



Ungani 3 Turkeys Nest Maintenance Environment Plan Bridging Document: Summary Document

Document number	Revision	Date of Revision
HSE-SUM-030	1	30/10/2015

1. INTRODUCTION

Buru Energy Limited (Company) is an Australian ASX listed company engaged in oil and gas exploration in the Kimberley region of Western Australia, in an area known in geological terms as the Canning Superbasin.

The Company has recently completed extended production testing at the Ungani Facility. The Company will undertake maintenance and upgrade operations at the Ungani Facility (Activity), prior to commencing production.

The Company developed the *Ungani Facility Maintenance and Upgrade Environment Plan* (HSE-PLN-036) to identify potential environmental risks associated with the Activity, and set out mitigation and management measures to ensure that environmental impacts are As Low As Reasonably Practicable (ALARP) and of an acceptable level. The Company will undertake further maintenance operations, on the Ungani 3 Turkeys Nest (the Activity), which was not covered in the scope of the Environment Plan.

The Company therefore developed the *Ungani 3 Turkeys Nest Maintenance Environment Plan Bridging Document* (HSE-BDG-033) (Bridging Document) to link the specific operations at Ungani 3 to the mitigation and management measures outlined in the Environment Plan. This summary document provides an overview of the Activity that will occur and summarises the mitigation and management measures in the Environment Plan and Bridging Document.

1.1. Contact Details

Buru Energy Limited

Phone: +61 8 9215 1800

Fax: +61 8 9215 1899

Email: info@buruenergy.com

2. OVERVIEW OF THE ACTIVITY

The Activity will be undertaken at the existing Ungani 1ST1 and Ungani 2 well site, and the Ungani 3 well site (collectively, the Ungani Facility). The general characteristics of the wells are provided in Table 1.

Table 1: Details of the Ungani wells.

Well	Date Drilled	Location	
		Easting	Northing
Ungani 1ST1	August – September 2011	517,375 mE	8,010,864 mN
Ungani 2	November – January 2012	517,365 mE	8,010,848 mN
Ungani 3	January – March 2014	518,470 mE	8,011,035 mN

The Ungani Facility is located approximately 100 km east of Broome and 86 km southwest of Derby on Yakka Munga Station as shown in Figure 1.

2.1. Existing Infrastructure

The existing infrastructure at the Ungani Facility includes:

- Bunded three phase (oil, produced water and gas) production separator.
- Various storage tanks.
- Impermeable lined Turkeys Nests.
- Road tanker load out facility.
- Various drum stands containing engine and hydraulic oil, and chemicals for injection.
- Plant processing and well control systems.
- Produced water injection equipment.
- Other equipment including generators, lighting towers, reverse osmosis plant and office.
- Camp site including accommodation and kitchen.

The existing infrastructure at the Ungani 3 well site includes:

- Ungani 3 well and water injection equipment.

- Impermeable lined Turkeys Nest (approximately 25 m x 25 m).
- Storage tanks.

2.2. Stages and Timing

The majority of the Activity will commence in June 2015 and will take approximately one month to complete. The Activity at Ungani 3 is planned to commence in late October 2015 and will take approximately one week to complete. The Activity will be completed through the following stages:

- Pumping of residual water in Turkeys Nest into a tank;
- Removal of liner for disposal at a licenced waste disposal facility;
- Reforming of earthen structure of Turkeys Nest;
- Installation of new liner, including anchoring outer edges with soil;
- Welding or gluing of any joins;
- Addition of bore water or produced water to weigh liner down.

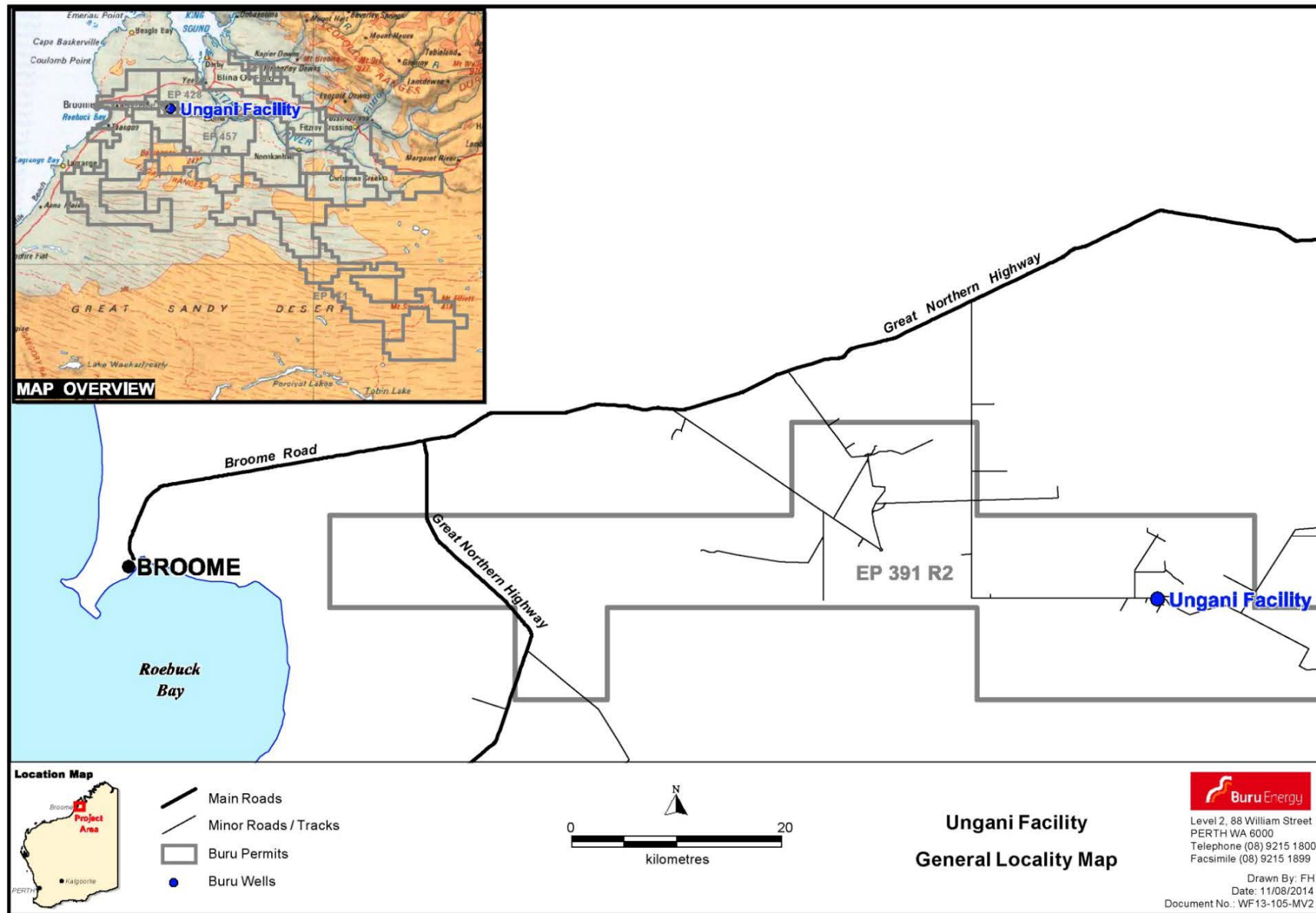


Figure 1: Location of the Ungani Facility.

2.3. Mobilisation

Mobilisation will be staged, that is not all machinery and equipment will mobilise to the Activity area at once. During mobilisation, equipment, personnel and supplies required for the Activity will be mobilised to the Activity area using dedicated vehicles. All travel on public roads will be in accordance with State road legislation and the Company's *Travel Management Procedure* (HSE-PRO-002). In accordance with this Procedure, all vehicles travelling along station roads will be limited to 80 km/h and 60 km/h on access tracks during mobilisation. This procedure also includes restrictions on night time driving.

Equipment and vehicles mobilised to the Activity area will include earthmoving equipment, trucks, cranes and light vehicles.

2.4. Removal of Existing Infrastructure

As described below, some infrastructure at the Ungani Facility will be replaced as part of the Activity. The Company will likely retain the replaced piping for use in future testing operations at other wells; this will be stored at the laydown area or offsite at another Company storage facility. The remainder of removed infrastructure will be disposed of appropriately.

2.5. Facility Maintenance and Upgrades

2.5.1. Bunding

The following changes will be undertaken to upgrade the tank bunding:

- Existing storage tank and load out facility bunds: Repair and replace plastic liners and reinforcing bund walls using concrete coating;
- Chemical injection bund: Replacement of the current temporary bund via installation of permanent bunding for the chemical injection system, including concrete coating;
- Existing diesel storage bund: Relocating tank location for compliance with AS 1940 (minimum distance of 8 m from an ignition source, a tanker) and construction of a new bund, including concrete coating;
- Installation of stepped bridge walkways over tank bunds;
- Installation of an earthen flood protection bund.

2.5.2. Ungani 3 Turkeys Nest

2.5.2.1. Removal of Liner

The existing liner is anchored to the edges with a combination of concrete blocks and soil. The anchor blocks will be removed for reuse and the soil dug away to free the liner. Fauna egress paths will also be removed for reuse. Earthmoving equipment will then be used to remove the liner from the Turkeys Nest.

The liner will be placed in a skip or truck for transfer to a licenced waste facility for disposal.

2.5.2.2. Earth Works

The indicative dimensions of the reformed Turkeys Nest will be 30 m x 30 m at the top. The capacity of the Turkeys Nest will remain unchanged at approximately 2,500 kL plus freeboard. To achieve the new design, additional gravel/fill may be required.

2.5.3. Installation of Liner

The liner will either come made to fit or in sheets to be connected onsite. The liner will be HDPE or a similar material with low permeability. Connecting of liner sheets will be done by a specialised contractor, 'welding' the sheets together. Purpose adhesive (Sikaflex) may also be used for small connections of liner.

Once the liner has been installed, fauna egress paths and fencing will be reinstated, and water introduced to weigh down the liner.

2.5.4. Site Contours

With the exception of the hume interceptor drain at the tanker load out facility, there is no formal drainage system at the Ungani Facility. Surface water is not focussed to and discharged from any point; it is purely isolated from key areas using bunding. However, Company experience has determined that ponding can occur at the central well site during periods of high rainfall. Minor earthworks may be utilised to minimise ponding in key areas of the well site, primarily at the wells and site office. This will likely be limited to minor raising of some areas of the well site by importing and compacting gravel or similar materials. Material (up to 80 tonnes of “cracker dust”) will be sourced from a commercial supplier (Kimberley Quarries). The flood protection bund described above will also reduce ponding by minimising the volume of water reaching the central well site.

2.5.5. Storage and Loadout

The Company will undertake minor modifications of the existing storage and loadout system such as:

- Installation of additional saddles on at least two tanks (T5 and T6);
- Installation of Guided Wave Radar on at least three tanks (T1, T5 and T6) for level detection (currently installed on all other storage tanks);
- Installation of emergency vents on all storage tanks;
- Installation of name plates with capacities on oil storage tanks;
- Painting of tanks;
- Alteration of the loadout system including replacement of the transfer flowline and refurbishment of the export pumps.

2.5.6. Production System

The Company will undertake the following modifications of the existing production system:

- All temporary piping will be replaced with permanent steel pipe (ANSI Class 600).
- All piping supports will be replaced.
- Installation of valving throughout the system.
- Addition of production header to allow for future expansion.
- Potentially raise height of cold vent (depending on results of gas dispersion analysis).

2.5.7. Instrumentation and Electrical

The Company has determined that the following upgrades are necessary for instrumentation and electrical systems:

- Installation of compressed air system.
- Replacement of cabling.
- Installation of lightning warning system and lightning rods.

2.5.8. Fire Detection

Further upgrades to the Ungani Facility include installation of fire detection equipment in accordance with AS1940. This includes installation of fixed fire detectors, linked to the facility emergency shutdown system.

2.5.9. Camp and Sewage

The Company is investigating the potential for replacement of the current rental camp facility by purchasing a similar facility. The replacement facility will be of equal or lesser capacity than the current facility, and will be located in the same area.

Further, the sewage treatment system may be upgraded. The current system has capacity for typical accommodation levels at the Ungani Facility; however, a larger system may be installed to allow greater contingency capacity, particularly during periods of high activity. This will likely involve the installation of an additional unit. Given that the discharge volume will only increase during periods of high activity, the treated discharge from the system will remain unchanged (i.e. discharged via a sprinkler system into a fenced area). This method of disposal has proved effective to date.

2.5.10. Fencing

The current well site fencing will be maintained as necessary. Further, the fence and gate at the load out facility may be extended along the access track.

2.6. Waste

All putrescible wastes will be stored at the well site or camp site in lidded skips/bins which remain closed to prevent fauna access and litter generation. Inert recyclable and industrial waste will be stored in skips. All waste types (putrescible, inert, recyclable and industrial) will be removed from the Ungani Facility and disposed offsite by an approved waste disposal contractor. Any hydrocarbon contaminated materials will be contained (e.g. in bins or bunded area). Waste will be transported in accordance with the *Environmental Protection (Controlled Waste) Regulations 2004* where required.

Sewage and grey water at the Ungani Facility is treated by an Aerated Wastewater Treatment System, as described above.

2.7. Demobilisation and Rehabilitation

Following completion of the Activity, all Activity specific machinery and equipment will be removed from the Activity area. As for mobilisation, demobilisation will be staged.

No rehabilitation is planned as part of the Activity. Following completion of the Activity, the Ungani Facility will transition into production.

3. ENVIRONMENTAL IMPACTS AND MANAGEMENT MEASURES

The Activity will be confined to the existing Activity area. A summary of the existing environmental characteristics of the Activity area, potential impacts that could result from the Activity and the risk of these potential impacts occurring is provided in Table 2. Included in this table are also the management and mitigation measures that form part of the implementation strategy to minimise environmental risk.

Table 2: Summary of the existing environment, potential impacts and management approach associated with the Activity.

Environmental characteristic	Description	Potential Impact	Key Management Measures	Risk	Implementation Strategy
Surface water	The access track to the Ungani Facility is within the Cape Leveque Coast Basin while the Ungani Facility is located in the Fitzroy River Catchment. The Fitzroy River, 53 km from the Ungani Facility, is the largest water course in the vicinity of the Activity area. No permanent water bodies are located in the vicinity of the Activity area and drainage lines are internally draining, only flowing to the Fitzroy River under flood conditions. During the wet season, sheet flow can occur due to the low lying topography of the Activity area.	Contamination of surface water.	<ul style="list-style-type: none"> Vehicles limited to the Activity area, travel in accordance with the <i>Travel Management Procedure</i> (HSE-PRO-002). Operations with spill risks undertaken in bunded areas or over drip trays. Waste will be managed and monitored in accordance with the <i>Waste Monitoring and Management Procedure</i> (HSE-PR-005). 	Given the mitigation and management measures that will be implemented, major alteration to surface water is unlikely.	<ul style="list-style-type: none"> Person In Charge (PIC) to ensure no personnel or vehicle access outside of the Activity area. PIC to ensure well site is fenced and gate closed. PIC to ensure wastes are appropriately stored prior to disposal.
Geology, Landforms and Soil	The Activity area is located in the Fitzroy Trough, a major subdivision of the Canning Basin, and the Dampierland Interim Biogeographic Regionalisation of Australia bioregion. The geology and soils characteristic of the Dampierland bioregion are comprised of extensive riverine plains with grey and brown cracking clays; extensive sandplains or red earthy sands, low uplands of sandstone and limestone with shallow stony soils. The area around the existing Activity area is comprised of a series of sand sheets intersected by alluvial flood plains that are either no longer active or not frequently inundated.	Soil erosion, sedimentation or compaction. Potential contamination of soil.	<ul style="list-style-type: none"> Dangerous and hazardous goods will be stored within bunded areas. Dangerous goods labelled in accordance with regulations and MSDS. Refuelling of vehicles in accordance with the <i>Refuelling Procedure</i> (HSE-PR-011). Well maintained machinery, vehicles and equipment. Containment, clean-up and remediation if required of a spill in accordance with the <i>Canning Basin Spill Response Plan</i> (HSE-ICM-009). 	Given the mitigation and management measures that will be implemented, soil contamination and erosion is unlikely.	<ul style="list-style-type: none"> PIC to complete weekly operational checklist. PIC to ensure all dangerous goods or hazardous substances are transported, stored and handled to prevent spills. PIC to ensure all physical containment measures are well maintained.
Groundwater	The major aquifer used by stations in the vicinity of the Activity is the Wallal Sandstone. The Wallal Sandstone is intersected at depths of between 130 m and 200 m below ground level (BGL) by the Activity area. The groundwater bore at the Ungani Facility accesses this aquifer at 140 m BGL. The nearest water bore operated by a third party is approximately 11 km to the west. The closest drainage area to the Activity is a small drainage depression about 9 km north.	Potential contamination of groundwater.	<ul style="list-style-type: none"> Flood protection bund will be up to approx. 500 m long and therefore only affect a small area of surface flow. DMP will be notified of the design and construction details prior to construction of the flood protection bund. Turkeys Nest will be drained prior to removal of liner. Produced water will be transferred to a tank. Liner connections visually inspected prior to filling of the Turkeys Nest. Once liner installed, bore water or produced water placed in the Turkeys Nest. Receiving tank or Turkeys Nest inspected to ensure adequate capacity. A minimum of 500 mm freeboard in the Turkeys Nest. Removed liner and any scraps will be placed in a skip bin or truck for transfer to a licenced waste facility for disposal. Any other wastes produced (general rubbish) will be contained and transferred to bins at the Ungani Facility. 	Given the mitigation and management measures that will be implemented, groundwater contamination is considered unlikely.	<ul style="list-style-type: none"> PIC to ensure well maintained machinery, vehicles and equipment.
Vegetation and Flora	Within Dampierland the vegetation is characterised by the pindan formation which occurs on sand plains. Pindan is described by as a “grassland wooded by a sparse upper layer of trees and a dense, thicket-forming middle layer of unarmed, phyllodal <i>Acacia</i> ”. Two taxa recorded during an on-ground survey in the vicinity of the Activity area, <i>Goodenia byrnesii</i> and <i>G. crenata</i> , are ranked by DPAW as priority three.	Potential loss of a local population of a conservation significant flora species. Loss of native flora.	<ul style="list-style-type: none"> No clearing of vegetation is required. Vehicle and personnel access limited to the Activity area. Earthmoving machinery and equipment will be inspected and cleaned. Externally sourced gravel will be weed free. Vehicles comply with the <i>Travel Management to Procedure</i> (HSE-PRO-002). Vehicles and machinery will be well maintained and undergo a pre-start check. 	Given that no clearing is required, the Activity will not have a significant impact on flora and vegetation, ESAs or fauna.	<ul style="list-style-type: none"> PIC to ensure well maintained firebreaks and firefighting equipment, regular servicing of machinery and equipment, and limiting smoking to designated areas. PIC to ensure no personnel or vehicle access outside of the Activity area.
Environmentally Sensitive Areas (ESAs)	The nearest ESA is Taylors Lagoon, approximately 30 km to the northwest of the Ungani Facility. Edgar Range Red Book area is 1.6km south of the Ungani1 ST1 and 2 Facility.	Potential loss of environmental values associated with ESA.	<ul style="list-style-type: none"> Firebreak will be inspected and maintained. Smoking restricted to designated smoking areas. Firefighting equipment available and operational personnel trained in its use. 		<ul style="list-style-type: none"> PIC to ensure all earthmoving machinery/ equipment is checked prior to entering the Activity area. Weekly inspection of the Activity area.
Fauna	The only of fauna of conservation significance sighted during surveys in the vicinity of the Activity area were the Australian Bustard (<i>Ardeotis australis</i>) and the grey falcon. No feral fauna was identified, nor were any signs (tracks, scats, diggings) noted.	Death or injury of fauna. Loss of conservation significant fauna habitat.	<ul style="list-style-type: none"> Operations limited to daylight hours. Welding and cutting operations subject to Permit to Work system. Broome Veterinary Hospital or Department of Parks and Wildlife Wildcare Helpline will be contacted if any fauna becomes injured. Turkeys Nest fenced when lined to prevent access by macro-fauna and cattle. 		<ul style="list-style-type: none"> PIC to ensure lighting is minimum for safe operations. Weekly inspection of fauna egress paths and fencing. PIC to ensure Turkeys Nest is drained prior to removal of liner.

Ungani 3 Turkeys Nest Maintenance Environment Plan Bridging Document: Summary Document

Environmental characteristic	Description	Potential Impact	Key Management Measures	Risk	Implementation Strategy
Social	The Activity is located within a sparsely populated region with limited settlement, transport or communications infrastructure. Land use is dominated by open range pasture grazing of beef stock. The townships of Derby to the northeast and Broome 100 km to the west are the largest population centres in the vicinity of the Activity. The nearest Homestead is Yakkamunga approximately 30 km east of the Activity.	Disturbance of livestock. Disturbance of local landholders.	<ul style="list-style-type: none"> On-going consultation with local landholders and other stakeholders including regular notice/updates until completion of the Activity. Vehicles will comply with the <i>Travel Management Procedure</i> (HSE-PRO-002). All wastes removed from the Activity area for disposal at a licenced facility. The scale of the Activity is not unusual for the Ungani Facility, in terms of number of vehicles, personnel, etc. 	Through the implementation of management measures, it is unlikely the Activity will have an impact on Social values.	<ul style="list-style-type: none"> PIC to ensure no disturbance outside of Activity area. Weekly inspection for impacts outside of the Activity area.
Cultural	Heritage surveys and clearances for the Ungani Facility have been undertaken by representatives of the native title claimants and an anthropologist engaged by the Traditional Owners.	Damage to cultural heritage site/s or object/s.	<ul style="list-style-type: none"> Vehicle and personnel activity limited to the Activity area. No clearing as part of the Activity. Land access agreements have been signed with relevant Traditional Owner groups for the Ungani Production Facility. 	Given that no clearing is required, it is unlikely that the Activity will have an impact on cultural heritage site/s or object/s.	<ul style="list-style-type: none"> PIC to ensure no disturbance outside of Activity area. Weekly inspection of the Activity area for impacts outside of the Activity area.

4. COMMUNICATION

The Company has engaged in communication and consultation with relevant stakeholders as summarised in the Environment Plan. As the Activity is located within a sparsely populated region with limited settlement, transport or communications infrastructure, relevant stakeholders are limited to government departments, traditional owners and pastoralists.

No issues have been raised in relation to the Activity through the consultation process. The Company will continue to communicate with stakeholders and consult during all phases of the Activity, on a formal and informal basis, and by email, letter, face-to-face and telephone.