Modification Notice - Regulation 22

Interest Holder	Santos QNT Pty Ltd	EMP Title	EP161 2D Seismic and Ground Gravity Survey Program	Unique EMP ID No.	STO7-4	Change/ Mod No.	1	Date	02/10/2024
Brief Description	The modifications to the EMP provide an additional option for seismic acquisition through utilisation of a weight drop unit to minimise the need for line preparation in riparian areas.								
Geospatial Files Included?	No								

Does the proposed change result in a new, or increased, potential or actual environmental impact or risk?	If an INCREASE in an existing potential or actual environmental impact or risk, is it provided for in the approved EMP?	Does the proposed change require additional mitigation measures to be included?	Has additional stakeholder engagement been conducted?	Does it require additional environmental performance standards and measurement criteria?	Does it affect compliance with Sacred Site Authority Certificates?	Does it affect current rehabilitation, weed, fire, wastewater, erosion and sediment control, spill or emergency response plans?	Will the environmental outcome continue to be achieved and will the impacts and risks be managed to ALARP and acceptable?
No	N/A	No	No	No	No	No	Yes

Current EMP Text	Amended EMP Text
2.4 Ecologically Sustainable Development • In the final ground truthing along the seismic and connection line routes to identify significant trees, the presence of any riparian vegetation would also be recorded. Seismic vehicles may traverse these areas where the density of vegetation allows safe passage of vehicles with no line preparation. Vegetation slashing or mulching may be required for access but will follow the riparian vegetation decision tree shown in **Figure 3.5—13**. Where suitable, watercourse crossing points are not possible, existing access tracks will be used. Small	**2.4 Ecologically Sustainable Development** • In the final ground truthing along the seismic and connection line routes to identify significant trees, the presence of any riparian vegetation would also be recorded. Seismic vehicles may traverse these areas where the density of vegetation allows safe passage of vehicles with no line preparation. Vegetation slashing or mulching may be required for access but will follow the riparian vegetation decision tree shown in **Figure 3.5—13**. Where suitable, watercourse crossing points are not possible, existing access tracks will be used. Small portable nodal geophones may also be used in riparian areas for data acquisition. An alternative option for data

portable nodal geophones may also be used in riparian areas for data acquisition.	acquisition in riparian areas is through utilisation of a weight drop unit carried via a skid steer.
See: Table 3.1-1 Summary of the Activity	See revised wording shaded in grey in updated in Table 3.1-1 Summary of the Activity (below)
3.3 Vehicle Movements Heavy vehicles can be split into two categories: • Operational support heavy vehicles (on seismic lines): o Trucks required to carry in equipment/vehicles e.g. temporary camps, mulchers, slashers, vibrator trucks etc. o Water and supply trucks. • Seismic Heavy Vehicles (used on seismic lines): o Line preparation units e.g. mulchers and slashers. o Seismic vibrators and recorders. o Mechanic trucks (not used for seismic but is a support vehicle that may need to traverse working corridors).	**3.3 Vehicle Movements** Heavy vehicles can be split into two categories: • Operational support heavy vehicles (on seismic lines): o Trucks required to carry in equipment/vehicles e.g. temporary camps, mulchers, slashers, vibrator trucks, weight drop unit etc. o Water and supply trucks. • Seismic Heavy Vehicles (used on seismic lines): o Line preparation units e.g. mulchers and slashers. o Seismic vibrators and recorders. o Mechanic trucks (not used for seismic but is a support vehicle that may need to traverse working corridors).
See: Table 3.5-1 Site Selection and Planning	See revised wording shaded in grey in updated in Table 3.5-1 Site Selection and Planning (below)
3.5.2 Seismic Line Preparation Where there are existing crossing points in the seismic working corridor, they will be used, to avoid preparation. Where there are no existing crossings in the seismic working corridor, the least sensitive crossing point will be identified and used. That is, the section of the bank with the lowest gradient or hardest surface and where preparation is not required. After assessing a crossing to ensure risk of impact is reduced, the chosen crossing point is to be marked e.g. flagging, and all vehicles will use the selected crossing point. In the final ground truthing and recording of significant trees along the seismic line routes, the presence of any riparian vegetation would also be recorded. The final routes selected within the 50 m seismic line working corridors would avoid these areas as much	**3.5.2 Seismic Line Preparation** Where there are existing crossing points in the seismic working corridor, they will be used, to avoid preparation. Where there are no existing crossings in the seismic working corridor, the least sensitive crossing point will be identified and used. That is, the section of the bank with the lowest gradient or hardest surface and where preparation is not required. After assessing a crossing to ensure risk of impact is reduced, the chosen crossing point is to be marked e.g. flagging, and all vehicles will use the selected crossing point. In the final ground truthing and recording of significant trees along the seismic line routes, the presence of any riparian vegetation would also be recorded. The final routes selected within the 50 m seismic line working corridors would avoid these areas as much as practicable. Small portable nodal geophones may also be used in riparian areas for data acquisition (**Section 3.5.4**).

as practicable. Small portable nodal geophones may also be used in riparian areas for data acquisition (**Section 3.5.4**).	In areas where seismic vehicle access is inhibited, such as narrow creeks and riparian areas, a weight drop unit carried by a skid steer (Figure 3.5-14) will be deployed as an alternative method of seismic acquisition as no line preparation would be required. Weight drop units are highly unlikely to be able to image the deeper targets in the area, however, will provide valuable information of the near surface and shallower targets.  **Figure 3.5-14 Indicative weight drop unit on skid steer**
See: Table 6.1-1 Risk Assessment Table	See revised wording shaded in grey in updated in See: Table 6.1-1 Risk Assessment Table (below)

Table 3.1-1 Summary of the activity

Component	Details
Operating Hours	• Daylight restricted (12-hr day shifts where possible).
Civil Works	• Maintenance of the previously cleared Tanumbirini well pad and existing access tracks if necessary. • Establishment of a temporary camp site at the Tanumbirini well pad for use during the Activity and for vehicle parking and fuelling.
Seismic Acquisition Program	• 2D seismic and ground gravity survey • Line preparation of twelve seismic lines, one set of five, approximately 7.5 - 8.5 km long and another set of seven, approximately 24 – 33 km long. The total seismic line length is approximately 239 km. • Preparation of approximately 10 km of connection lines between the seismic lines for access of mulchers and survey vehicles
Equipment and Machinery	• Light and heavy vehicles like mulchers, slashers, seismic vibroseis source and survey trucks, ground gravity survey vehicles and weight drop unit with skid steer.
Access	• Existing access is available to the Tanumbirini well pad. • Existing access to the seismic lines will be used wherever possible, with connection lines to be prepared between seismic lines where necessary. Refer to **Section** Error! Reference source not found. (Site Selection) for further details. LAA will be in place with the Tanumbirini Station pastoralist.
Diesel Use	• Campsite, generators, light, and heavy vehicle diesel usage.
Water Source	• Water required to maintain existing track(s) dust suppression and firefighting. Water will be trucked in from existing licenced bores. • Potable water for the campsite will be trucked in.

Component	Details
Rehabilitation Methods Proposed	• Mulchers cut vegetation above ground and mulch and spread the cut material for minimal impact and to promote rapid rehabilitation. The soil is not disturbed, and vegetation rootstock is left intact. • Further rehabilitation of the seismic lines is discussed in **Section** Error! Reference source not found..

Table 3.5-1 Site Selection and Planning

Specific Criteria	Planning Considerations	Design Considerations	Location Considerations
Suitability of Site	• Preliminary seismic line locations based on previous borehole breakout data and reviewed fracture orientations from image logs. • Desktop surveys undertaken to refine preliminary seismic line locations based on environmental sensitivities. • Field surveys undertaken to further refine the location of preliminary seismic lines. • Fauna Spotter to ground-truth ahead of seismic line preparation crew to ground truth riparian area, assist in mulching decision trees, stream crossing locating.	• Tree mulching and riparian area mulching decision trees created to ensure significant vegetation is avoided where possible. • Slasher used in combination with mulcher and/or weight drop unit controlled via skid steer to provide alternative to mulching where possible. • The area of vegetation to be potentially mulched has been minimised through efficient design, co-location, and use of existing infrastructure. • Seismic connection lines chosen to avoid significant backtracking in an area known to be highly traversable without mulching.	• Preliminary concept seismic lines adjusted based on field surveys (civil, cultural, and ecological) to a ground-truthed route. • Creation of a 50 m working corridor to allow deviations around environmental sensitivities and reduce mulching requirements (refer Error! Reference source not found.). • Campsite selected at a previously cleared location requiring no new clearing. • Use of existing access tracks to reach seismic lines. • Seismic connection lines ground-truthed and located in traversable areas.

Erosion and Sediment Controls	• A Mulcher has been selected for vegetation removal (where required) for the Activity. As detailed in **Section** Error! Reference source not found. a mulcher does not disturb the soil and vegetation rootstock is left intact.
	• No new tracks or infrastructure being constructed.
		• Erosion and sediment control plan developed, **Section** Error! Reference source not found..
		  ○ The Activity designed to ensure a very low erosion hazard.
		  ○ Controls specific to the Activity, wet weather and watercourses created.
			• Creation of a 50 m working corridor to allow selection of areas with favourable slope and soils where possible.
			• Ground-truthed seismic connection lines defined to reduce required passes of vehicles along seismic line **Section** Error! Reference source not found..

Specific Criteria	Planning Considerations	Design Considerations	Location Considerations
	• The Activity to occur during a period of very low erosion risk • Utilise existing clearing to support the Activity. • Maintenance and rehabilitation to ensure identified erosion is addressed (**Section** Error! Reference source not found.).	• The mulcher simultaneously cuts, mulches, and spreads the mulch on the seismic line which provides immediate protection of soil surface from both natural elements and mechanical damage (e.g., vibroseis trucks). • Weight drop unit and skid steer to be used in areas where seismic vehicle access is inhibited (e.g. narrow creeks and riparian areas).	• All creek crossings to be undertaken at a 90° angle.
Sensitive Receptors	• Proximity of camp site to Tanumbirini Station. • Activity is short in duration and noise sources are not fixed and continue along seismic lines quickly. • Land Access Agreement.	• During program consultation with landholder, mulcher selected for the Activity instead of bulldozer (refer **Appendix 04**). • Design of program allows deviations to reduce mulching and, therefore, reduces noise. • One pass of heavy vehicles expected for seismic lines near sensitive receptor. • Dust suppression as necessary on existing access tracks.	• A setback distance of at least 2.7 km from seismic line working corridors. • Camp site on existing well pad approximately 8 km away from Tanumbirini Station.
Wildlife Movement	• A mulcher has been selected for the Activity that leaves rootstock intact	• Creation of a 50 m working corridor to allow deviations and, therefore, reduce	• Seismic lines situated in highly traversable areas based on field surveys, satellite imagery and SREBA vegetation datasets.

Specific Criteria	Planning Considerations	Design Considerations	Location Considerations
	promoting rapid rehabilitation of any mulched vegetation. • The mulcher simultaneously cuts, mulches, and spreads the mulch on the seismic line, providing soil fertility improvement for disturbed areas. • Fauna Spotter to be present during line preparation. • No construction proposed and, therefore, no permanent structures that could affect wildlife movement.	mulching requirements (refer Error! Reference source not found.). • Narrow mulching width required for access and infrequent mulching due to the highly traversable landforms within working corridor. • The Activity requires a short duration and passes through localised area quickly. • Vehicles for the Activity are slow-moving and frequently stopping, providing opportunity for wildlife to vacate the area. Continuous movement of the vehicles means no lasting impact on wildlife movement.	• Ecologist field survey conducted, and Activity location informed based on survey. • Ground-truthed seismic working corridors to ensure a traversable route is available.
Biodiversity Protection	• Fauna Spotter to be present during line preparation. • Desktop surveys to be undertaken prior to the Activity. • Baseline Ecological Assessment to allow the Interest Holder to undertake considerations specific to biodiversity protection.	• Tree mulching and riparian area mulching decision trees created to ensure no unnecessary mulching. • Slasher used in combination with mulcher and/or weight drop unit controlled via skid steer to provide an alternative to mulching. • The area of vegetation to be potentially mulched has been minimised through efficient design, co-location, and use of existing infrastructure.	• Preliminary concept seismic lines adjusted based on field surveys (civil, cultural, and ecological) to a ground-truthed route. • Seismic connection lines ground-truthed and located in traversable areas.

Specific Criteria	Planning Considerations	Design Considerations	Location Considerations
	• Ground-truthing to ensure seismic lines are positioned to provide protection of aquatic systems. • Site selection to avoid vegetation clearing and mulching to maintain ground cover. • The presence of essential habitats and threatened wildlife documented and assessed using ecological surveys.	• Tree and riparian area decision trees to be used by Fauna Spotter to ensure mulching of significant vegetation (e.g., trees with hollows or nests) and riparian vegetation is appropriately considered and avoided as much as practical while still ensuring safe work conditions.	
Water	• The Activity will not interfere with or obstruct a waterway. • Preliminary concept lines to be scouted to ensure proposed seismic lines avoid critical and important habitats (completed during ground-truthing field surveys). • Limit groundwater extraction licensed volumes from existing bores installed under an approved EMP. • No construction of waterway crossings.	• Alluvial groundwater-dependant ecosystems are present in the area (further information is provided in **Section** Error! Reference source not found.). These areas will not be traversed, and vegetation will be avoided where possible. • Tree mulching and riparian vegetation decision trees consider impacts to watercourses, as well as critical and important habitats. • During survey demobilisation, areas where vehicles were used for the Activity will be inspected to identify and address potential erosion issues. • Mulching of large vegetation in riparian areas (although not anticipated) requires	• Preliminary concept seismic lines adjusted based on field surveys (civil, cultural, and ecological) to a ground-truthed route. The Tanumbirini Creek area was completely traversed, and therefore, the route selected is traversable without mulching.

Specific Criteria	Planning Considerations	Design Considerations	Location Considerations
		completion the riparian vegetation decision tree (as shown in Error! Reference source not found.). • Weight drop unit and skid steer to be used in areas where seismic vehicle access is inhibited (e.g. narrow creeks and riparian areas).	
Weeds	• The Activity is unlikely to introduce or spread any declared weeds. • Baseline weed survey to be undertaken prior to the Activity. • Implementation of a site-specific weed management plan.	• Rehabilitation expected to commence following survey completion. • Rehabilitation plan includes weed control requirements. • Use of the mulcher does not disturb soil and does not allow weeds to establish easily.	• Known weed locations along seismic lines have been GPS logged and will be avoided. • Use of existing tracks for seismic surveys and access.
Cultural Heritage	• Archaeological survey to be undertaken prior to the Activity. • AAPA Restricted Work Areas to be GPS located.	• Line preparation vehicles to be GPS programmed to avoid cultural heritage locations.	• Cultural heritage areas avoided, and preliminary seismic lines adjusted based on survey and AAPA Restricted Work Areas.

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Table Error! No text of specified style in document.**—1 Risk Assessment Table**

Risk Type	Potential Impact	Relevant Environmental Factor	Risk Source	Initial Risk Ranking			Mitigation and Management Measures		Residual Risk Ranking			Effective Controls	Uncertainty Ranking
				L	C	R	EMP Commitments	Relevant section of *the Code*	L	C	R		
Physical Disturbance	Disturbance to native vegetation.	Terrestrial environmental quality.	Mulching and vehicle and plant movements.	E	I	2	• The temporary campsite will be on a previously cleared area, the Tanumbirini well pad. • Existing access tracks and roads will be used for access. • Where possible, existing tracks and roads will be utilised for surveys to eliminate the need for additional line preparation. • Weight drop unit and skid steer to be used in areas where seismic vehicle access is inhibited (e.g. narrow creeks and riparian areas). • Where necessary, line preparation will be conducted using a mulcher, which simultaneously cuts, mulches, and spreads the mulch on the seismic or connection line, leaving the rootstock intact to reduce erosion and facilitate rehabilitation. • The mulcher prepares a 5 m width within an indicative 50 m corridor so seismic vehicles can deviate around dense vegetation and landforms. • The mulcher will be used “mulcher up” to avoid disturbance when not required. • Mature trees, trees with active hollows or nests selected for preservation, are to be flagged to ensure their protection. • Tree mulching decision tree to be used to protect mature and nesting trees.	A.3.1 Site Selection and Planning A.3.9 Rehabilitation	C	I	1	Yes	A
Physical Disturbance	Damage to Landforms	Landforms	Mulching and vehicle and plant movements.	E	I	2	• The temporary campsite will be on a previously cleared area, the Tanumbirini well pad. • Existing tracks and roads will be used for access. • Where possible, existing tracks and roads will be utilised for surveys to eliminate the need for additional line preparation.50 m buffer in place to aid in choosing the most traversable area to place seismic lines. • Weight drop unit and skid steer to be used in areas where seismic vehicle access is inhibited (e.g. narrow creeks and riparian areas). • The Activity will not commence if there has been rainfall in the past 24 hours within the Project Area until ground conditions have been assessed. • Stream orders to be crossed at 90 degrees.	A.3.1 Site Selection and Planning	C	I	1	Yes	A

Risk Type	Potential Impact	Relevant Environmental Factor	Risk Source	Initial Risk Ranking			Mitigation and Management Measures		Residual Risk Ranking			Effective Controls	Uncertainty Ranking
				L	C	R	EMP Commitments	Relevant section of *the Code*	L	C	R		
Physical Disturbance	Disruption of natural drainage lines.	Hydrological processes.	Mulching and vehicle and plant movements.	E	I	2	• Supervisor and Fauna Spotter to pre-scout and identify riparian areas. Riparian area start and stop points are to be input into GPS / a navigation system. • Riparian vegetation decision tree to be used before traversing riparian vegetation. • All-terrain vehicles used do not require formed drainage line crossings and do not cause major disturbance. • Weight drop unit and skid steer to be used in areas where seismic vehicle access is inhibited (e.g. narrow creeks and riparian areas). • The number of times a drainage line will be crossed will be limited, with little disturbance expected. • The Activity will not commence if there has been rainfall in the past 24 hours within the Project Area until ground conditions have been assessed.	A.3.1 Site Selection and Planning A.3.9 Rehabilitation	C	I	1	Yes	A
Physical Disturbance	Adversely affect the breeding pattern of a Grey Falcon	Terrestrial ecosystems	Vehicle and plant movements (including mulching of vegetation)	E	II	4	• Seismic lines ground-truthed, and a 50 m working corridor implemented to maximise traversability without mulching. • Fauna Spotter to precede line preparation vehicles to identify the presence of Grey Falcon active nests within or visually adjacent to the 50-meter working corridor. • Seismic line prep and data acquisition to maintain a 300 m vehicle free exclusion zone established for identified active Grey Falcon nests within, or visually adjacent to the 50-meter working corridor (seismic nodes walked through area).	A.3.1 Site Selection and Planning	B	II	1	Yes	B
Physical Disturbance	Adversely affect habitat critical to the Gouldian Finch	Terrestrial ecosystems	Mulching vegetation	C	II	2	• Mulching of large hollow-bearing trees with a trunk diameter greater than 25 cm at 1.3 m above the ground avoided utilizing the tree mulching decision tree.	A.3.1 Site Selection and Planning	B	I	1	Yes	B
Physical Disturbance	Adversely affect habitat critical to the Brushtail Possum	Terrestrial ecosystems	Vehicle and plant movements (including mulching)	B	II	1	• Seismic lines ground-truthed, and a 50 m working corridor implemented to maximise traversability without mulching. • Mulching of trees with a trunk diameter greater than 25 cm at 1.3 m above the ground avoided, where possible, utilizing the tree mulching decision tree. • Riparian areas ground-truthed by Fauna Spotter to verify area where mulching is limited to mowing/slashing where practicable. • Water crossing conduced at 90 degrees.	A.3.1 Site Selection and Planning	A	II	1	Yes	B

Risk Type	Potential Impact	Relevant Environmental Factor	Risk Source	Initial Risk Ranking			Mitigation and Management Measures		Residual Risk Ranking			Effective Controls	Uncertainty Ranking
				L	C	R	EMP Commitments	Relevant section of *the Code*	L	C	R		
							• Fauna Spotter to precede line preparation vehicles.						
Physical Disturbance	Adversely affect habitat critical to the Yellow-spotted Monitor. Mertens' Water Monitor	Terrestrial ecosystems	Vehicle and plant movement (including mulching)	C	III	2	• Seismic lines ground-truthed, and 50 m working corridor implemented to maximize traversability without mulching. • Riparian areas ground-truthed by Fauna Spotter to verify area where mulching is limited to mowing/slashing where practicable. • Water crossing conducted at 90 degrees. • Fauna Spotter to be present during line preparation.	A.3.1 Site Selection and Planning	C	II	2	Yes	B
Physical Disturbance	Adversely affect habitat critical to the Crested Shrike-tit	Terrestrial ecosystems	Mulching vegetation	A	II	1	• Seismic lines ground-truthed, and 50 m working corridor implemented to maximise traversability without mulching. • Mulching of trees with a trunk diameter greater than 25 cm at 1.3 m above the ground avoided utilising the tree mulching decision tree. • Fauna Spotter to be present during line preparation.	A.3.1 Site Selection and Planning	C	I	1	Yes	B
Physical Disturbance	Adversely affect habitat critical to the Bluetongue Lizard habitat	Terrestrial ecosystems	Mulching vegetation	B	II	1	• Seismic lines ground-truthed, and a 50 m working corridor implemented to maximize traversability without mulching. • Riparian areas ground-truthed by Fauna Spotter to verify areas where mulching is limited to mowing/slashing where practicable. • Fauna Spotter to be present during line preparation.	A.3.1 Site Selection and Planning	A	II	1	Yes	B
Physical Disturbance	Disturbance to soil. Compaction of soils. Erosion of soil due to loss of vegetative cover.	Terrestrial environmental quality.	Mulching and vehicle and plant movements.	F	I	2	• The temporary campsite will be in a previously cleared area. • Existing access tracks and roads used for access. • Where possible, existing tracks and roads will be utilised for surveys to eliminate the need for additional line preparation. • Weight drop unit and skid steer to be used in areas where seismic vehicle access is inhibited (e.g. narrow creeks and riparian areas). • Where necessary, line preparation will be conducted using a mulcher, which simultaneously cuts, mulches, and spreads the mulch on the seismic or connection line, leaving the rootstock intact to reduce erosion and facilitate rehabilitation. • The mulcher prepares a 5 m width within an indicative 50 m corridor so seismic vehicles can deviate around dense vegetation and landforms. • The mulcher will be used "mulcher up" to avoid disturbance in easily traversable terrain. • Weather checked daily to determine if the Activity will commence.	A.3.1 Site Selection and Planning A.3.9 Rehabilitation	C	I	1	Yes	A

Risk Type	Potential Impact	Relevant Environmental Factor	Risk Source	Initial Risk Ranking			Mitigation and Management Measures		Residual Risk Ranking			Effective Controls	Uncertainty Ranking
				L	C	R	EMP Commitments	Relevant section of *the Code*	L	C	R		
							• Fauna Spotter to pre-scout and identify riparian areas to verify area where mulching limited to mowing/slashing where practicable. Riparian area start and stop points to be input into navigation system. • Riparian vegetation decision tree to be used before traversing riparian vegetation. • Immediately protect the soil surface after mulching with mulch to the greatest extent possible. • The Activity will not commence if there has been rainfall in the past 24 hours within the Project Area until ground conditions have been assessed.						
Physical Disturbance	Damage to culturally sensitive sites. Indirect impacts on sensitive site.	Culture and Heritage	Mulching and vehicle and plant movements.	C	III	2	• Disturbance is restricted to subject land as set out within the AAPA Authority Certificates and will avoid the restricted work areas in the Certificates during line preparation. • Known sites of sacred or cultural significance have been identified and will be avoided. • Any new sites identified during the Activity will be reported to the NT Heritage Branch. • Maintain GIS database of Project Area and cultural heritage sites, including details of any works conditions. • Provide information to personnel and contractors of Sacred Site water hole that may be impacted by sediment release during stream crossing. • Site inductions include details of controls in the Spill Management Plan. • Spill kits available to treat spills in situ. • Erosion and sediment controls implemented in accordance with the ESCP (**Section** Error! Reference source not found.). • The Activity will not commence if there has been any rainfall in the previous 24 hours within the Project Area until ground conditions have been assessed. • No crossing of streams on line 12 in wet conditions. • Seismic lines inspected for erosion during rehabilitation activity.	A.3.1 Site Selection and Planning	A	III	1	Yes	A
Groundwater Extraction	Reduction in groundwater quantity.	Hydrological processes.	Use of groundwater for the Activity.	B	III	2	• Groundwater for track maintenance and dust suppression, if required, will be extracted from existing licenced bores. • The water use for the Activity is small.	C.6.1 Water and wastewater tracking and reporting requirements	A	III	1	Yes	A

Risk Type	Potential Impact	Relevant Environmental Factor	Risk Source	Initial Risk Ranking			Mitigation and Management Measures		Residual Risk Ranking			Effective Controls	Uncertainty Ranking
				L	C	R	EMP Commitments	Relevant section of *the Code*	L	C	R		
Groundwater Extraction	Reduction in groundwater available for other users.	Community and Economy	Use of groundwater for the Activity.	B	III	2	• Groundwater for track maintenance and dust suppression, if required, will be extracted from existing licenced bores. • The quantity of water required is not expected to have any significant impact on the aquifer.	C.6.1 Water and wastewater tracking and reporting requirements	A	III	1	Yes	A
Creation of Dust	Smothering of flora.	Terrestrial environmental quality.	Mulching and vehicle and plant movements.	F	II	3	• Line preparation will be done using a mulcher. • Mulching of seismic lines will reduce their potential to create dust. • Driving will only be permitted on designated access roads and seismic lines. • Speeds on unsealed roads will be limited – maximum 60 km/hr on unsealed roads, 40 km/hr on seismic lines. • Activity to be completed within a short timeframe. • Water trucks used to suppress dust on access tracks if required.	No section directly applicable.	B	II	1	Yes	A
Creation of Dust	Loss of amenity.	Community and economy Air quality	Mulching and vehicle and plant movements.	F	II	3	• Line preparation will be done using a mulcher. • Mulching of seismic lines will reduce their potential to create dust. • Driving is only permitted on designated access roads and seismic lines. • Speeds on unsealed roads will be limited – a maximum 60 km/hr on unsealed roads and 40 km/hr on seismic lines. • Activity to be completed within a short timeframe. • Water trucks used to suppress dust on access tracks, if required.	No section directly applicable.	B	II	1	Yes	A
Creation of Dust	People inhaling dust	Human health Community and economy Air quality	Mulching and vehicle and plant movements	F	II	3	• Line preparation will be undertaken using a mulcher. • Mulching of seismic lines will reduce the potential to create dust. • Driving is only permitted on designated access roads and seismic lines. • Speeds on unsealed roads will be limited – maximum 60 km/hr on unsealed roads and 40 km/hr on seismic lines. • Water trucks used to suppress dust on access tracks, if required.	A.3.1 Site Selection and Planning	B	II	1	Yes	A
Creation of Vehicle and Plant Emissions	Reduction in air quality	Air quality Atmospheric processes	Vehicle and plant movements creating air emissions	C	II	2	• Vehicles and fixed plant maintained to OEM maintenance schedule. • Vehicles compliant with Northern Territory Motor Vehicle registration requirements and Work Health and Safety Regulations.	A.3.1 Site Selection and Planning	B	II	1	Yes	A
Noise and Vibration from the Activity	Disturbance to native fauna	Terrestrial environmental quality	Vehicle movements and seismic equipment	D	II	2	• Vehicles and fixed plant maintained to OEM maintenance schedule. • The Activity timeframe is short in duration.	A.3.1 Site Selection and Planning A.3.3 Noise	B	II	1	Yes	A

Risk Type	Potential Impact	Relevant Environmental Factor	Risk Source	Initial Risk Ranking			Mitigation and Management Measures		Residual Risk Ranking			Effective Controls	Uncertainty Ranking
				L	C	R	EMP Commitments	Relevant section of *the Code*	L	C	R		
			generating noise and vibration										
Noise and Vibration from the Activity	Disturbance to landholders	Community and economy	Vehicle movements and seismic equipment generating noise and vibration	D	II	2	• Vehicles and fixed plant maintained to OEM maintenance schedule. • The Activity will be restricted to daylight hours. • Land access agreement in place. • Seismic activity transient and short in duration relevant to noise impacts to a point source receptor (e.g., maximum noise level to be less than 15 minutes in duration).	A.3.1 Site Selection and Planning A.3.3 Noise	B	II	1	Yes	A
Light from the Activity	Disturbance to native fauna	Terrestrial environmental quality	Vehicles and seismic equipment operating at night Lighting from campsite	F	II	3	• The Activity will be restricted to daylight hours.	A.3.1 Site Selection and Planning	B	II	1	Yes	A
Light from the Activity	Disturbance to landholders	Community and economy	Vehicles and seismic equipment operating at night. Lighting from camp	F	II	3	• The Activity will be restricted to daylight hours.	A.3.1 Site Selection and Planning	B	II	1	Yes	A
Fauna Interaction with Mobile Plant and Vehicles	Disturbance, injury, or death to terrestrial fauna	Terrestrial environmental quality	Vehicles and seismic equipment	E	I	2	• Speeds on unsealed roads will be limited – maximum 60 km/hr on unsealed roads and 40 km/hr on seismic lines. • Driving is only permitted on designated access roads and seismic lines. • Fauna Spotter present during line preparation. • Driving at night is prohibited except in cases of emergency or unforeseen circumstances such as vehicle breakdown.	A.3.5 Biodiversity protection	C	I	1	Yes	A
Livestock Interaction with Mobile Plant and Vehicles	Disturbance, injury to, or death of livestock	Community and economy	Vehicles and seismic equipment	E	I	2	• Relevant landowners and occupiers notified prior to commencement of the Activity. • All gates are left in the condition they were found (i.e., open/closed).	A.3.5 Biodiversity Protection	C	I	1	Yes	A

Risk Type	Potential Impact	Relevant Environmental Factor	Risk Source	Initial Risk Ranking			Mitigation and Management Measures		Residual Risk Ranking			Effective Controls	Uncertainty Ranking
				L	C	R	EMP Commitments	Relevant section of *the Code*	L	C	R		
							• All fences restored to the satisfaction of landowner/managers. • Speeds on unsealed roads will be limited – maximum 60 km/hr on unsealed roads and 40 km/hr on seismic lines. • Fauna Spotter present during line preparation.						
Introduction and Spread of Weeds	Loss of native vegetation through competition for resources	Community and economy Terrestrial environmental quality Terrestrial Ecosystems	Plant and vehicles carrying weeds from outside the Project Area Spread of weeds in Project Area through mulching and vehicle movements	D	III	3	• Comply with the approved Weed Management Plan. • Dedicated Weed Officer. • Vehicle inspections and clearance certificates.	A.3.1 Site Selection and Planning A.3.6 Weed Management	B	III	2	Yes	A
Introduction and Spread of Weeds	Loss of pasture through competition for resources	Community and economy	Plant and vehicles carrying weeds from outside the Project Area Spread of weeds in Project Area through mulching and vehicle movements	D	III	3	• Comply with the approved Weed Management Plan. • Implement a Dedicated Weed Officer. • Vehicle inspections and clearance certificates.	A.3.1 Site Selection and Planning A.3.6 Weed Management	B	III	2	Yes	A
Fire	Disturbance to or death of terrestrial fauna	Community and economy Terrestrial environmental quality	Ignition sources from plant and machinery Smoking	D	III	3	• All vehicles will be equipped with portable fire extinguishers. • Machinery and vehicles should be parked in areas of low fire risk. • Any petrol motor vehicles or petrol-powered pumps will be fitted with spark arresters. • All vehicles will be equipped with operational VHF and/or UHF radio transceivers.	A.3.1 Site Selection and Planning A.3.7 Fire Management	B	III	2	Yes	A

Risk Type	Potential Impact	Relevant Environmental Factor	Risk Source	Initial Risk Ranking			Mitigation and Management Measures		Residual Risk Ranking			Effective Controls	Uncertainty Ranking
				L	C	R	EMP Commitments	Relevant section of *the Code*	L	C	R		
		Terrestrial Ecosystems					• Smoking will only be permitted in designated areas; all butts will be disposed in specially designed receptacles. • Monitor North Australian Fire Management (NAFI) annual fire mapping. • Fauna Spotter during line preparation. • All personnel will receive an induction prior to the commencement of the Activity relating to the following: ○ The Emergency Response Plan. ○ The operation of portable fire extinguishers and communications equipment. ○ Smoking restrictions. ○ Compliance with the Fire Management Plan. • During operations, daily toolbox meetings will be conducted to: ○ Alert the workforce of the fire risk level for the day. ○ Discuss any fire incidents and near misses and remedial actions. ○ Reinforce compliance with the Fire Management Plan.						
Fire	Injury to or death of livestock, loss of pasture, dwellings, and infrastructure	Community and economy	Ignition sources from plant and machinery Smoking	D	III	3	• All vehicles will be equipped with portable fire extinguishers. • Machinery and vehicles parked in low fire risk areas. • All petrol motor vehicles or petrol-powered pumps will be fitted with spark arresters. • All vehicles will be equipped with operational VHF and/or UHF radio transceivers. • Smoking will only be permitted in designated areas, all butts disposed in specially designed receptacles. • Monitor North Australian Fire Management (NAFI) annual fire mapping. • Fire Tender present during line preparation. • All personnel will receive an induction prior to the commencement of the Activity relating to: ○ The Emergency Response Plan. ○ The operation of portable fire extinguishers and communications equipment. ○ Smoking restrictions. ○ Compliance with the Fire Management Plan. • During operations daily toolbox meetings will be conducted to: ○ Alert the workforce of the fire risk level for the day.	A.3.1 Site Selection and Planning A.3.7 Fire Management	B	III	2	Yes	A

Risk Type	Potential Impact	Relevant Environmental Factor	Risk Source	Initial Risk Ranking			Mitigation and Management Measures		Residual Risk Ranking			Effective Controls	Uncertainty Ranking
				L	C	R	EMP Commitments	Relevant section of *the Code*	L	C	R		
							○ Discuss any fire incidents and near misses and remedial actions. ○ Reinforce compliance with the Fire Management Plan.						
Disturbance to Landholder	Disturbance to landholders' operations	Community and economy	Vehicle and plant movements	D	II	2	• Relevant landowners and occupiers are notified before the commencement of the Activity. • Inductions for all employees and contractors cover pastoral, conservation, legislation, and infrastructure issues. • System is in place for logging public/landholder complaints to ensure that issues are addressed. • Any damage to station tracks and fences is reported and restored to the satisfaction of landowner/managers. • All gates are left in the condition they were found (i.e., open/closed). • Speeds on unsealed roads will be limited – maximum 60 km/hr on unsealed roads and 40 km/hr on seismic lines. • Seismic sources are not to operate within the distance defined by the Interest Holder's standards of any pipeline, utility, installation, or building.	A.3.1 Site Selection and Planning D.1 Overview	B	II	1	Yes	A
Chemical and Fuel Leaks and Spills	Impact to soil quality	Community and economy Terrestrial environmental quality	Inappropriate storage or handling of hazardous substances Poor refuelling or fuel transfer practices	D	III	3	• Spill kits available to treat spills in situ. • Minimise fuel transfer where possible. • Site inductions include details of controls in the Spill Management Plan. • No refuelling near riparian buffers. • Use of drip trays for transfers. • Any spills contained and remediated. • Fuel and lubricants will be stored and managed in accordance with AS1940. • Compliance with the Spill Management Plan. • All contaminated materials/waste stored at the temporary campsite is in appropriate containers or bunds to prevent off-site release. • Secondary containment will have sufficient capacity to hold 100% of the volume of the largest container stored in the area (plus 10%) unless the container is equipped with individual secondary containment. • During operations daily inspections of chemical storage area and secondary containment (Error! Reference source not found. **Environmental Monitoring Program**). • Inspection reports and maintenance records (if any) of secondary containment shall be kept and available for review upon request.	A.3.8 Containment of contaminants A.3.9 Rehabilitation B.4.16 Site material and fluids management C.7.2 Spill management plan	B	III	2	Yes	A

Risk Type	Potential Impact	Relevant Environmental Factor	Risk Source	Initial Risk Ranking			Mitigation and Management Measures		Residual Risk Ranking			Effective Controls	Uncertainty Ranking
				L	C	R	EMP Commitments	Relevant section of *the Code*	L	C	R		
							• Spill-specific contingency/emergency response drills to be conducted in line with the Emergency Response Plan (**Appendix 05**). • Comply with **Section** Error! Reference source not found. *Contingency Plan for Bogged Vehicles Transporting Chemicals* of the Spill Management Plan.						
Chemical and Fuel Leaks and Spills	Reduction in surface water and groundwater quality	Inland water environmental quality Community and economy	Inappropriate storage or handling of hazardous substances Poor refuelling or fuel transfer practices	D	III	3	• Spill kits available to treat spills in-situ. • Minimise fuel transfer where possible. • Site inductions include details of controls in the Spill Management Plan. • No refuelling near waterways. • Use of drip trays for transfers. • Any spills contained and remediated. • Fuel and lubricants will be stored and managed in accordance with AS1940. • Compliance with the Spill Management Plan. • All contaminated materials/waste stored at the temporary campsite is in appropriate containers or bunds to prevent off-site release. • Secondary containment will have sufficient capacity to hold 100% of the volume of the largest container stored in the area (plus 10%) unless the container is equipped with individual secondary containment. • During operations daily inspections of chemical storage area and secondary containment (Error! Reference source not found. **Environmental Monitoring Program**). • Inspection reports and maintenance records (if any) of secondary containment shall be kept and available for review upon request. • Spill-specific contingency/emergency response drills to be conducted in line with the Emergency Response Plan (**Appendix 05**). • Comply with **Section** Error! Reference source not found. *Contingency Plan for Bogged Vehicles Transporting Chemicals* of Spill Management Plan.	A.3.8 Containment of contaminants A.3.9 Rehabilitation B.4.16 Site material and fluids management C.7.2 Spill management plan	B	III	2	Yes	A
Irrigation of Treated Effluent (if needed)	Reduction in surface water quality	Inland water environmental quality	Irrigation of treated effluent in an area where it can enter waterways	D	III	3	• Treated effluent sprayed in an irrigation area 50-100 m away from the camp in a place where it is reasonably unlikely to enter any waterways. • Personnel will be advised to minimise water usage when using showers, in the kitchen, etc, to reduce volumes of greywater generated. • Irrigation will be done in a manner to minimise spray drift and ponding.	A.3.8 Containment of contaminants A.3.9 Rehabilitation	B	III	2	Yes	A

Risk Type	Potential Impact	Relevant Environmental Factor	Risk Source	Initial Risk Ranking			Mitigation and Management Measures		Residual Risk Ranking			Effective Controls	Uncertainty Ranking
				L	C	R	EMP Commitments	Relevant section of *the Code*	L	C	R		
							• During operations daily inspections to confirm controls are complied with and records kept. • Fencing will be installed around the irrigation area. • The STP will be designed to comply with, and all wastewater will be disposed of, in accordance with the *Public and Environmental Health Regulation* 2014 and the NT's *Code of Practice for Wastewater Management* [DoH, 2014].	B.4.16 Site material and fluids management C.7.2 Spill management plan					
Fauna Interaction	Fauna attracted to waste	Terrestrial environmental quality Community and economy	Waste stored inappropriately	F	II	3	• Waste will be segregated and stored on-site, and all putrescible waste material will be held in fauna-proof containers. • Other than waste from approved wastewater systems and grey water, there will be no disposal of waste to the natural environment. • A licenced waste contractor will be used for any off-site transfer or disposal. Tracking or other records to be kept. • Compliance with the Wastewater Management Plan. • During operations daily inspections of the designated waste disposal area and the effluent hoses and irrigation area to ensure no visible leaks or pooling. • Daily inspection reports will be created During operations and maintained.	C.3.1 Waste management hierarchy	B	II	1	Yes	A