural Resources Management Act 2004*.

**Note:** In a case where the landholder requests a borrow pit for pastoral watering purposes, pursuant to section 111(2)(b) of the *Petroleum and Geothermal Energy Act 2000*, the following may be applied to facilitate transfer of ownership and liability of the borrow pit to the landholder –

#### **111—Liability for damage caused by authorised activities**

(2) If a licensee provides the Minister with a report, made by an independent expert acceptable to the Minister, containing an assessment of the risk inherent in regulated activities, and of the precautions necessary to eliminate or minimise the risk, the Minister may enter into an agreement with the licensee under which—

(b) the licensee's liability under this section is limited or excluded.

## **Appendix C**

### **GAS Criteria for Production Facility Abandonment**

**GAS criteria for assessing the rehabilitation of abandoned production facilities**

Objective	Goals	Expected Goal Exceeded +2	Goal Exceeded +1	Expected Goal Attained 0	Minor Shortfall - 1	Significant Shortfall - 2
<b>Minimise visual impact</b>	Access tracks	The track contours and colour blend with the surroundings and the earthworks 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 is still prominent (e.g. ripping, rolling, respreading or original material)	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 scaped surface, windrows along its edges or gully erosion
	Interdune and floodplain sites	The site contours and colour blend with the surroundings and the earthworks disturbance is indistinguishable	The site contours and colour blend with the surroundings and the earthwork disturbance is beginning to blend also	The site contours and colour blend with the surroundings, but the earthwork disturbance is still prominent (e.g. ripping, rolling, respreading or original material)	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
	Dune Sites	The edge and colour of the site blend with the surroundings. The site contours are indistinguishable whether viewed from the top or base of the dune	The edge and colour of the site blend with the surroundings. The site contours are visible only when viewed from the top of the dune; they cannot be seen from the base. Erosion gullies are present down the face of the dune, but they are not extensive or prominent	The edge and colour of the site blend with the surroundings. The site contours are visible only when viewed from the top of the dune; they cannot be seen from the base. Erosion gullies are present down the face of the dune, but they are not extensive or prominent	The site has been restored to the natural contour of the dune, but the contour of foreign material contrasts with the surroundings	Extensive gully erosion down the face of the dune and / or steep site edge are prominent
	Gibber Sites	Site is indistinguishable from the surrounds	Site matches adjacent contours and the gibber is uniformly spread with no imported material evident	Site matches adjacent contours with some imported material that is still evident within the gibber spread	Site matches adjacent colours, but is visible due to inconsistent spreading of the gibber and some bare areas	Site is poorly formed and predominantly bare due to incomplete spreading or loss of gibber
<b>Revegetation of indigenous species</b>	Predictive rehabilitation on abandonment	N/A	N/A	There has been appropriate preparation of the ground surface to promote revegetation	The restored surface is inconsistent with the surroundings	No attempt has been made to restore the site
	Less than five years since abandonment	The revegetation is extensive and mostly consists of annuals and biennials; perennials are beginning to establish which is consistent with surroundings	The revegetation is extensive and consists of annuals and biennials; in contrast to the surroundings there are no perennials	Colonisation of the original species is starting to occur	Revegetation with inappropriate species	No revegetation is occurring
	At least five years since abandonment	The revegetation type, density and maturity is indistinguishable from the surroundings	The revegetation, mostly perennials, is consistent with the surroundings; but there is contrast in maturity between them	The revegetation consists of annual, biennials and perennials; but there are some bare patches which are inconsistent with the surroundings	The revegetation mostly consists of annuals and biennials; in contrast to the surroundings there are few perennials	There is no revegetation

Note: These criteria are consistent with PIRSA (2009) *Field Guide for the Environmental Assessment of Abandoned Petroleum Wellsites*.