EMPIRE OIL & GAS NL

Management of Red Gully North-1 Environment Plan Summary

EGO-HSE-RGN1-EP-002SUM

Issue Date: 26/06/2017

1 Term Definitions and Abbreviations

Abbreviation	Definition
ALARP	As Low as Reasonably Practicable
DBNGP	Dampier to Bunbury Natural Gas Pipeline
DMP	Department of Mines and Petroleum
Empire	Empire Oil & Gas NL
EP	Environment Plan
ESA	Environmentally Sensitive Area
GDE	Groundwater Dependent Ecosystem
HSEQ	Health, Safety, Environment and Quality
OSCP	Oil Spill Contingency Plan
PEB	Petroleum Environment Branch
RGN1	Red Gully North-1 Well
RGPF	Red Gully Gas Pipeline and Processing Facility
SDS	Safety Data Sheet
WIA	Well Intervention Activities

2 Contact Details

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3 Location

RGN1 is located approximately 24km north of the Gingin town site within Exploration Permit EP389. Primary access to the site is via Brand Highway, Wannamal Road West and a 5.4km upgraded farm access track. The coordinates for RGN1 are presented below.

Location	Easting	Northing
RGN1	388 053 mE	6 553 753 mN

4 Timeframe

RGN1 is currently under care and maintenance with occasional well intervention activities.

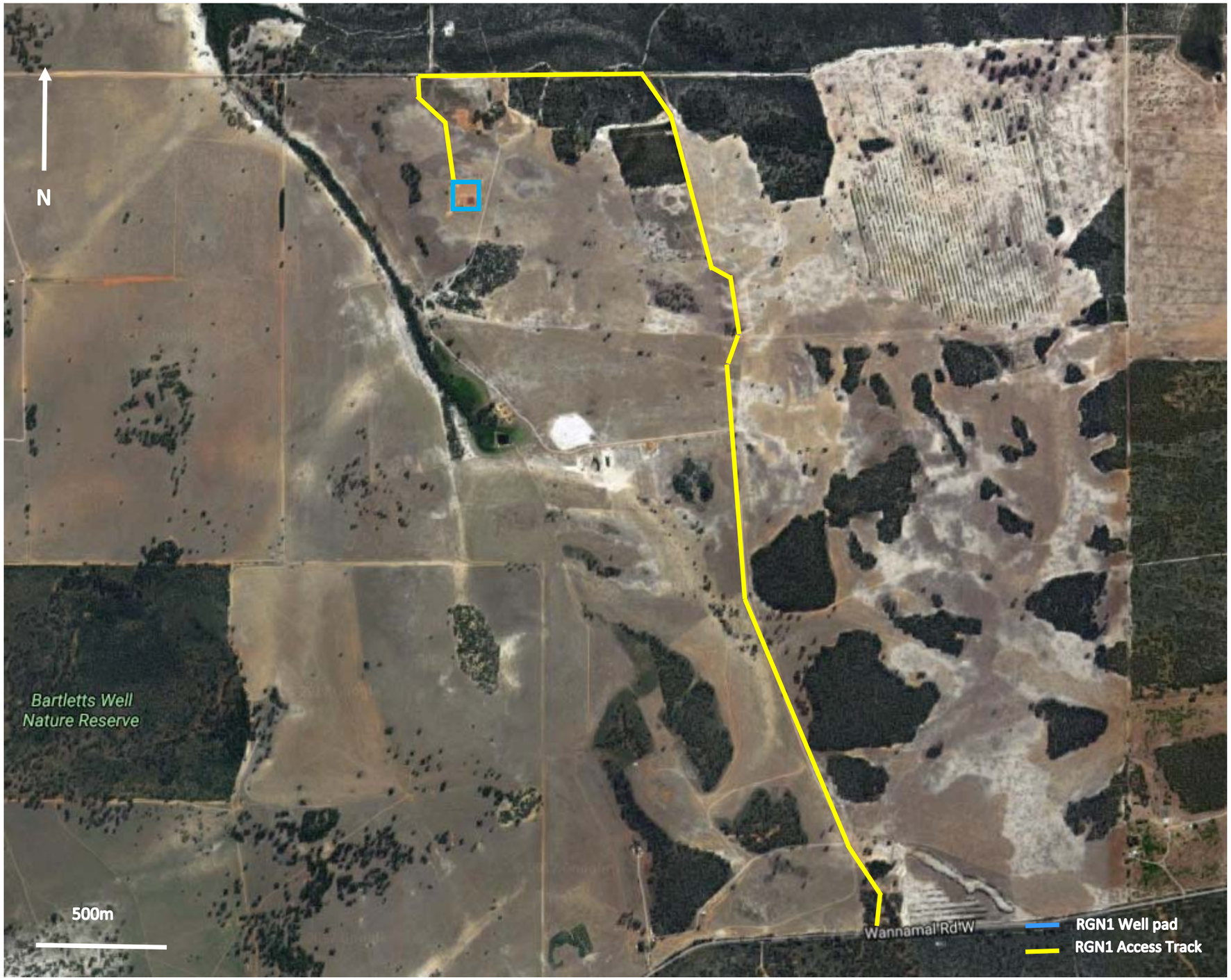

Figure 1: RGN1 Access

Figure 2: RGN1 and associated infrastructure

5 Description of the Existing Environment

A description of the environment in the RGN1 area is included in Table 1. Figure 3 indicates sensitive receptors with respect to RGN1. RGN1 is located on grazing land.

Table 1: RGPF Flowline Details

Aspect	Detail
Climate	Mediterranean climate characterised by seasonal patterns of hot, dry summers and mild, wet winters
Soils	Red and yellow earthy sands over calcareous rocks and siliceous rocks
Surface water	Red Gully Creek South (300m west) Red Gully Farm Soak (1km south) New Springs Seep (3.5km south)
Groundwater	Yarragadee Aquifer is approx. 300m below surface with superficial aquifers at approx. 10m. RGN1 has a groundwater monitoring bore in the superficial aquifer. No identified GDEs in the area
Conservation Areas	No Bush Forever sites in the area Bartlett Well Nature Reserve (1.7km southwest) [Register of the National Estate and Redbook Area] Boonanarring Nature Reserve (3.3km south of RGN1) ESA (3km southwest)
Vegetation	Cleared farmland. No DRF or ecological communities of national or state significance within 1.7km. 11 invasive flora species identified
Fauna	Introduced fauna including stock and feral animals. Vegetated areas could provide habitat to 14 listed species of native fauna. Operations will not impact on significant fauna habitat
Heritage	Inspections have found that there are no areas of Aboriginal or European heritage in the operational area. Red Gully Creek South (300m west) could hold aboriginal significance
Socio-economic	Gingin town site (22km south) Land use within the surrounding region is agricultural and infrastructure including RAAF tracking and communications, DBNGP, Parmelia Pipeline and telecommunications

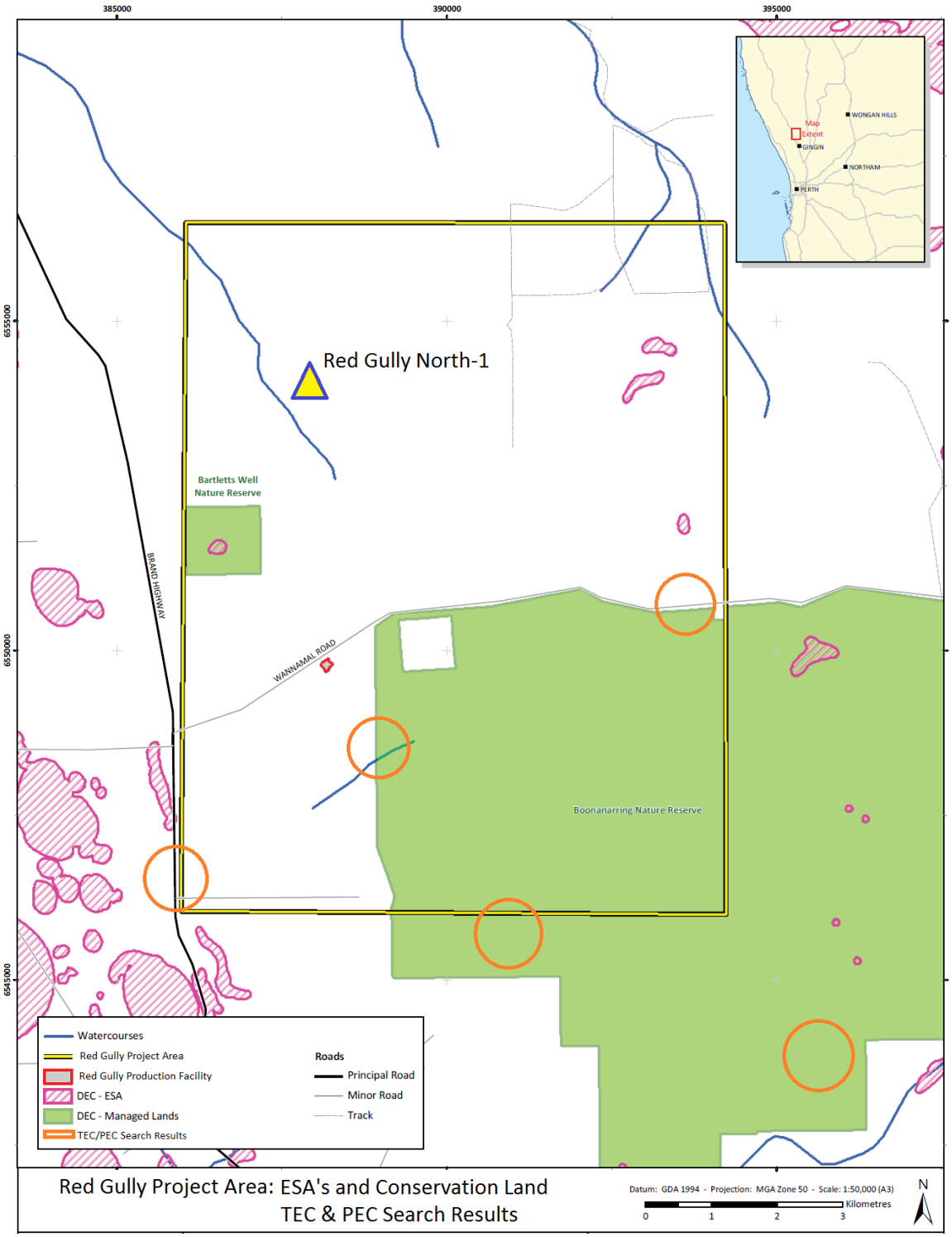

Figure 3: RGN1 with reference to Environmental Sensitivities

6 Facility Description

The scope of this EP is for operations associated with Red Gully North-01 and includes the following infrastructure:

- RGN1 access track
- RGN1 wellhead compound
- Gravel Pit

Section 2.6 describes this infrastructure in further detail.

RGN1 activities are managed centrally via the Red Gully Gas Pipeline & Processing Facility (RGPF) under this EP. RGPF operations are managed under the Red Gully Gas Pipeline & Processing Facility Environment Plan [EGO-HSE-RGPF-EP-001].

All personnel for activities associated with RGN1 operations are accommodated offsite or at the permanent RGPF camp.

All RGN1 activities are within existing disturbed areas. Access is via Brand Highway and Wannamal Road.

6.1 Infrastructure

6.1.1 Access Track

A 5.4 km gravel sheeted access track through Red Gully Farm (Lot 5448) runs from Wannamal West Road to the RGN1 well pad. The track entrance has a cattle grid and the track is a farm ringlock fenced 'laneway' with up to 7 gates restricting access along its route up to paddock 9 (RGN1 well pad location) (status of gates depend on farm operations).

The access track was previously farm tracks, firebreaks and fence lines prior to drilling construction activities. The track is gravel sheeted and elevated, to allow transport of heavy equipment, minimise dust and reduce water pooling and erosion risks. Drainage breaks are installed on the sides of the track at risk prone low lying areas. There are three wider sections to allow vehicles to pass along the access track.

The speed limit along the access track is 40 km/hr and 10 km/hr on the well pad. A 40km/hr speed limit sign and livestock warning sign are posted near the access track entry.

6.1.2 Well pad

The fenced RGN1 wellhead compound is approximately 2 ha (Figure 2). The compound is graded and contains:

- Wellhead and cellar with surrounding 300mm berm and fauna egress
- Lined and fenced cuttings sump with surrounding 300mm berm and fauna egress
- Lined and fenced turkey's nest with fauna egress
- Flare pit
- Groundwater bore

6.1.2.1 Wellhead

The wellhead is contained within a secure chain mesh fenced compound. Schematics have been included of the well completion (Figure 8) and wellhead schematics for RGN1 (Figure 9 & 10).

6.1.2.2 Cuttings Sump

The cuttings sump liner is a fortified polyolefin 0.75mm thickness 'Enviro Liner 6030HD' with a permeability of 3×10^{-10} mm/s permeability. The cuttings sump is maintained with a 500 mm freeboard.

6.1.2.3 Turkey's Nest

The turkey's nest has a 0.5mm LLDPE (Linear Low Density Poly Ethylene) liner. The turkey's nest is maintained with a 500 mm freeboard. Water is supplied to site via the groundwater bore or water tanker from offsite. Alternatively water is used directly from offsite tanker.

6.1.3 Gravel Pit

The existing Red Gully Farm Gravel Pit can be utilised as a source of gravel for earthworks activities.

6.1.4 Additional Equipment associated with WIAs

Equipment that may be brought to RGN1 during WIA could include:

- Vehicles including light vehicles, trucks, utilities, cranes, telehandler, diesel refuelling vehicle
- Trailers including utility, equipment, mobilisation and water trailers
- Site huts and containers
- Bunded generators
- Fire extinguishers and spill kit
- Chemicals and oils and greases
- Pipework and downhole equipment and tools
- Equipment for specific WIAs
- Waste receptacles

6.2 RGN1 Operational Details

Care & Maintenance activities include:

- Routine inspections (weekly security check, wellhead pressure monitoring)
- House keeping
- Infrastructure maintenance including access track, well pad, cuttings sump
- Environmental management including weed control and groundwater monitoring
- Contingency activities ie. liquid load out from cuttings sump/cellar/turkey's nest or well venting
- Progressive rectification works eg. flare pit, turkey's nest or cuttings sump
- Well Intervention Activities:
    - Wellhead maintenance
    - Slickline
    - Wireline
    - Pumping
- Auditing
- Reporting

Well intervention activities (WIAs) are performed on an "as required" basis. WIAs generally run for approximately 14 days, which includes the mobilisation / demobilisation time. A blow out preventer (BOP) is used during WIA (if required). Low pressure WIA may not necessitate a BOP.

All well intervention activities requiring down-hole chemical injection will be conducted under a bridging document which contains disclosure of down-hole chemicals to the requirement of DMP PEB (eg. Pumping, cement squeezing, plug and abandonment, coiled tubing, well side-tracking).

6.2.1 Wellhead Maintenance

The condition of the wellhead affects the complexity of this operation. Scheduled annual maintenance may simply involve greasing and pressure testing the valve on the hardware using a grease trailer and high pressure pump.

6.2.2 Slickline

Slickline operations may be used for fishing, gauge cutting, setting or removing plugs, deploying or removing wireline retrievable valves and memory logging.

Slickline units use long, smooth, unbraided wire, often shiny, silver/chrome in appearance. It comes in varying lengths, according to the depth of the well. The unbraided wire is spooled off a drum on the back of a slickline truck to use down hole tools in the well. The tools lowered into an oil or gas well are used to perform a specified maintenance job down hole. Slickline units may require a crane to lift the lubricator.

The slickline operator monitors at surface the slickline tension via a weight indicator gauge and the depth via a depth counter 'zeroed' from surface to ensure the down hole tool is lowered to the desired depth. The job is completed by manipulating the down hole tool mechanically. Checks are undertaken to ensure the job has been completed (if possible), and then pulls the tool back out by winding the slickline back onto the drum it was spooled from. The slickline drum is controlled by a hydraulic pump, which is controlled by the operator.

Slickline comes in different sizes and grades. The larger the size, and higher the grade, generally means the higher line tension can be pulled before the line snaps at the weakest spot and causes a costly 'fishing' job.

6.2.3 Wireline (cabling)

The term wireline usually refers to cabling technology used by operators of oil and gas wells to lower equipment or measurement devices into the well for the purposes of WIA and reservoir evaluation.

Braided line can contain an inner core of insulated wires which provide power to equipment located at the end of the cable, normally referred to as electric line, and provides a pathway for electrical telemetry for communication between the surface and equipment at the end of the cable. Occasionally braided line is used for swabbing operations where liquid is removed from the well.

The wireline apparatus resides on the surface, wound around a large portable spool on the back of a special truck. A motor and drive train turn the spool and raise and lower the equipment into and out of the well. Wireline units may require a crane to lift the lubricator.

6.2.4 Pumping

This is the simplest form of intervention, as it does not involve putting hardware into the well itself. Frequently it simply involves rigging up to the kill wing valve on the Xmas tree and pumping liquid and chemicals into the well using a pump. This may consist of well control inhibited liquid, diluted acid with water, cement slurry, and wax dissolver.

6.3 Oil Spill Contingency Plan

The preparedness planning and management of a spill associated with RGN1 is in accordance with the OSCP. The OSCP defines how field and Perth office teams would respond to a hydrocarbon/chemical spill incident in a manner which minimises the impact on the environment. Spill sources applicable to RGN1 operations include:

- RGN1 wells
- Machinery/equipment
- Vehicles
- Cuttings Sump

- Transfer operations
- WIA equipment /sundries

One emergency response drill managed under the OSCP will be conducted annually.

6.4 Details of Chemicals and Other Substances

No chemicals or other substances will be introduced into the RGN1 well, reservoir or subsurface formation as part of RGN1 Operations without an approved Environment Plan Bridging Document.

7 Environmental Impacts and Risks

The environmental risks and management identified for the commissioning and operations activities ranked medium or above are presented in Table 2.

Table 2: Risk Assessment Table (Medium or Above)

Aspect	Source of Risk	Potential Impacts	Controls	Risk Ranking (Post Treatment)		
			Description	Consequence (0-5)	Likelihood (A-E)	Residual Risk
Security	*Sabotage*	*Loss of Containment*	• 4km inland from main road – no road signage to identify location • Secure fencing that is locked around well head • Stock fencing and access gates enroute to location • Farm management presence • Minimal equipment on site that can be handled • Tree valves locked on well • Regular visits from personnel to location for inspections – weekly work order (any hazards reported)	3	A	Medium
Fire	*Bushfire* *WIA event*	*Loss of fauna, habitat or personnel* *Public third party damage* *Loss of containment*	• Large pad (2 ha) • Empire vehicles have access to fire extinguisher • Presence of farming management within the area • Vicinity of RGPF within a short distance (5km) • Firefighting equipment on site for WIA • Fire trailer available for use at site • Ongoing communication with Gingin Shire (Emergency Response) • Weed control management • Exemptions under Bushfires Act in place where required • (Risk assessed for site originated fires)	4	A	Medium
Soil and Landform	*Soil erosion* *Vehicles* *Vegetation clearing (Fire breaks, weed spraying)* *Weather* *Third Party* *Ground disturbance activities*	Loss of habitat Exceeding approved license (clearing permit) Erosion Dust Soil compaction Local complaints	• Berm (300mm) around the cutting's sump and well head – which is maintained as identified during inspection regime • Inspection (weekly) checklist • Weed control management • Erosion remedial works undertaken where erosion rills are greater the 0.3m x 10m • Cleared areas kept maintained • Pad is fenced preventing third party access (limited) • Access track and well pad are fenced to ensure access to cleared areas only • Access track maintained for heavy loads	1	E	Medium
Noise Emissions	*WIA* *Vehicles*	Complaint from stakeholders Disturbance of fauna	• Limited noise associated with activities on site • Remote location • Stakeholder consultation • Limited gas venting for WIA	1	C	Medium

Aspect	Source of Risk	Potential Impacts	Controls	Risk Ranking (Post Treatment)		
			Description	Consequence (0-5)	Likelihood (A-E)	Residual Risk
Air Emissions	*Vehicle / stationary engine exhaust* *Plant machinery* *WIA venting*	Adverse greenhouse gas emissions	• Low volume of vehicle movement • Short duration of WIA campaigns • Minimal equipment on site • Generator sets utilized on site as required • NGER reporting	1	D	Medium
Fauna	*Vehicle collision* *Behavioural disturbance due to physical presence* *Fauna drowning* *Effects of chemicals*	Dead or injured animals	• Low volume of vehicle movement • Traffic signage (including speed limits) on access roads • Minimal equipment utilized on site • Short duration of WIA (lighting) • Fauna egress matting in turkeys nest and cuttings sump • Cellar has grated covering • Fencing around the wellsite, wellhead, cuttings sump and turkeys nest • Open pipework capped • No long term storage of chemicals • Chemicals contained and secured on site • Waste containment covered, secured and disposed offsite • Access track and well pad are fenced to ensure access to cleared areas only • Induction includes fauna awareness • No human interaction with animals – report to PIC	1	C	Medium
Groundwater	*LOC from cuttings sump* *LOC well integrity*	Ground water contamination	• Weekly annulus pressure monitoring • Visual inspections of the liner of cuttings sump • Annual ground water testing • Mitigation measures described in above aspects • Maintain levels in the cuttings sump of 500mm	3	A	Medium
Surface Water	*LOC from cuttings sump*	Surface water contamination	• Mitigation measures as described in above aspects • Maintain levels of the cuttings sump of 500mm • Maintain berms around cuttings sump to 300mm • Prevent well pad erosion from undermining cuttings sump • Access track and well pad are fenced to ensure access to cleared areas only • Weekly inspections of well pad area	3	B	Medium
Wellhead Operations (WIA)	*Fuel, oil or chemical spills* *Gas release* *Oil release* *Overpressure of line* *Pipework leak / failure* *Loss of Well Control* *Blowout* *Uncontrolled Vehicle access*	Contaminated soil Ignition of release – resulting in fire Mortality of Flora/Fauna Landowner complaints Legislative Non compliance Atmospheric emissions	• Details as mentioned in above control measures for this assessment (refer to Aspects) • Approved program with DMP for operation • Trained and competent personnel supervising activity • Daily reports and documents, fuel usage and well inspection • Site access and induction requirements to be rolled out for all personnel. • General area has low population density and is remote from high density populations	2	B	Medium

Aspect	Source of Risk	Potential Impacts	Controls	Risk Ranking (Post Treatment)		
			Description	Consequence (0-5)	Likelihood (A-E)	Residual Risk
	Site wastes and chemicals not removed at end of program *Failure to meet Environmental commitments* *Ignition from non-intrinsically safe equipment* *Sabotage* *Human error* *Systems failure* *Movement of equipment* *Nitrogen gas release* *Chemicals being released down hole*		• Chemicals oriented within bunded areas as required • Containers checked to ensure they are in sound order • Operate equipment to specifications and vendor standard procedures • Routine maintenance (work order) and weekly inspections • Document [EGO-HSE-PRO-036] Waste Management Procedure • OSCP and ERP in place • Blow out preventer (if required) in use and regularly tested • Diesel vehicles only on well pad • Segregation of wastes and stored appropriately for offsite disposal by waste management contractor • Short duration of WIA • Site inspection at conclusion of WIA • Annual environmental report at RGN1 • Light at project infrastructure will be turned inwards to minimise the risk of attracting some native fauna • Stakeholder register and communication strategy in place and implemented • Empire owned site vehicles to be equipped with fire extinguisher • Permanent RGPF personnel to be trained in use of fire extinguishers • All spills cleaned immediately if safe to do so in accordance with OSCP requirements • Third party training matrix and certification checked to comply with WIA activities • Upstream PS PTW shall be implemented • Pre start/tool box meeting • Completion of pre operation checklist • Chemical handling on surface to be in accordance with Standard Operating Procedures • SDS available for all down hole chemicals • Generators are bunded • Diesel refueling vehicle has spill kit and drip tray • Low noise activity			
Unplanned Site Event	*Major loss of containment (eg. Well integrity failure)* *Cuttings sump liner failure*	Fire Hazard Greenhouse gas emissions Spills and soil contamination Ground water contamination	• Mitigation measures as described in the above aspects • Mitigation measures as discussed in the aspect WIA • Well design • Annulus pressure monitoring (weekly) • Annual monitoring bore water sample	3	B	Medium

8 Implementation Strategy

The objective of the implementation strategy below is to describe how all aspects of the activity will be directed, reviewed and managed to ensure that all potential impacts and risks are continuously reduced to ALARP:

1. Ensure that the agreed environmental performance objectives and standards are met
2. Identify specific systems, practices and procedures to be used to ensure that environmental risks and effects are reduced to ALARP
3. Establish a commitment to the protection of the environment
4. Establish a clear chain of command that sets out the roles and responsibilities of Personnel in relation to the implementation, management and review of the EP
5. Ensure that each Employee or Contractor working on or in connection with RGN1 has the appropriate skills and training
6. Monitor, audit and review environmental performance and the Implementation Strategy
7. Maintain quantitative records
8. Develop and implement emergency and spill preparedness planning and response capability
9. Report on environmental performance
10. Provide for appropriate consultation with relevant government authorities and other interested persons or organisations

8.1 Systems, Practices and Procedures

Details of Empire systems, practices and procedures relating to the management of all potential impacts and risks of the activity are included in Table 12. The objective of these systems, practices and procedures is to continuously reduce the potential impacts and risks of the activity to ALARP.

Table 3: Empire Systems, Practices and Procedures

Item	Objective to achieve ALARP	Details of Location
Standard of Practice for Empire sites	To outline the main HSE criteria to be observed by Empire and third party providers	Empire Environment Policy
Environment Plan	To document environmental management of operations	Management of Red Gully North-1 Environment Plan
Emergency Response Plan	To provide guidance on the management of an emergency situation	Empire Emergency Response Plan
Oil Spill Response Plan	To provide guidance on the management of a spill	Empire Oil Spill Contingency Plan
Compliance scheduling – Environmental	To prompt environmental compliance requirements (reporting, auditing, license renewal and document updates)	Environmental Compliance Register
HSEQ Management System Manual	To provide a framework of the systems, procedures and processes which Empire use to effectively manager operations to meet the objectives of the Empire Environment Policy	HSEQ Management System Manual

Item	Objective to achieve ALARP	Details of Location
Preventative Maintenance Management	To provide a preventative maintenance management tool that stores records, schedules maintenance and documents activities undertaken	Preventative Maintenance Management Program
Standard Operating Procedures	To guide personnel on how to conduct tasks to meet environmental performance throughout operations	Empire IMS
Audit management Strategy	To plan and document the independent examination and verification of activities, records, processes, and other elements to determine conformity to documented requirements and standards	HSE Audit Plan
Training Management	To provide the framework for all personnel to have the competency for their respective roles for the management of safety and environmentally critical risks and daily work activities	Training Management Plan (site personnel)
Permit to Work System	To ensure facilities are in a safe and environmentally acceptable condition before works starts and is kept in this condition until all personnel involved in the work have signed off completion	• Upstream Production Solutions IMS • Empire site office
Landowner Communications	To guide all personnel working at Empire owned assets on interactions with landowners (including tenants and staff)	Stakeholder Management Plan
Hazard and Incident Reporting	To ensure a systematic approach for reporting and investigating an incident is adopted across the Australian Operations of the company, identify causes of the incident and not attribute blame when conducting investigations, and prevent future incidents	Hazard and Incident Reporting Procedure

9 Consultation

Empire has engaged with stakeholders since the planning phase for the drilling of the RGN1 through to well test and current operations. During this time the stakeholders consulted with include:

- RGN1 Landowner and Neighbours
- Department of Mines and Petroleum
- Department of Fire and Emergency Services
- Shire of Gingin
- Gingin Community ER
- Department of Water
- Local stakeholders
- Yued Native Title Group representatives
- Department of Aboriginal Affairs (DAA)
- Department of Parks and Wildlife
- South West Aboriginal Land and Sea Council
- Western Savanah Piggery
- Westpork

Empire will continue to engage the above and additional stakeholders during RGN1 operations. Empire are continually liaising with the community in order to be cognizant of any other potential stakeholders that may need to be engaged for both current and future works with RGPF.