

Ventia SKA Power Plant Construction

Environmental Risk Assessment

31-Oct-2024

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Environmental Risk Assessment

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1.0 Ventia SKAO Power Plant Part V Works Approval

1.1 Background

Square Kilometre Array Organisation (SKAO), is constructing the Square Kilometre Array (SKA) radio telescope at Boolardy Station in the Western Murchison region of Western Australia. This international initiative, managed by the Commonwealth of Australia, aims to build the world's largest and most sensitive radio telescope, with Western Australia hosting the SKA1-Low Frequency Aperture Array (SKA1-Low), the low-frequency component of the project. The new infrastructure, including the SKA1-Low Array (MWA), will be co-located with the existing Australian SKA Pathfinder (ASKAP) and MWA facilities at the Murchison Radio-astronomy Observatory (MRO), approximately 315 km northeast of Geraldton.

1.2 The Power Plant:

To provide power to the Central Processing Facility SKAO proposes to install five generators and establish an on-site fuel storage capacity of approximately 300,000 litres. These activities are likely to be classified as a prescribed premise under Schedule 1 of the Environmental Protection Regulations 1987. Consequently, a Works Approval under Part V of the *Environmental Protection Act* (EP Act) is required before construction can commence.

The Power Plant Footprint will include.

- Installation of five 1.250 kVA Containerised Generators: Emitting 0.0013 g/L Carbon Monoxide (CO) at continuous power. These generators are self-bunded to 110% of each tank's capacity (4000 litres).
- Three Fuel Tanks: Approximately 110,000 litre capacity each with a usable 100,000 litre volume, self-bunded double wall tanks.
- Four 400 V 3 PH, 150 kW Load Banks: Concrete bunded.
- Impact footprint of Approximately 0.56 ha of the 5.19 ha proposed for "Construction Compound and Access Site" (Figure 4)
- Three 11 kVA Shunt Reactors: Concrete bunded.
- Two 11 kVA Transformers: Concrete bunded.
- One 48 ft High Voltage (HV) Switch Room.
- One 48 ft Low Voltage (LV) Switch Room.
- One Multi Compartment Storage Unit: Self-bunded, holds new and waste oil in separate containments within the tank.
- One Oil/Water Separator.
- One 20 ft Storage Container.

Construction machinery and tooling will include:

- Mobile plant, earthmoving equipment and machinery
- Power Tools
- Pneumatic Tools
- Welding Tools
- Small generators and compressors.

All construction machinery produces emissions in the form of dust, noise, light, hydrocarbons and carbon-based gas emissions. Operations during the construction phase of the SKAO power plant project will result in the generation of putrescible, recycled, general and controlled waste. Identifying relevant controls to manage emissions and waste requires an in-depth Risk Assessment to identify risk of environmental impact.

2.0 Risk Assessment

2.1 Risk Assessment Overview

Sensitive receptors within the proximity of machinery and operations include fauna and flora outside the SKAO power plant project footprint. Of note and conservation status are the Shield-back Trapdoor spider (*Idiosoma nigrum*) population and Western Spiny-tailed skink (*Egernia stokesii*). Other sensitive receptors include groundwater (contamination) and soil stability and structure of the surrounding environment (erosion potential).

Although both fauna species are >5 km away from the Power Plant Construction site as detailed in the SKAO EPBC Referral (AECOM, 2014), it is important to ensure that environmental aspects that can be impacted have gone through a risk assessment process and relevant controls are implemented to mitigate environmental risk.

A risk assessment has been undertaken to determine the risks associated with the construction of the SKAO power station and outline the management measures proposed, which align with the Department of Water and Environmental Regulation (DWER) "Guideline Risk Assessments, Part V, Division 3, *Environmental Protection Act 1986*" (DWER, February 2017). Table 1 presents the risk matrix and criteria utilised to assess each Environmental Aspect and Table 2 presents the risk assessment.

Table 1 Risk Assessment Matrix

LIKELIHOOD	The event is a frequent occurrence and expected to occur at least annually	5. Almost certain	Medium	Medium	High	High	High
	The event has occurred on several occasions in the past	4. Likely	Low	Medium	Medium	High	High
	The event has occurred on similar construction projects in the past	3. Possible	Low	Low	Medium	High	High
	The event may have occurred on similar construction projects but infrequently, has occurred infrequently in the industry	2. Unlikely	Low	Low	Medium	Medium	High
	The event has not occurred in similar construction projects but has occurred infrequently elsewhere within the industry	1. Rare	Low	Low	Low	Medium	Medium
RISK MATRIX			1. Insignificant	2. Minor	3. Moderate	4. Major	5. Catastrophic
			Minor breach of environmental policy with little or no impact on environment	Minor, reversible damage to environment, localised short-term reputational impact	Reversible environmental damage, requiring moderate degree of clean-up and short-term reputational harm	Substantial but reversible environmental damage, involving significant clean-up costs and widespread reputational damage	Irreversible, significant damage to environment, with widespread and long-term reputational damage
			CONSEQUENCE				

Table 2 Risk Assessment Table

Source/Activities	Environmental Aspect	Potential Pathways and Impact	Receptors	Risk Rating without controls C= consequence L= likelihood	Controls	Risk Rating with controls C= consequence L= likelihood
Time Limited Operations						
Vehicle and Machinery Movements	Dust	Air / wind dispersion causing impacts to sensitive receptors	Shield-back Trapdoor spider (<i>Idiosoma nigrum</i>) population and Western Spiny-tailed skink (<i>Egernia stokesii</i>). Other Fauna and Flora outside clearing footprint.	C = 1	Monitoring and Specified Action: <ul style="list-style-type: none"> Use portable water tanks / water carts to suppress dust. Avoid high dust generating activities during windy conditions. 	C = 1
				L = 1		L = 1
				Risk = Low		Risk = Low
	Noise	Sound energy emitted through the air from vehicle movements impacting sensitive receptors.	d Western Spiny-tailed skink (<i>Egernia stokesii</i>). Other Fauna	C = 1	Specifications on product or materials: <ul style="list-style-type: none"> Fitting non-tonal reversing beepers or an equivalent to use on mobile plant. Emission Limits: <ul style="list-style-type: none"> Limit non fixed plant activities to daylight hours. Turning off vehicles and machinery when not in use. 	C = 1
				L = 1		L = 1
				Risk = Low		Risk = Low
	Vibration	Vehicle movements in and around project area causing ground vibration.	Shield-back Trapdoor spider (<i>Idiosoma nigrum</i>) population and Western Spiny-tailed skink (<i>Egernia stokesii</i>). Other Fauna and Flora outside clearing footprint.	C = 2	Requirements for Operation of Infrastructure: <ul style="list-style-type: none"> Limit ground disturbance where possible when operating vehicle and machinery during construction activities. 	C = 2
				L = 2		L = 1
				Risk = Low		Risk = Low

Source/Activities	Environmental Aspect	Potential Pathways and Impact	Receptors	Risk Rating without controls C= consequence L= likelihood	Controls	Risk Rating with controls C= consequence L= likelihood
	Flora and Fauna	Vehicle movements in and around project area causing damage to flora and fauna.	Shield-back Trapdoor spider (<i>Idiosoma nigrum</i>) population and Western Spiny-tailed skink (<i>Egernia stokesii</i>). Other Fauna Existing Native Vegetation	C= 3 L = 2 Risk = Moderate	Specified Action: <ul style="list-style-type: none"> Set speed limit in and outside project site to a reasonable speed conducive to fauna safety. Operate mobile and fixed plant during daylight hours where possible. No go zones complete with signage and flagging tape. Qualified surveyors to mark out clearing boundary to avoid over clearing. Mobile Equipment to stay on pre-formed tracks. Monitoring: <ul style="list-style-type: none"> Project supervisor to check boundary daily for marker integrity. All machinery and vehicles to be inspected for fauna at prestart. All excavations to be checked for fauna prior to works daily. Report all fauna sightings and fauna status including relocation. Report all fauna strikes 	C= 2 L = 2 Risk = Low

Source/Activities	Environmental Aspect	Potential Pathways and Impact	Receptors	Risk Rating without controls C= consequence L= likelihood	Controls	Risk Rating with controls C= consequence L= likelihood
	Other Emissions and Loss of Containment	<p>Vehicles and machinery use hydrocarbons that produce gas emissions and have potential to spill to ground.</p> <p>Vehicles and Machinery produce light that can attract or detract fauna impacting usual movements.</p>	<p>Shield-back Trapdoor spider (<i>Idiosoma nigrum</i>) population and Western Spiny-tailed skink (<i>Egernia stokesii</i>).</p> <p>Other Fauna</p> <p>Existing Native Vegetation</p> <p>Ground Water.</p>	<p>C = 3</p> <p>L = 5</p> <p>Risk = High</p>	<p>Specified Actions:</p> <ul style="list-style-type: none"> • Carpool when appropriate and limit the number of vehicles for the project. • Use busses for contractor/staff movements between project site and camp facilities. • Limit operation of mobile plant to daylight hours. <p>Specifications on Products or Materials:</p> <ul style="list-style-type: none"> • Use low light around infrastructure where appropriate to minimise fauna impact. • Use low sulphur diesel in engines when possible. • All tanks and small engines to be self-bunded. • Spill kits must be made available around the construction site for spill mitigation. • Use pads and drip trays when refuelling. <p>Monitoring:</p>	<p>C= 2</p> <p>L = 3</p> <p>Risk = Low</p>

Source/Activities	Environmental Aspect	Potential Pathways and Impact	Receptors	Risk Rating without controls C= consequence L= likelihood	Controls	Risk Rating with controls C= consequence L= likelihood
					<ul style="list-style-type: none"> Report and record spills as they occur. Keep service records of machines being used for construction. <p>Siting of Infrastructure</p> <ul style="list-style-type: none"> Bulk chemicals to be stored in bunded areas. All controlled waste created from hydrocarbon waste (waste oil, filters) must be stored appropriately in bunded areas and removed from site as per State Legislative requirements. Designated service and refuelling area or service truck to carry spill kit and drip trays. 	
	Weed, Seed and Plant Pathogens	Weed, Seed and Plant Pathogens brought into Project Area from externally sourced Clearing and construction machinery and light vehicles.	Shield-back Trapdoor spider (<i>Idiosoma nigrum</i>) population and Western Spiny-tailed skink (<i>Egernia stokesii</i>). Other Fauna Existing Flora outside clearing boundary.	C = 3 L = 3 Risk = Moderate	Monitoring and Specified Actions: <ul style="list-style-type: none"> Request completed Weed, Seed and Hygiene certification certificates from machinery hire contractor prior to mobilisation to site. Project Supervisors to inspect machinery prior to use once mobilised to site. Vehicle washdown prior to entering site. 	C = 2 L = 2 Risk = Low

Source/Activities	Environmental Aspect	Potential Pathways and Impact	Receptors	Risk Rating without controls C= consequence L= likelihood	Controls	Risk Rating with controls C= consequence L= likelihood
Ground Preparation and Power Plant Construction Site Operations	Dust	Air / wind dispersion causing impacts sensitive receptors from excavation activities.	Shield-back Trapdoor spider (<i>Idiosoma nigrum</i>) population and Western Spiny-tailed skink (<i>Egernia stokesii</i>).	C = 1	Monitoring and Specified Actions: <ul style="list-style-type: none"> Use portable water tanks / water carts to suppress dust. Avoid high dust generating activities during windy conditions. Spray stockpiles of excavated materials where appropriate. 	C = 1
				L = 4		L = 3
			Other Fauna and existing vegetation outside project boundary.	Risk = Low		Risk = Low
	Noise	Sound energy emitted through the air from project operations impacting sensitive receptors.	Western Spiny-tailed skink (<i>Egernia stokesii</i>).	C = 2	Specifications on product or materials: <ul style="list-style-type: none"> Fitting non-tonal reversing beepers or an equivalent to use on mobile plant. Emission Limits: <ul style="list-style-type: none"> Limit non fixed plant activities to daylight hours. Turn off equipment when not in use. 	C = 2
			Other Fauna	L = 4		L = 3
				Risk = Moderate		Risk = Low
	Vibration	Compaction machinery causing vibration in project area.	Shield-back Trapdoor spider (<i>Idiosoma nigrum</i>) population and Western Spiny-tailed skink (<i>Egernia stokesii</i>).	C = 2	Specified Action: <ul style="list-style-type: none"> Limit compaction and earth moving activities to daylight hours. 	C = 2
				L = 2		L = 1
			Other Fauna outside project footprint.	Risk = Low		Risk = Low
	Flora and Fauna	Machinery operating in project area causing	Shield-back Trapdoor spider (<i>Idiosoma nigrum</i>) population	C = 3	Specified Action:	C = 2

Source/Activities	Environmental Aspect	Potential Pathways and Impact	Receptors	Risk Rating without controls C= consequence L= likelihood	Controls	Risk Rating with controls C= consequence L= likelihood
		vibration and disturbing existing flora fauna outside project area.	and Western Spiny-tailed skink (<i>Egernia stokesii</i>). Other Fauna Existing Native Vegetation	L= 3 Risk = Moderate	<ul style="list-style-type: none"> Set speed limit inside and outside project site to a safe and reasonable limit conducive to fauna safety. Operate mobile and fixed plant during daylight hours where possible. Qualified surveyors to mark out clearing boundary to avoid over clearing. Mobile Equipment to stay on pre-formed tracks. <p>Monitoring:</p> <ul style="list-style-type: none"> Project supervisor to check boundary daily for marker integrity. All machinery and vehicles to be inspected for fauna at prestart. All excavations to be checked for fauna prior to works daily. Report all fauna sightings and fauna status including fauna relocation. Report all fauna strikes/deaths. 	L = 2 Risk = Low

Source/Activities	Environmental Aspect	Potential Pathways and Impact	Receptors	Risk Rating without controls C= consequence L= likelihood	Controls	Risk Rating with controls C= consequence L= likelihood
	Other Emissions and Loss of Containment	<p>Vehicles and machinery use hydrocarbons that produce gas emissions and have potential to spill to ground.</p> <p>Vehicles and Machinery produce light that can attract or detract fauna impacting usual movements.</p> <p>Construction involves concrete pouring. Spills may lead to localised soil contamination.</p> <p>Construction involves laying pipes and has potential to lead to pipe damage and leaks.</p>	<p>Shield-back Trapdoor spider (<i>Idiosoma nigrum</i>) population and Western Spiny-tailed skink (<i>Egernia stokesii</i>).</p> <p>Other Fauna</p> <p>Existing Native Vegetation</p> <p>Ground Water</p>	<p>C = 3</p> <p>L = 5</p> <p>Risk = High</p>	<p>Specified Actions:</p> <ul style="list-style-type: none"> • Carpool when appropriate and limit the number of vehicles for the project. • Use busses for contractor/staff movements between project site and camp facilities. <p>Emission Limits:</p> <ul style="list-style-type: none"> • Limit operation of non-fixed machinery to daylight hours. <p>Specifications on Products or Materials:</p> <ul style="list-style-type: none"> • Use low light around infrastructure where appropriate to minimise fauna impact. • Concrete to be batched in lined areas and all Waste to be removed to an appropriate landfill facility. • All spills of concrete to be remediated immediately and reported. • All pipework to be checked for leaks and or damage prior to commissioning. Any leaks to be remediated immediately. 	<p>C = 2</p> <p>L = 3</p> <p>Risk = Low</p>

Source/Activities	Environmental Aspect	Potential Pathways and Impact	Receptors	Risk Rating without controls C= consequence L= likelihood	Controls	Risk Rating with controls C= consequence L= likelihood
					<ul style="list-style-type: none"> • Use low sulphur diesel in engines when possible. • All tanks and small engines to be self-bunded. • Spill kits must be made available around the construction site for spill mitigation. <p>Use pads and drip trays when refuelling.</p> <p>Monitoring:</p> <ul style="list-style-type: none"> • Report and record spills as they occur. • Keep service records of machines being used for construction. <p>Siting of Infrastructure:</p> <ul style="list-style-type: none"> • Bulk chemicals to be stored in bunded areas. • All controlled waste created from hydrocarbon waste (waste oil, filters) must be stored appropriately in bunded areas and removed from site as per State Legislative requirements. • Designated service and refuelling area or service truck to carry spill kit and drip trays 	

Source/Activities	Environmental Aspect	Potential Pathways and Impact	Receptors	Risk Rating without controls C= consequence L= likelihood	Controls	Risk Rating with controls C= consequence L= likelihood
	Waste Management	<p>Waste generated from construction activities and staff/contractor operations (crib room etc) not correctly captured, stored or removed from project site.</p> <p>Causing pollution of surrounding natural areas, ground contamination or encouraging foraging fauna.</p> <p>Construction involves concrete pouring waste concrete can cause contamination to soil.</p>	<p>Shield-back Trapdoor spider (<i>Idiosoma nigrum</i>) population and Western Spiny-tailed skink (<i>Egernia stokesii</i>).</p> <p>Other Fauna</p> <p>Existing Native Vegetation</p> <p>Ground Water</p>	<p>C = 3</p> <p>L = 5</p> <p>Risk = High</p>	<p>Specified Actions:</p> <ul style="list-style-type: none"> All waste to be stored in appropriate bins on site. All general waste bins to have lids to discourage foraging fauna. Controlled wastes and dangerous goods to be stored in bunded areas where appropriate. Concrete to be batched in lined areas and all Waste to be removed to an appropriate landfill facility. <p>Monitoring and Specified Actions:</p> <ul style="list-style-type: none"> All bins to be emptied and removed from site regularly to prevent overflow to ground and avoid decayable wastes from putrefying. All controlled wastes to be removed from site using suitably DWER licenced vendor and DWER licenced disposal facility. 	<p>C = 2</p> <p>L = 3</p> <p>Risk = Low</p>
	Surface Water / Runoff and Drainage	Increased Hardstand and compacted areas in Project site will see	Shield-back Trapdoor spider (<i>Idiosoma nigrum</i>) population and Western Spiny-tailed skink (<i>Egernia stokesii</i>).	<p>C = 2</p> <p>L = 4</p>	<p>Infrastructure Design:</p> <ul style="list-style-type: none"> Suitable Drainage Engineered into Footprint and design of Power Plant These include Sediment Fences, drain 	<p>C = 2</p> <p>L = 2</p>

Source/Activities	Environmental Aspect	Potential Pathways and Impact	Receptors	Risk Rating without controls C= consequence L= likelihood	Controls	Risk Rating with controls C= consequence L= likelihood
		<p>increase runoff and erosion risk.</p> <p>Potential for contaminated water runoff from hardstand areas containing, DG, Controlled Waste, Waste and Refuelling Servicing areas.</p> <p>Potential for ablution overflow.</p>	<p>Other Fauna</p> <p>Existing Native Vegetation</p> <p>Ground Water</p>	Risk = Moderate	<p>covers, diversion drains, HumeCeptors' and associated infrastructure to manage water flow from construction footprint to potential contaminated water holding areas.</p> <ul style="list-style-type: none"> Fencing installed to correct soil infiltration and capacity requirements. Areas with poor infiltration to be avoided when installing fencing to prevent ponding. <p>Monitoring and Specified Actions:</p> <ul style="list-style-type: none"> Waste water from potential contaminant areas (Ablutions, vehicle and machine service areas, chemical storage) to be treated or removed from site as required. Reporting any incidents where drainage failure or containment failure has occurred. All Waste movement records and details of treatment, reuse or disposal to be kept. 	Risk = Low
		Weed, Seed and Plant Pathogens brought into	Shield-back Trapdoor spider (<i>Idiosoma nigrum</i>) population	C = 3	Monitoring:	C = 2

Source/Activities	Environmental Aspect	Potential Pathways and Impact	Receptors	Risk Rating without controls C= consequence L= likelihood	Controls	Risk Rating with controls C= consequence L= likelihood
	Weed, Seed and Plant Pathogens	Project Area from externally sourced Clearing and construction machinery and light vehicles.	and Western Spiny-tailed skink (<i>Egernia stokesii</i>).	L = 3	<ul style="list-style-type: none"> Request completed Weed, Seed and Hygiene certification certificates from machinery hire contractor prior to mobilisation to site. Project Supervisors to inspect machinery prior to use once mobilised to site. 	L = 2
			Other Fauna Existing Flora outside clearing boundary.	Risk = Moderate		Risk = Low
	Cultural Heritage	<p>Surveys with Wajarri Yamatji, traditional owners not carried out for construction area.</p> <p>Excavations may reveal artefacts or impact areas of cultural significance.</p>	Undiscovered Cultural Heritage places or artefacts of Wajarri Yamatji impacted by Power Station construction activities.	C= 3	<p>Monitoring and Specified Actions.</p> <ul style="list-style-type: none"> Surveys to be carried out with Wajarri Yamatji prior to any works. All excavations to be executed with care. Any artefact or suspected artefact found enacts a 'stop work' and be reported immediately for further investigation. 	C= 3
				L= 2		L= 1
				Risk = Moderate		Risk =Low

2.2 Discussion

The Risk Assessment shows that all known environmental aspects that could be impacted by construction and operation activities have been assessed and controls identified to low any risk ratings. Environmental Aspects during this Risk Assessment scored from High to Low. After detailing Control measures all risks have been brought to the grading of 'Low'.