STATEMENT OF ENVIRONMENTAL OBJECTIVES

Drilling, Completion and Initial Production Testing

PEL 73

STANSBURY BASIN

YORKE PENINSULA, SOUTH AUSTRALIA

DMS PARTNERS LP

JANUARY 2007

1 INTRODUCTION

1.1 Purpose

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

The intent of this SEO is to outline the environmental objectives that the operator of PEL 73, in southern Yorke Peninsula, is required to achieve during drilling and well operations including initial production testing if any, and the criteria upon which these objectives are to be assessed.

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

1.2 Relation to other SEOs

The SEO details the environmental objectives that need to be demonstrably achieved by the licensee to address the risks associated with this activity as detailed in the Environmental Impact Report for Gravestock 1, PEL 73 (Stansbury Basin, Yorke Peninsula) (Geoweste Pty Ltd and Fatchen Environmental Pty Ltd, August 2006).

1.3 Scope

This SEO applies to drilling and initial production testing operations in PEL 73 (Figures 1 and 2) as described in the EIR, but may subsequently be extended to other parts of PEL 73 in subsequent exploration. Those covered by this Draft SEO are:

- well site and access track construction
- drilling
- well completions and workovers
- production testing (both drill stem tests and any initial production testing)
- well and zonal abandonment
- site and access abandonment and remediation.

The following operations are not covered by this Draft SEO:

- seismic exploration activities
- production and processing operations beyond initial production testing.

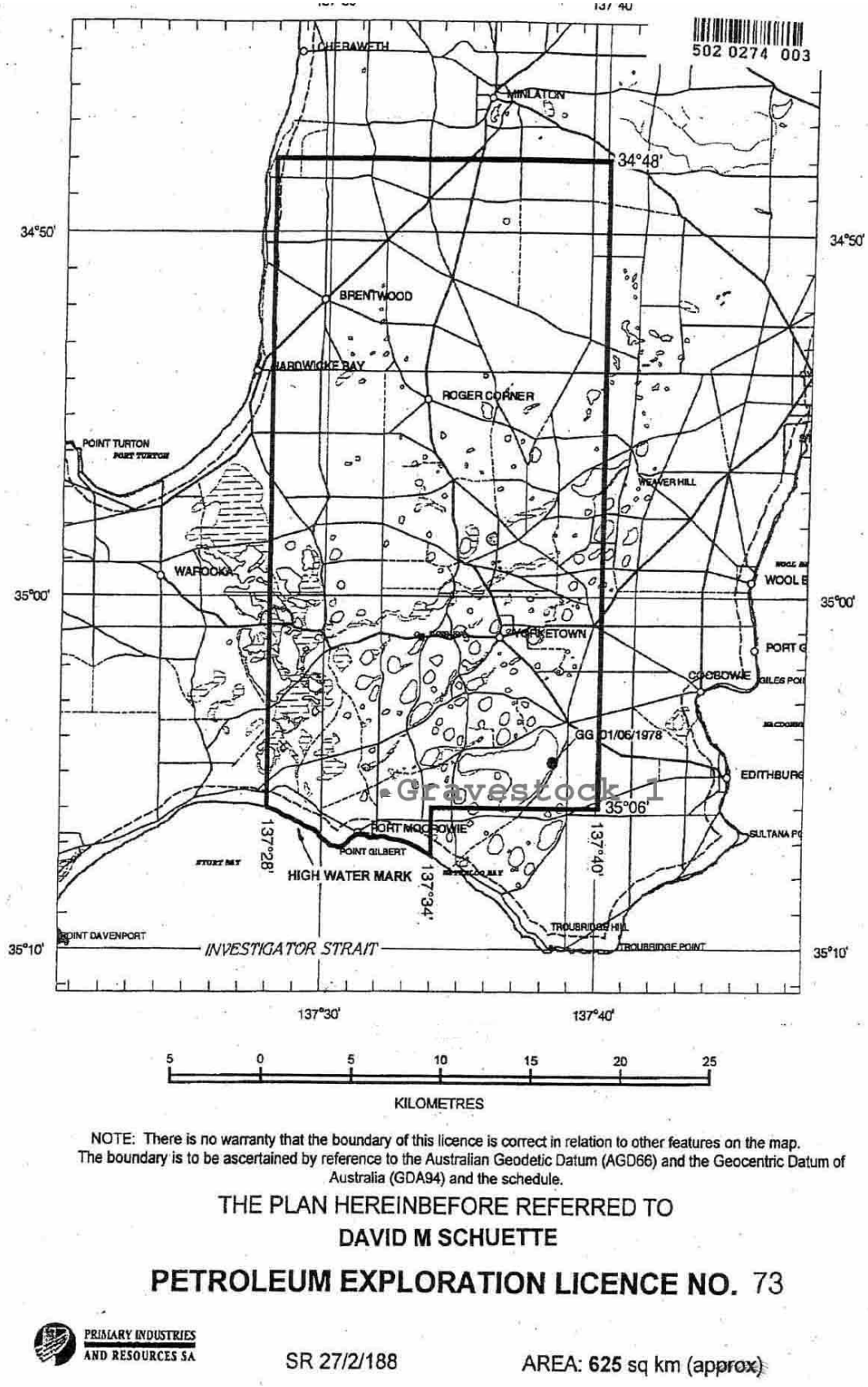

Figure 1. PEL 73 and Gravestock 1

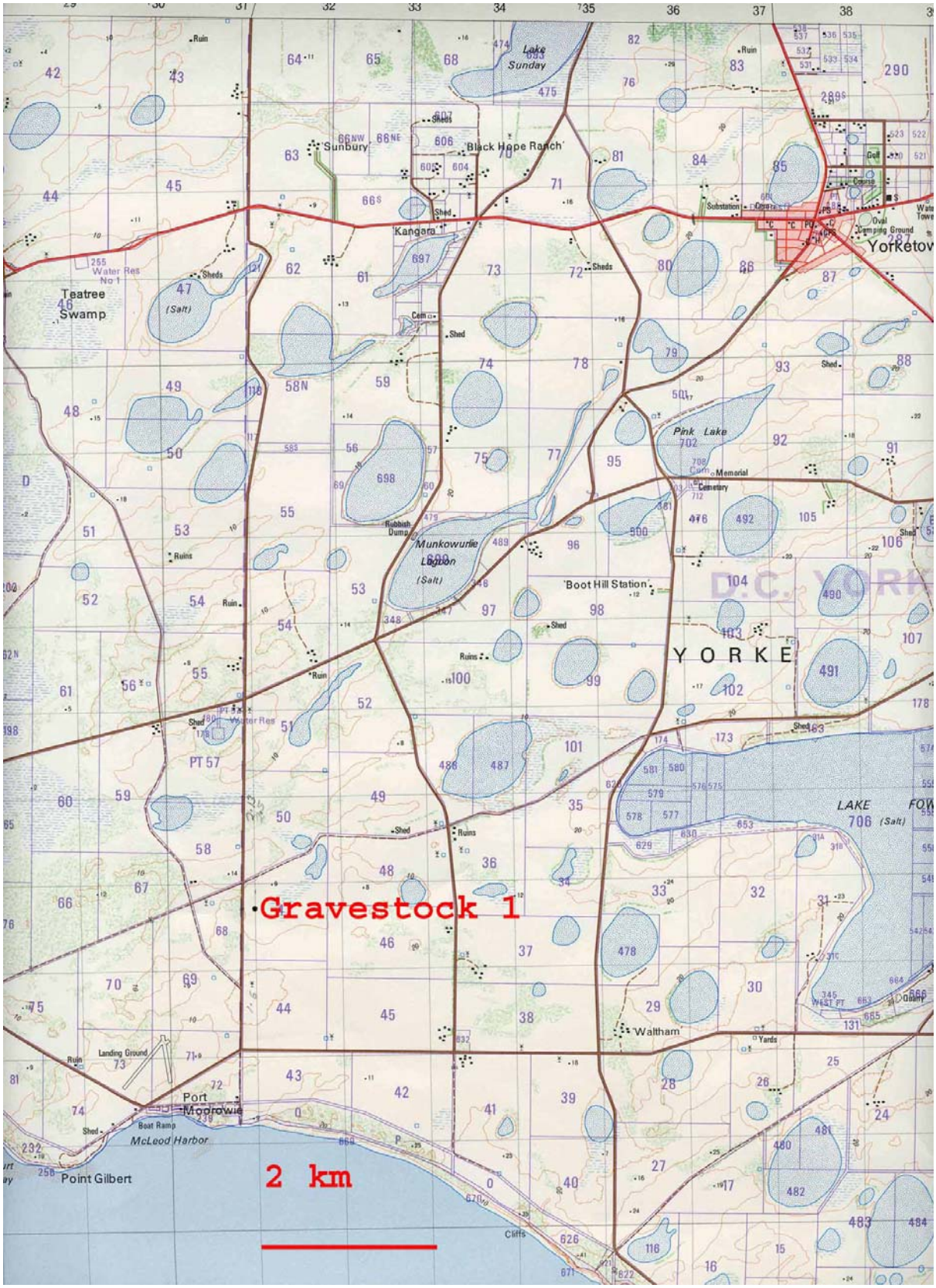

Figure 2. Part of PEL 73 showing topography and location of proposed Gravestock 1.

2 ENVIRONMENTAL OBJECTIVES

2.1 Objectives

Environmental 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 minimise environmental damage from activities involved in drilling and well operations.

Environmental hazards and risks of drilling and associated activities have been identified in the Gravestock-1 EIR (Geoweste Pt Ltd and Fatchen Environmental Pty Ltd, August 2006). The purpose of the SEO is to provide the environmental objectives to which drilling and related activities, including transportation and well testing, must conform, and the criteria upon which achievement of those objectives can be assessed, for consideration under Section 101(1) of the Act. A condition of approval of the activity is that the operator and licence holder is liable for meeting the environmental objectives and assessment criteria.

The relevant environmental objectives for drilling and well operations 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. Avoid disturbance to rare, vulnerable and endangered flora and fauna species.

3. Prevent the introduction and establishment of weed species.

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 the local community.

9. Minimise visual impact.

2.2 Assessment Criteria

The criteria for measuring the achievement of these environmental objectives are given in Table 1. Criteria generally take the form of defined conditions where the achievement of an objective can be judged through ensuring that those particular conditions are met or carried out. Examples are:

- Prohibitions of specific actions where the prohibition directly eliminates potential impacts. The best example is the objective "Avoid disturbance to sites of Aboriginal and non-indigenous heritage significance", for which one assessment criterion is compliance with the *Aboriginal Heritage Act 1988*.
- Requirements to undertake actions in accordance with approved procedures or industry accepted standards. For example, multiple aspects of the construction and operation of production, storage and loading facilities, and the safe transportation of oil are required to meet stated Australian Standards.

- Requirements to undertake actions or develop procedures to actively limit particular risks or minimise impacts where they do occur.

3 AUSTRALIAN STANDARDS

The drilling rig, its ancillary equipment and any testing equipment will all comply with the relevant industry standard.

4 INCIDENTS

4.1 Serious incidents

Section 85(1) of the Act defines "serious incident" to mean:

"an incident arising from activities conducted under a 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."

Pursuant to Regulation 12(2) of the Act, the incidents listed below are considered to be those which could arise and, if not properly managed or avoided, cause a serious incident:

- Explosion or fire at the well or loading facility;
- Spills of oil and/or chemicals which enter land off work site or into ground or surface waters;
- Transportation accident involving oil spillage;
- Transportation accident resulting in fire;
- Disturbance to sites of Aboriginal and non-indigenous heritage significance;
- Removal of rare, vulnerable or endangered flora and fauna species;
- Identification of cross flows in aquifers;
- Uncontrolled flows to the surface (i.e. blow out).

4.2 Reportable incidents

Pursuant to Regulation 12(2) of the Act, the incidents listed below are considered to be reportable incidents under Section 85(1) of the Act.

- Non-compliance with procedures defined or developed to implement environmental objectives
- Spills of oil outside bunded and other defined areas intended to contain spillages
- Failure of the formation water handling/disposal system;
- A complaint from a landowner in regard to operations.
- Any detected unauthorised access to production and processing facilities and associated infrastructure.

5 REFERENCES

Factchen, 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 the Assessment Criteria.* Report to MESA. DME 389/1994.

Geoweste Pty Ltd and Fatchen Environmental Pty Ltd (August 2006). Environmental Impact Report: Gravestock-1, PEL 73, Stansbury Basin, Yorke Peninsula, South Australia.

PIRSA Field Guide 2002. *Field Guide for the Environmental Assessment of Abandoned Petroleum Wellsites in the Cooper Basin, South Australia.*

6 APPENDICES

APPENDIX 1

Environmental objectives and assessment criteria

APPENDIX 1

ENVIRONMENTAL OBJECTIVES AND ASSESSMENT CRITERIA

OBJECTIVE	COMMENT	GUIDE TO HOW OBJECTIVES CAN BE ACHIEVED	ASSESSMENT CRITERIA
1) Avoid disturbance to sites of Aboriginal and non-indigenous heritage significance.	The aim of this objective is to ensure that any sites of Aboriginal and European heritage significance are identified and protected. The ALRM and Native Title Unit have been consulted. The Narungga National Aboriginal Corporation, who have traditional responsibility for the PEL73 licence area, have expressed concern regarding possible interference with salt pans and associated shoreline areas.	• Personnel are trained to identify and respond appropriately to any sites discovered during construction and operation activities. • All operations to avoid any access, by vehicle or on foot, to salt pans and associated shorelines. • Compliance with the Aboriginal Heritage Act 1988. • Proposed well site and access tracks have been surveyed and any sites of Aboriginal and European heritage identified.	• No disturbance to Aboriginal and non-indigenous heritage sites.
2) Avoid disturbance to rare, vulnerable and endangered flora and fauna species.	Most of the district, and particularly the initial Gravestock-1 site, has been cleared of native vegetation. It is possible that relict species may still persist in isolated pockets on properties and in roadside vegetation.	<u>Wellsite and Access Track Construction</u> • The drilling pad and access road will have been scouted previously for rare, vulnerable and endangered flora and fauna species by appropriately trained and experienced people before commencement of construction. • Areas to be affected by construction of the campsite, sump and flare pit will be scouted for rare, vulnerable and endangered species by appropriately trained personnel before commencement of operations. • Records of such scouting are kept and available for auditing <u>Drilling and Production Testing Activities</u> • Confinement of flammable sources, restrictions on certain procedures and ready access to suitable fire fighting equipment. • Construction of proper fire break around wellsite area and access track. • Response to fire included in Emergency Response Plan.	<u>Wellsite and Access Track Construction</u> • Any sites of rare, vulnerable and endangered flora and fauna have been identified, flagged and subsequently avoided. • The attainment of 0, +1 or +2 GAS criteria (refer to PIRSA Field Guide 2002) for the re-vegetation of Indigenous species. <u>Drilling and Production Testing Activities</u> • No fires during drilling and production testing activities.

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		• Fire risk included in compulsory induction. • Fire trailer on site for activities conducted during fire season and drill crews to receive fire fighting training. • Advise CFS when conducting well testing / flaring. • Advise CFS of water volumes available on site. • Request CFS presence if flaring during bushfire season. • Maintain pumps and water supply in readiness during periods of high fire danger.	
3) Prevent the introduction and establishment of exotic weed species.	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.	• All vehicles and equipment entering the region to be assessed for risk of transporting weeds and plant pathogens. • Records relating to the assessment are kept and are available for auditing • The landowner is aware of the risk and approves the procedures. • The site and access will be monitored on a regular basis for new weed species and treated as necessary in accordance with the landowner's wishes.	• No introduced exotic weed species as a consequence of activities.
4) Minimise impacts to soil.	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. This creates a visual impact and can also alter the soil characteristics that can in turn impact on the effective re-establishment of crop, pasture or native vegetation. The site has been 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	<u>Wellsite and Access Track Construction and Restoration</u> • Orientate site constructions to minimize soil removal. • Soil removed in construction to be stored on site and returned to its original stratigraphic level upon restoration of the drill site. • Restoration of the drill site to be approved by the landowner or in accordance with landowner's wishes should retention of specific parts of the site be requested (e.g. pad).	<u>Wellsite and Access Track Construction</u> • No disturbance to soil profiles as a result of construction activities. • No significant increase of surface limestone on surface following restoration. <u>Drilling and Production Testing</u> • No soil contamination as a result of drilling and production testing activities.

OBJECTIVE	COMMENT	GUIDE TO HOW OBJECTIVES CAN BE ACHIEVED	ASSESSMENT CRITERIA
	correct order. Another potential impact to soil is soil contamination from accidental spillages of chemicals or hazardous substances during well operations. All contaminated soil will be removed and replaced with clean fill or will undergo bio-remediation. "Sokerol" absorbent material will be stored at the rig for use in the event of a spill. Precautions will be taken to prevent and contain spills at all sites where fuels are used or transferred (generators, vehicle re-fuelling). Bunded pits will be constructed to collect any oil and grease at the campsite and drill rig generators and initial production storage tanks. Waste refers to all wastes with the exception of the Listed Wastes in Schedule 1 Part B of the Environment Protection Act 1993. Liquid and solid waste will be treated as discussed in the Environmental Impact Report. All waste removal contractors will be licensed and will operate within EPA guidelines.	• Approval by the landowner of all work. • Avoid initiating disturbance of shallow limestone in subsoil, substrates and any area of relief such as palaeo-dunes. <u>Drilling and Production Testing</u> • Sump to have capacity 2.5 times hole and surface volume. • Any oil contamination of sump from contaminated drill cuttings to be controlled by an absorbent barrier and pumped out to a disposal tank. • Camp and drill rig generators to be located in polyethylene lined bunded areas to contain any spills. • Production storage tanks to be stored in polyethylene lined bunded pits. • Initial production lines and tanks to be inspected prior to use. • MSDS information readily available on the well site. <u>Fuel and Chemical Storage and Handling</u> • Fuel tanks and delivery systems are to be inspected by DMS Partners Drilling Supervisor for any potential leaks and refused entry to the site if found to be unsuitable. • Hazardous material stored, used and disposed of in accordance with relevant legislation on dangerous substances. • All hazardous materials stored in approved containers in polyethylene lined bunded area. • Any contaminated soil removed from the site will be treated / disposed of at an EPA approved facility.	<u>Fuel and Chemical Storage and Handling</u> • No spills/leaks outside areas designed to contain them. • All oil spill bio-remediation meets end point assessment criteria of 0.1% total petroleum hydrocarbons 12 months after the spill (unless a more specific end point is prepared for this region). <u>Waste Management</u> • No soil contamination as a result of waste storage and disposal

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		• Fuels, oils and chemicals are to be stored in polythene lined bunded pits. <u>Waste Management</u> • All wastes generated on wellsite (except grey water) recycled or disposed of at an EPA licensed facility. • Septic tanks will be used at camp and drill rig ablutions. • At completion of drilling septic tanks will be pumped out by a licensed septic waste removal contractor and disposed of at a licensed facility. • All wastewater disposed in accordance with the *Public and Environmental Health (Waste Control) Regulations 1995.*	
5) Minimise loss of reservoir and aquifer pressures and avoid aquifer contamination.	This objective seeks to protect the water quality and pressure of any aquifers and to maintain pressure in potential petroleum aquifers. There are no known significant nearsurface or useable aquifers in the vicinity of Gravestock 1. Attempts to locate borewater have been unsuccessful with insufficient flow volumes on pumping and high salinities. Groundwaters are too saline for stock. For Gravestock 1 a site specific drilling / casing / cement plugging program has been devised as a precautionary measure. Casing will be centered with centralisers to ensure full radial cement coverage, mud cake will be removed to maximize cement bond to formation and excess cement	<u>Drilling and Completion Activities</u> • Observed volumes of cement return to surface match calculations. • Where there is evidence of insufficient isolation, remedial action such as cement squeeze to be conducted. <u>Well Abandonment Activities</u> • Well abandonment program to be submitted to PIRSA with wireline logs for prior approval. • Plugs set to isolate potential aquifers through the well bore. • Records of plug depths and intervals are kept.	• No aquifer contamination as a result of drilling, completion or production testing activities. <u>Drilling and Completion Activities</u> • No uncontrolled flow to surface (i.e. blow out). • Sufficient barriers exist in casing annulus to prevent crossflow between separate aquifers or hydrocarbon reservoirs. <u>Production Testing and Well Abandonment Activities</u> • No cross-flow behind casing between aquifers, and between aquifers and hydrocarbon reservoirs unless approved by the Department of Water, Land and Biodiversity Conservation.

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	volumes will be pumped to cater for unforeseen cavities and overguage hole.		
6) Minimise disturbance to drainage patterns and avoid contamination of surface waters and shallow groundwater resources.	Near-well bore invasion by mud filtrate is an accepted process during drilling. Near-surface sediments in the vicinity have very low permeabilities restricting invasion. Conductor casing will be cemented through near-surface sediments into Permian claystone. High groundwater and deeper formation salinities limit contamination from saline drilling fluids. Potential spills can originate from the well while the well is producing or from the mud pits during drilling. Drilling fluid materials that may contribute to pollution will be clearly identified and stored securely. Due to the small and confined area impacted on well sites, there should be minimal impact to surface water drainage patterns. The main threat to surface water is contamination from spills during times of heavy rainfall and localised flooding. The area receives low rainfall and the sump ahs been designed to contain a large volume. If required the sump may be pumped and excess fluid disposed at an approved waste facility.	<u>Wellsite and Access Track Construction and Restoration</u> • Any soil removed during the construction of the drill pad will be respread over the disturbed area during restoration. • Any area artificially elevated via pad or access track construction will be lowered to original ground level by removal of paving material unless otherwise instructed by the landowner. • Original drainage patterns will be restored. • Restoration will be completed by light plowing of the area and sowing a crop. <u>Drilling and Completion Activities</u> • Information on muds and chemicals to be readily available on the rig. • 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. <u>Drilling and Production Testing</u> • Sump to have capacity 2.5 times hole and surface volume. • Any oil contamination of sump from contaminated drill cuttings to be controlled by an absorbent barrier and pumped out to a disposal tank. • Camp and drill rig generators to be located in	<u>Wellsite and Access Track Construction and Restoration</u> • No disturbance to drainage patterns as a result of construction activities. <u>Drilling and Production Testing Activities</u> • No contamination of surface waters and shallow groundwater resources as a result of drilling or production testing activities. <u>Fuel and Chemical Storage and Handling</u> • No spills/leaks outside areas designed to contain them.

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		polyethylene lined bunded areas to contain any spills. • Production storage tanks to be stored in polyethylene lined bunded pits. • Initial production lines and tanks to be inspected prior to use. <u>Fuel and Chemical Storage and Handling</u> • Fuel tanks and delivery systems are to be inspected by DMS Partners Drilling Supervisor for any potential leaks and refused entry to the site if found to be unsuitable. • All hazardous materials stored in approved containers in polyethylene lined bunded area. • Fuels, oils and chemicals are to be stored in polyethylene lined bunded pits.	
7) Minimise risks to the safety of the public, employees and other third parties.	The guide to how to achieve this objective have 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 cross flow). Rig practices need to be monitored and training / induction programs maintained and upgraded as necessary. The wellsite will be under the control of Drilling Supervisor. 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	<u>Unauthorised Access by Third Parties</u> • "No Entry" signs warning of dangers associated with drilling operations placed at the entry to the site access track • Site area to be fenced with a gate on the access track which will be locked when the site is not attended. • Wellsite office and parking area located adjacent to the access track between the public road and the wellsite. • Drilling Supervisor and Drilling Contractor Manager given authority to refuse entry of unauthorized third parties. <u>Drilling and Completion Activities</u> • Drill rig, ancillary and any testing equipment to comply with Regulations, meet relevant industry standards and be "Fit for Purpose".	• No injuries to the public or third parties as a result of drilling, completion and production testing activities.

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	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. Abandonment plugs must be set to ensure long term isolation of any potential aquifers intersected or shallow zones may become overpressured. Rural areas typically have high vehicle speeds on main roads and intersections with minor roads are hazardous. Dust resulting from drilling activities and supply truck movements may become inconvenient and a road safety issue and roads will be sprayed with water as required.	• 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 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. <u>Well Abandonment Activities</u> • 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. <u>Vehicle Movement</u> • Control production and dispersion of dust on unsealed roads and drilling lease areas. • On identification of a dust problem, roads will be sprayed with water • 50kph peed limit on unsealed roads included in all inductions. • Speed reduction signs to be positioned on unsealed roads vicinity of wellsite.	

OBJECTIVE	COMMENT	GUIDE TO HOW OBJECTIVES CAN BE ACHIEVED	ASSESSMENT CRITERIA
		Wellsite Restoration Activities • Assessment of the threat to third parties from well completion / downhole abandonment. • Necessary measures 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.	
8) Minimise disturbance to the local community and other land users.	Slow heavy vehicle associated with operations can cause interference to local community vehicular traffic. The cleared open nature of the region minimizes natural attenuation and makes noise moderation difficult. Drilling rigs are inherently noisy and need to operate 24 hours per day. Where possible wellsite buildings and other structures will be placed to act as noise barriers. The main risk to livestock is injury from vehicle movements open sumps and cellars. The wellsite will be fenced to the landholder's satisfaction. The landholder has stated that he does not intend to run stock on the land, but to rotate crops. An unconfined spill may contaminate the soil and crops. Spills must invoke a rapid response by drilling personnel to minimise impact on he environment and any stock.	• Driver behaviour and vehicle speed limits to be included in compulsory induction. • Rig mobilization ad demobilization to detour around town centres. • Major vehicle movements to be scheduled so as to not clash with school bus times. • Local community properly informed of major vehicle movements and increased usage of particular roads. • Plan vehicle movements and schedule activities as best as possible to minimize inconvenience. • Noise limitation to be included as part of induction procedures (e.g. noisy tubular/pipe handling, unnecessary use of horns). • Heavy truck drivers to be instructed not to use engine brake near dwellings. • Vehicle speed limits observed. • Adequate fencing of wellsite area to landholders satisfaction. • In the event of an oil spill, contingency plan to be implemented after the spill event. • In the case of an abandoned restored site, the entire area has been restored to original landsurface topography with no irregularities likely to cause injury to running stock.	• No adverse impact on livestock as a result of activities. • No complaints from the local community or other land users

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9) Minimise visual impact.	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 Field Guide 2002).		• The attainment of 0, +1 or +2 GAS criteria (refer to PIRSA Field Guide 2002) for minimising visual impact.