

Decision Report

Application for Works Approval

Part V Division 3 of the Environmental Protection Act 1986

Works Approval Number W6532/2021/1

Applicant Northern Star (Thunderbox) Pty Ltd

ACN 107 154 727

File Number DER2021/000137

Premises North Eastern Goldfields Operations

Thunderbox Mill and Power Station expansion

Mining tenement M36/542

LEINSTER WA 6437

As defined by the Premises map attached to the issued works

approval

Date of Report 2 July 2021

Decision Works approval granted

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1. Decision summary

This Decision Report documents the assessment of potential risks to the environment and public health from emissions and discharges during the construction and operation of the Premises. As a result of this assessment, Works Approval W6532/2021/1 has been granted.

2. Scope of assessment

2.1 Regulatory framework

In completing the assessment documented in this Decision Report, the department has considered and given due regard to its Regulatory Framework and relevant policy documents which are available at https://www.der.wa.gov.au.

2.2 Application summary and overview of Premises

On 12 March 2021, Northern Star (Thunderbox) Pty Ltd (the applicant) submitted an application for a works approval to the department under section 54 of the *Environmental Protection Act* 1986 (EP Act).

The application is to undertake construction works relating to the expansion of the Thunderbox Mill and power station at the North Eastern Goldfields Operations which operates under licence L7815/2001/11. Construction will occur on mining tenement M36/542 (the Premises) which is located approximately 90km north of the town of Leonora. The expansion will increase the throughput of the Thunderbox Mill from 3 million tonnes per annum (Mtpa) to 7 Mtpa and increase the throughput of the Thunderbox power station from 14.8 megawatts (MW) in aggregate to 38MW.

The proposed expansion will include the construction of:

- New primary jaw crushing circuit (consisting of ROM bin, apron feeder, vibrating grizzly and C160 jaw crusher) operating in parallel with the existing crushing circuit.
- New crushed ore stockpile, accepting crushed products from the existing and new crushing circuits.
- New 18 MW SAG mill.
- New pebble crushing circuit.
- New cyclone cluster.
- New gravity circuit.
- Two new 4,100 m³ leach tanks.
- Conversion of the existing pressure Zadra elution circuit to split-AARL.
- New electrowinning cells to suit the new elution circuit.
- New (parallel) tailings thickener.
- Services upgrades as required.
- Addition of seven new 2.5MW generators.

Figure 1 shows the layout of the new infrastructure within the existing Thunderbox mill operations area. Construction activities for the mill expansion is due to commence in July 2021, with the first ore milled and commissioning completed in August 2022.

The Premises relates to the categories and assessed design capacity under Schedule 1 of the *Environmental Protection Regulations 1987* (EP Regulations) which are defined in Works Approval W6532/2021/1. The infrastructure and equipment relating to the Premises category and any associated activities which the department has considered in line with *Guidance Statement: Risk Assessments* (DER 2017) are outlined in Works Approval W6532/2021/1.

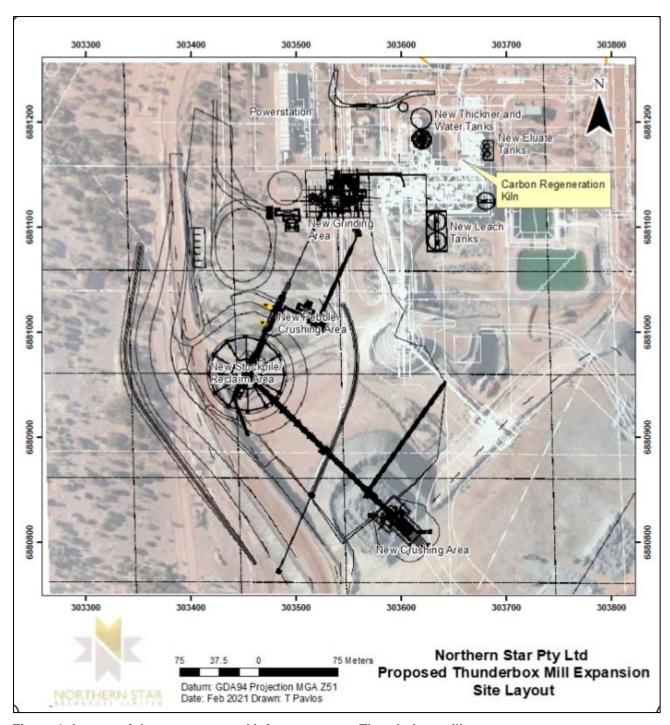


Figure 1: Layout of the new proposed infrastructure at Thunderbox mill.

The installation of the new infrastructure will result in the existing crusher ore stockpile, stockpile reclaim feeders, conveyors, SAG mill and associated pebble circuit and cyclone cluster to be made redundant.

The increase in throughput from 3 mtpa to 7 mtpa will result in an increase in tailings being produced and deposited into the Thunderbox tailings storage facility (TSF). The works approval holder is currently in the process of completing a ten-year deposition strategy for the TSF, considering the installation of the new proposed tailings thickener and also a paste fill plant which will be undergoing commissioning in April 2021. The works approval holder plans to dispose of as much tailings, in the form of paste, as possible to the Thunderbox underground mine and estimates approximately 16% of tailings will be disposed of in this way following the expansion of the Thunderbox mill.

The existing TSF is currently approved to undergo an addition six embankment lifts on Cell A and seven more on Cell B. The proposed Thunderbox mill expansion will eventually also require the construction of an additional TSF cell to meet the life of mine requirements. The preliminary design for this new cell (Cell C) is under development and a works approval application will be submitted separately for this new cell in the future.

Capacity of the Thunderbox power station will also be increased to 38MW in aggregate with the addition of seven new 2.5MW gas powered generators. The footprint of the existing power station will be extended to the north (see Figure 2). The proposed additional generators will be high speed CAT G3520H. Predicted emission rates, based on supplier provided emissions data is shown below in table 1.

Table 1: Exhaust stack emission rates for 2.5MW generators based on pipeline natural gas (source: application documents).

LPG Fuel Emissions Per Generator								
Carbon Monoxide Oxides of Nitrogen Sulphur Dioxide PM10 Particulates								
(kg/m³)	(kg/m³)	(kg/m³)	(kg/m³)					
24.51	315.28	4	0.006					

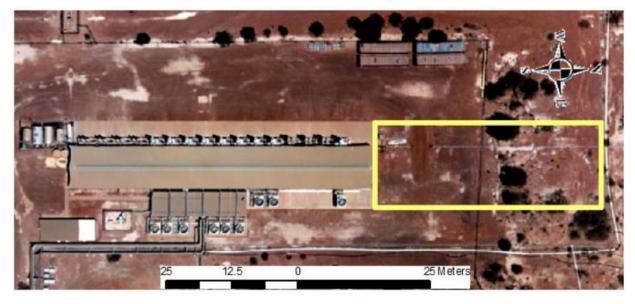


Figure 2: Location of proposed power station expansion (source: Application documents)

The current LNG storage facility, comprising six off storage bullets with a total storage capacity of 45 kilo litres (KL) will be decommissioned and removed and all gas appliances on site (gold room furnace, elution heater and carbon regen kiln) will be converted from LNG to pipeline natural gas (LPG).

It is expected that emissions for the carbon regeneration kiln will increase; however, burned emissions per unit carbon will decrease with the change from LNG to LPG. It is anticipated pollutants from the carbon regeneration kiln listed in L7815/2001/11 will continue to remain under the conditioned licence limits.

3. Risk assessment

The department assesses the risks of emissions from prescribed premises and identifies the potential source, pathway and impact to receptors in accordance with the *Guidance Statement: Risk Assessments* (DWER, 2020).

To establish a Risk Event there must be an emission, a receptor which may be exposed to that

emission through an identified actual or likely pathway, and a potential adverse effect to the receptor from exposure to that emission.

3.1 Source-pathways and receptors

3.1.1 Emissions and controls

The key emissions and associated actual or likely pathway during premises construction and operation which have been considered in this Decision Report are detailed in Table below. Table also details the proposed control measures the applicant has proposed to assist in controlling these emissions, where necessary.

Table 2: Proposed applicant controls

Emission	Sources	Potential pathways	Proposed controls
Dust	Construction / Installation of infrastructure. Crushing of material, vehicle movements, lift-off from stockpiles and/or stored product, earthworks etc.	Air/windborne pathway	 New crushed ore stockpile will have a stockpile cover to mitigate fugitive dust. Water carts will be used to wet down roads etc. when required. All transfer points will be equipped with rubber sealing and skirting to contain dust. Water sprays will be installed on the ROM bin Dust extraction units (bag house) will be installed on the secondary crusher discharge and screen discharge chute.
Hydrocarbon spills/leaks	Crusher / machinery / power station	Direct discharge to land	■ The powerhouse shed is fully enclosed and concrete bunded and all drainage will report to an oil water separator for treatment. Treated water will be discharged into a concrete bund and allowed to evaporate. Should the volume of water that reports to the bund increase, to a point where it does not readily evaporate water will be transferred to the wash bay sump where it can be incorporated into the mill circuit
			 All hydrocarbons will be adequately bunded to ensure any spills or leaks are contained. The design and construction of storage facilities will be to Australian standards. Spill kits will be located in hydrocarbon
			storage areas. In the event of a spill, contaminated soil will be collected and removed to the bioremediation area for treatment.
			 All motors, pumps, crushers, drives and screens will sit on concrete footings which provide primary bunding for spills of oil and grease used to lubricate and maintain equipment. Additional leach tanks will be contained within primary concrete bunding

			which will be expanded to accommodate the additional infrastructure. Contaminated stormwater runoff will be captured via existing stormwater infrastructure.
Contaminated (sediment) stormwater	Stockpile runoff / runoff from within operations area.	Overland flow	The new infrastructure will be located in the processing plant area which has existing secondary bunding which drains to the south allowing surface water run-off to be capture in existing sumps or the ROM toe drain.
			 Toe drain to be constructed around perimeters of new stockpile/reclaim area to capture sediment laden stormwater.
			A new diversion drain will be constructed to the west of the precinct to stop water from reporting to the mill area. This diversion will direct water south where it will connect with existing drainage channels.
Air emissions	Expanded power station. Carbon Regeneration Kiln.	Air/windborne pathway	Emissions from the powerhouse and carbon regeneration kiln will be monitored and reported annually as per operating Licence conditions.

3.1.2 Receptors

In accordance with the *Guidance Statement: Risk Assessment* (DER 2017), the Delegated Officer has excluded employees, visitors and contractors of the applicant's from its assessment. Protection of these parties often involves different exposure risks and prevention strategies and is provided for under other state legislation.

Table below provides a summary of potential human and environmental receptors that may be impacted as a result of activities upon or emission and discharges from the prescribed premises (Guidance Statement: Environmental Siting (DER 2016)).

Table 3: Sensitive human and environmental receptors

Human receptors	Distance from prescribed activity
Town of Leonora	90 km from Premises. Not considered a receptor due to distance (no pathway).
Weebo Pastoral Station	20 km north west from the Premises. Not considered a receptor due to distance (no pathway).
Environmental receptors	Distance from prescribed activity
Surface water	Minor surface water drainage lines exist directly to the west of the Thunderbox mill operations area. No major surface water features located within 5km of the Thunderbox mill operations area.
Native Vegetation	Native vegetation located west of Thunderbox mill operations area.

	Priority flora (P4) Calytix Uncinata has been located 1km west of the mill. No Threatened/ priority ecological communities within 5 km of the project area.
Designated Area (as defined in section 57 of the EP Act). RIWI Act 1914 – Groundwater Area	Premises is within the Goldfields Groundwater Area. Groundwater (fresh, TDS 370 – 740 mg/L; pH neutral to slightly alkaline (7.1 – 8.0). Depth to groundwater in the area is approximately 15 -30 meters below ground level (mbgl). Groundwater not considered as a receptor due to nature of proposed activity.

3.2 Risk ratings

Risk ratings have been assessed in accordance with the *Guidance Statement: Risk Assessments* (DER 2017) for each identified emission source and takes into account potential source-pathway and receptor linkages as identified in Section 3.1. Where linkages are in-complete they have not been considered further in the risk assessment.

Where the applicant has proposed mitigation measures/controls (as detailed in Section 3.1), these have been considered when determining the final risk rating. Where the Delegated Officer considers the applicant's proposed controls to be critical to maintaining an acceptable level of risk, these will be incorporated into the works approval as regulatory controls.

Additional regulatory controls may be imposed where the applicant's controls are not deemed sufficient. Where this is the case the need for additional controls will be documented and justified in Table .

Works Approval W6532/2021/1 that accompanies this Decision Report authorises construction, commissioning and time-limited operations. The conditions in the issued Works Approval, as outlined in Table have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

An amendment to licence L7815/2001/11 is required following the time-limited operational phase authorised under the works approval to authorise emissions associated with the ongoing operation of the expanded Thunderbox Mill and Power station. A risk assessment for the operational phase has been included in this Decision Report, however licence conditions will not be finalised until the department assesses the licence application.

Table 4: Risk assessment of potential emissions and discharges from the Premises during construction and operation

Risk Event	Risk Event							
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Licence Holder's controls	C = consequence L = likelihood	Holder's controls sufficient?	Conditions ² of Works Approval	Justification for additional regulatory controls
Construction	onstruction							
Construction of new infrastructure, earthworks and movement of vehicles on unsealed roads.	Dust	Air/windborne pathway causing impacts vegetation health.	Native vegetation adjacent to project area	Refer to Section 3.1	C = Slight L = Unlikely Low Risk	Y	N/A	N/A
Commissioning								
Commissioning of new power generators.	Air emissions	Air/windborne pathway	No pathway to human receptors due to distance.	Refer to Section 3.1	N/A	N/A	Conditions 4- 10	Standard commissioning conditions added to the works approval to ensure that the air emissions produced by new power generators meet manufacturers specifications.
Operation (including time I	imited operatio	ns)						
Category 5 - Screening, crushing, unloading, loading and storage of material. Increase in approved throughput from 3Mtpa to 7Mtpa	Dust	Air/windborne pathway causing impacts vegetation health.	Native vegetation adjacent to project area	Refer to Section 3.1	C = Moderate L = Unlikely Medium Risk	Y	Condition 1 infrastructure requirements (dust water sprays and bag house installed on crusher) Condition 2 and 3 construction compliance reporting Conditions 11 and 12 - time limited operations commencement and duration.	The works approval holders' controls have been conditioned within the works approval. Some additional regulatory requirements apply for compliance reporting for new infrastructure, time limited operations commencement and duration.

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Risk Event					Risk rating ¹	Licence		
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Licence Holder's controls	C = consequence L = likelihood	Holder's controls sufficient?	Conditions ² of Works Approval	Justification for additional regulatory controls
	Hydrocarbon spills/leaks	Direct discharge to land. Potentially causing contamination of soils.	Soil within project area.	Refer to Section 3.1	C = Slight L = Unlikely Low Risk	Y	N/A	Condition 1.2.1 in existing licence adequately regulates this risk event. No additional regulatory controls required.
	Sediment laden / contaminated stormwater	Overland runoff potentially causing ecosystem disturbance or impacting surface water quality	Native vegetation adjacent to project area. Minor surface water drainage lines adjacent to project area.	Refer to Section 3.1	C = Minor L = Unlikely Medium Risk	Y	Condition 1 Infrastructure requirements – sediment bund and toe drain Condition 2 and 3 construction compliance reporting Conditions 11 and 12 – time limited operations commencement and duration.	The works approval holders' controls have been conditioned within the works approval. Some additional regulatory requirements apply for compliance reporting for new infrastructure, time limited operations commencement and duration.
	Air emissions (Carbon regeneration kiln)	Air/windborne pathway	No pathway to human receptors due to distance.	N/A	N/A	N/A	N/A	N/A The carbon regeneration kiln air emissions will continue to be monitored as per condition 3.2.1 on the existing licence. Emissions limits also apply (condition 2.2.2).
Category 52 – power station Increase in aggregate to 38 MW.	Air emissions from power station	Air/windborne pathway	No pathway to human receptors due to distance.	N/A	N/A	N/A	N/A	N/A The power station air emissions will continue to be monitored as per condition 3.2.1 on the existing licence.

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Risk Event	Risk Event							
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Licence Holder's controls	C = consequence L = likelihood	Holder's controls sufficient?	Conditions ² of Works Approval	Justification for additional regulatory controls
	Hydrocarbon spills/leaks	Direct discharge to land. Potentially causing contamination of soils.	Soil surrounding power station	Refer to Section 3.1	C = Slight L = Unlikely Low Risk	Y	N/A	Existing condition 1.2.1 adequately regulates this risk event. No additional regulatory controls required.

Note 1: Consequence ratings, likelihood ratings and risk descriptions are detailed in the Guidance Statement: Risk Assessments (DER 2017).

Note 2: Proposed applicant controls are depicted by standard text. **Bold and underline text** depicts additional regulatory controls imposed by department.

4. Consultation

Table provides a summary of the consultation undertaken by the department.

Table 5: Consultation

Consultation method	Comments received	Department response
Application advertised on the department's website on 25 May 2021.	One comment received from member of the public on 7 June 2021 regarding:	The impacts from and increase in the use of water is not something that assesssed by a Part V approval under the EP Act.
	Concerns around increase in water usage as a result of the expansion to the	This aspect is regulated under a groundwater licence (GWL) through the Rights in Water and Irrigation Act 1914 (RIWI Act)
	Thunderbox Mill and the impact this may have (i.e water drawdown) on their land/ business.	The applicant has indicated within their works approval application supporting documents that they hold a number of GWLs that give them a total allocation of 7,790,00 kL of water. Currently they are using about 49% of their allocated water amount and have stated that their current GWLs will cover the increase in water usage they will require for operation of the expanded Thunderbox mill. No additional GWLs is required at this stage.
		If the Applicant requires additional water allocation increase greater than 100,000kL per annum it will be advertised within the West Australian and the Kalgoorlie Miner where submissions by the public can then be made for consideration in the assessment for the GWL.
Local Government Authority advised of proposal on 24 May 2021	None received.	N/A.
Department of Mines, Industry Regulation and Safety (DMIRS) advised of proposal on 24 May 2021	None received.	N/A.
Applicant was provided with draft documents on 29 June 2021.	Comments received on 1/7/2021. Northern Star has reviewed the draft Works Approval and Decision Report and wishes to waive the 21 day consultation period.	Noted.

5. Conclusion

Based on the assessment in this Decision Report, the Delegated Officer has determined that a works approval will be granted, subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

An amendment to licence L7815/2001/11 is required following the time-limited operational phase authorised under the works approval to authorise emissions associated with the ongoing operation of the expanded Thunderbox Mill and Power station.

References

- 1. Department of Water and Environmental Regulation (DWER) 2016, *Guideline: Environmental Siting*, Perth, Western Australia.
- 2. DWER 2020, Guidance Statement: Risk Assessments, Perth, Western Australia.
- 3. DWER 2015, Guidance Statement: Setting Conditions, Perth, Western Australia.

Appendix 2: Application validation summary

SECTION 1: APPLICATION SUMMARY						
Application type						
Works approval	X					
		Relevant works approval number:		None		
		Has the works approvith?	oval been complied	Yes □	No □	
Licence		Has time limited ope works approval dem acceptable operatio	nonstrated	Yes □	No □ N/A □	
		Environmental Com Critical Containmen Report submitted?		Yes □	No □	
		Date Report receive	ed:			
Renewal		Current licence number:				
Amendment to works approval		Current works approval number:				
Amandment to license		Current licence number:				
Amendment to licence		Relevant works approval number:		N/A		
Registration		Current works approval number:		None		
Date application received		12/03/2021				
Applicant and Premises details						
Applicant name/s (full legal name/s)		Northern Star Resources Ltd				
Premises name		North Eastern Goldfields Operation				
Premises location	Have given same premises details as the existing licence L7815/2011/1. But works are only taking place on M36/542. Need to confirm premises boundary for the works approval.					
Local Government Authority	Shire of Leonora					
Application documents						
HPCM file reference number:	DER2021/000137					
Key application documents (addition application form):	nal to	Attachment 3B NSR-LET- Mill Expansion Attachments 2d, 2c, 2b and 2a.				
Scope of application/assessment						

Works approval

Northern Star Resources (NSR) is seeking a Works Approval to allow an expansion of the Thunderbox mill. The expansion will increase nominal throughout of Category 5: from 3 Million tonnes per annum to 7 Million tonnes per annum and 'Category 52-Electrical Power Generation' from 14.8MW in aggregate to 38MW.

The proposed expansion will include the construction of:

- New primary jaw crushing circuit operating in parallel with the existing crushing circuit.
- New crushed ore stockpile, accepting crushed products from the existing and new crushing circuits.
- New 18 MW SAG mill.
- New pebble crushing circuit.
- New cyclone cluster.
- New gravity circuit.
- Two new 4,100 m³ leach tanks.
- Conversion of the existing pressure Zadra elution circuit to split-AARL.
- New electrowinning cells to suit the new elution circuit.
- New (parallel) tailings thickener.
- Services upgrades as required.
- Addition of seven new 2.5MW generators.

Category number/s (activities that cause the premises to become prescribed premises)

Table 1: Prescribed premises categories

Summary of proposed activities or

changes to existing operations.

Prescribed premises category and description	Proposed production or design capacity
Category 5	An increase from 3 million tonnes to 7 million tonnes per annum
Category 52	An increase from 14.8 MW to 38 MW per annum

Legislative context and other approvals

Has the applicant referred, or do they intend to refer, their proposal to the EPA under Part IV of the EP Act as a significant proposal?	Yes □ No ⊠	Referral decision No: Managed under Part V □ Assessed under Part IV □
Does the applicant hold any existing Part IV Ministerial Statements relevant to the application?	Yes □ No ⊠	Ministerial statement No: EPA Report No:
Has the proposal been referred and/or assessed under the EPBC Act?	Yes □ No ⊠	Reference No:

Has the applicant demonstrated occupancy (proof of occupier status)?	Yes □ No ⊠	Certificate of title □
		General lease □ Expiry:
		Mining lease / tenement ⊠ Expiry: M36/542 (expires 21/12/2021).
		Applicant confirmed as tenement holder on GIS Viewer.
		Have not provided proof of occupier status (mining tenement extract)
		Other evidence □ Expiry:
Has the applicant obtained all relevant	Yes □ No □ N/A ⊠	Approval:
planning approvals?		Expiry date:
		If N/A explain why?
Has the applicant applied for, or have an existing EP Act clearing permit in relation to this proposal?	Yes ⊠ No □	CPS No: A valid permit applies CPS 6259/2.
Has the applicant applied for, or have an	Yes □ No ⊠	Application reference No: N/A
existing CAWS Act clearing licence in relation to this proposal?		Licence/permit No: N/A
		No licence required.
Has the applicant applied for, or have an existing RIWI Act licence or permit in relation to this proposal?	Yes □ No ⊠	Application reference No:
		Licence/permit No: 158766
		Valid licence applies
	Yes ⊠ No □	Name: Goldfields Groundwater area
Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the EP Act)?		Type: Proclaimed Groundwater Area
		Has Regulatory Services (Water) been consulted?
		Yes □ No □ N/A ⊠
		Regional office:
Is the Premises situated in a Public Drinking Water Source Area (PDWSA)?	Yes □ No ⊠	Name: N/A
		Priority: N/A
		Are the proposed activities/ landuse compatible with the PDWSA (refer to WQPN 25)?
		Yes □ No □ N/A ⊠

Is the Premises subject to any other Acts or subsidiary regulations (e.g. Dangerous Goods Safety Act 2004, Environmental Protection (Controlled Waste) Regulations 2004, State Agreement Act xxxx)	Yes ⊠ No □	Mining Act 1972 – mining proposal Dangerous Goods Safety Act 2004
Is the Premises within an Environmental Protection Policy (EPP) Area?	Yes □ No ⊠	
Is the Premises subject to any EPP requirements?	Yes □ No ⊠	
Is the Premises a known or suspected contaminated site under the Contaminated Sites Act 2003?	Yes □ No ⊠	Classification: N/A / possibly contaminated – investigation required (PC–IR) Classification on database for M36/542 is 'Report not substantiated'
		Date of classification: 22 August 2017