Government of Western Australia
Department of Water and Environmental Regulation

Decision Report

Application for Works Approval

Division 3, Part V *Environmental Protection Act 1986*

Works Approval Number	W6257/2019/1
Works Approval Holder	Aragon Resources Pty Ltd
ACN	114 714 662
File Number	DER2019/000220
Premises	Horseshoe Project Mining Lease M52/338 As defined by the coordinates in Schedule 1 of the Works Approval
Date of Report	05 November 2019
Status of Report	Final

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1. Definitions of terms and acronyms

In this Decision Report, the terms in Table 1 have the meanings defined.

Table 1: Definitions

Term	Definition
AACR	Annual Audit Compliance Report
ACN	Australian Company Number
AER	Annual Environment Report
Category/ Categories/ Cat.	Categories of Prescribed Premises as set out in Schedule 1 of the EP Regulations
Decision Report	refers to this document.
Delegated Officer	an officer under section 20 of the EP Act.
Department	means the department established under section 35 of the *Public Sector Management Act 1994* and designated as responsible for the administration of Part V, Division 3 of the EP Act.
DWER	Department of Water and Environmental Regulation As of 1 July 2017, the Department of Environment Regulation (DER), the Office of the Environmental Protection Authority (OEPA) and the Department of Water (DoW) amalgamated to form the Department of Water and Environmental Regulation (DWER). DWER was established under section 35 of the *Public Sector Management Act 1994* and is responsible for the administration of the *Environmental Protection Act 1986* along with other legislation.
DMIRS	Department of Mines, Industry Regulation and Safety
EP Act	*Environmental Protection Act 1986* (WA)
EP Regulations	*Environmental Protection Regulations 1987* (WA)
GIS	Geographic Information System
Minister	the Minister responsible for the EP Act and associated regulations
mtpa	million tonnes per annum
Occupier	has the same meaning given to that term under the EP Act.
Prescribed Premises	has the same meaning given to that term under the EP Act.
Premises	refers to the premises to which this Decision Report applies, as specified at the front of this Decision Report
Risk Event	As described in *Guidance Statement: Risk Assessment*

UDR	*Environmental Protection (Unauthorised Discharges) Regulations 2004* (WA)

2. Purpose and scope of assessment

On 28 March 2019 Aragon Resources applied for a Works Approval for their Horseshoe Project located within tenement M52/338, within the Shire of Meekatharra. The nearest town to the project is Meekatharra, located approximately 125km to the south. Aragon Resources' Fortnum Gold Mine is located approximately 25kms to the north-west.

Aragon Resources will be undertaking mine dewatering of Horseshoe Pit. Mine dewater will be discharged to another pit within the premises known as Cassidy Pit.

The Works Approval application is for the construction/installation of infrastructure associated with Prescribed Premises Category 6 which is the subject of this report. In addition to the Works Approval application the Applicant is required to apply for a Prescribed Premises Licence for Category 6 operations. The classification of the premises is detailed in Table 2 below.

Table 2: Classification of premises

Prescribed premises category	Description	Proposed premises production/design capacity
Category 6	Mine dewatering: premises on which water is extracted and discharged into the environment to allow mining of ore.	282,000 tpa

3. Overview of premises

3.1 Description of proposed activity

The Horseshoe Project is a historical existing mine consisting of three open pits named Horseshoe, Cassidy and Pod. The site also includes to two waste rock dumps, two low grade stockpiles and an evaporation pond. Aragon Resources notes the Horseshoe, Cassidy and Pod pits were initially mined by Dominion Mining from January 1992 to early 1993.

Aragon Resources will undertake further mining of Horseshoe Pit to a depth of 120m using a single cutback. Ore will be hauled from the Horseshoe Project to the Fortnum Gold Mine processing plant via Ashburton Downs Road.

Dewatering of Horseshoe Pit will be undertaken, in order to access ore below the water table. Dewater will be discharged into Cassidy Pit and used for dust suppression purposes at the site.

An estimated 282,000 m^3 will be dewatered into Cassidy Pit, which has an estimated available volume of 2,097,000 m^3. Dewatering of Horseshoe Pit will be achieved through the use of a pontoon pump and overland pipeline installed over a distance of approximately 80m between the Horseshoe and Cassidy Pits. Aragon Resources estimates dewatering will be completed over 4 to 5 months based on a dewatering rate of approximately 24L per second.

Mine dewater will be used for dust suppression at the site at an approximate rate of 480kL per day or 260,000 kL over the 18 month mine life. This equates to approximately 92% of the water drawn from Horseshoe Pit.

Figures 1 to 3 show the location of the project tenement, the premises boundary and the location of the mine dewater discharge pipeline.

Figure 1: Horseshoe Project regional location map

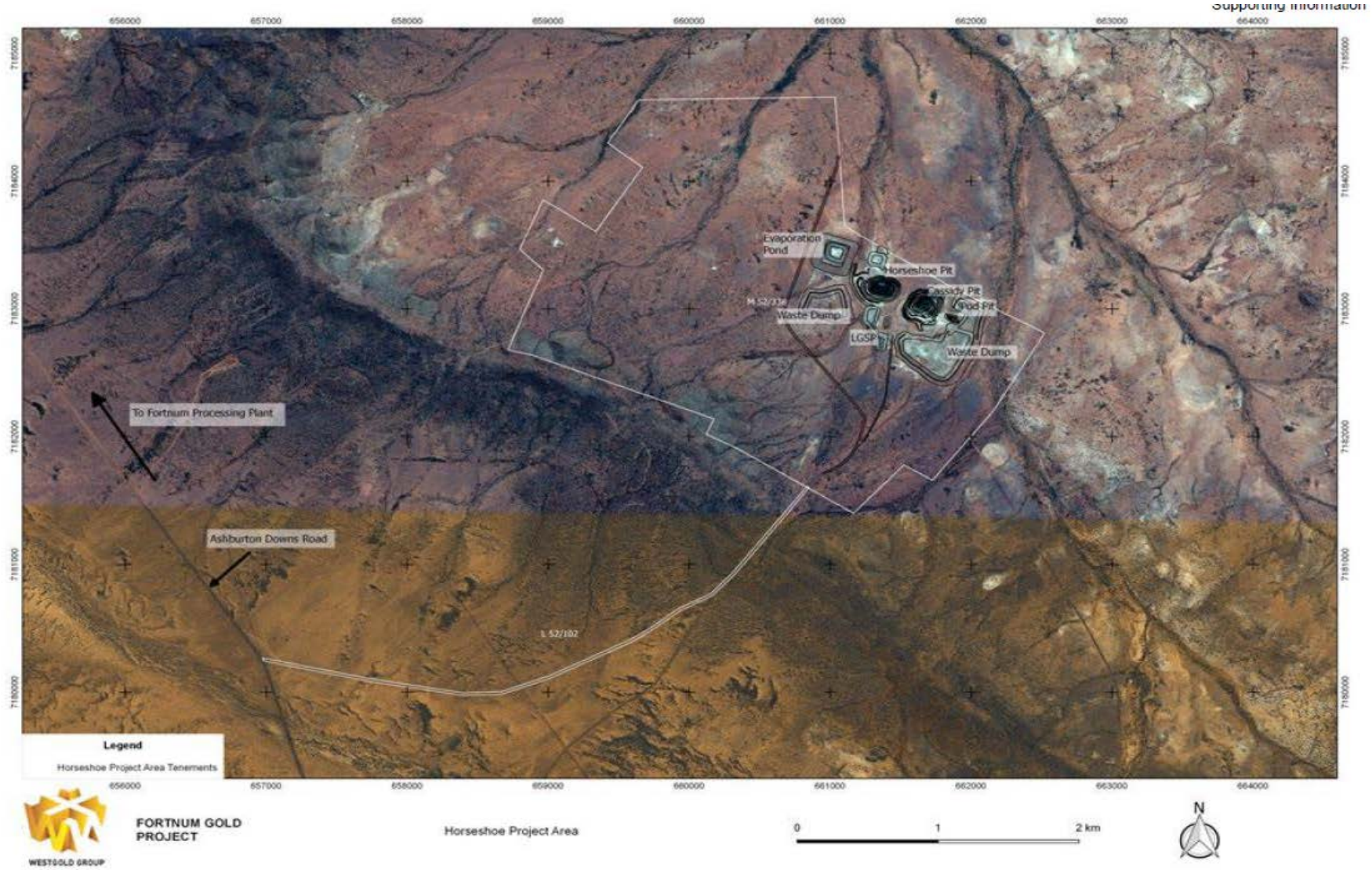

Figure 2: Horseshoe Project – tenement M52/338

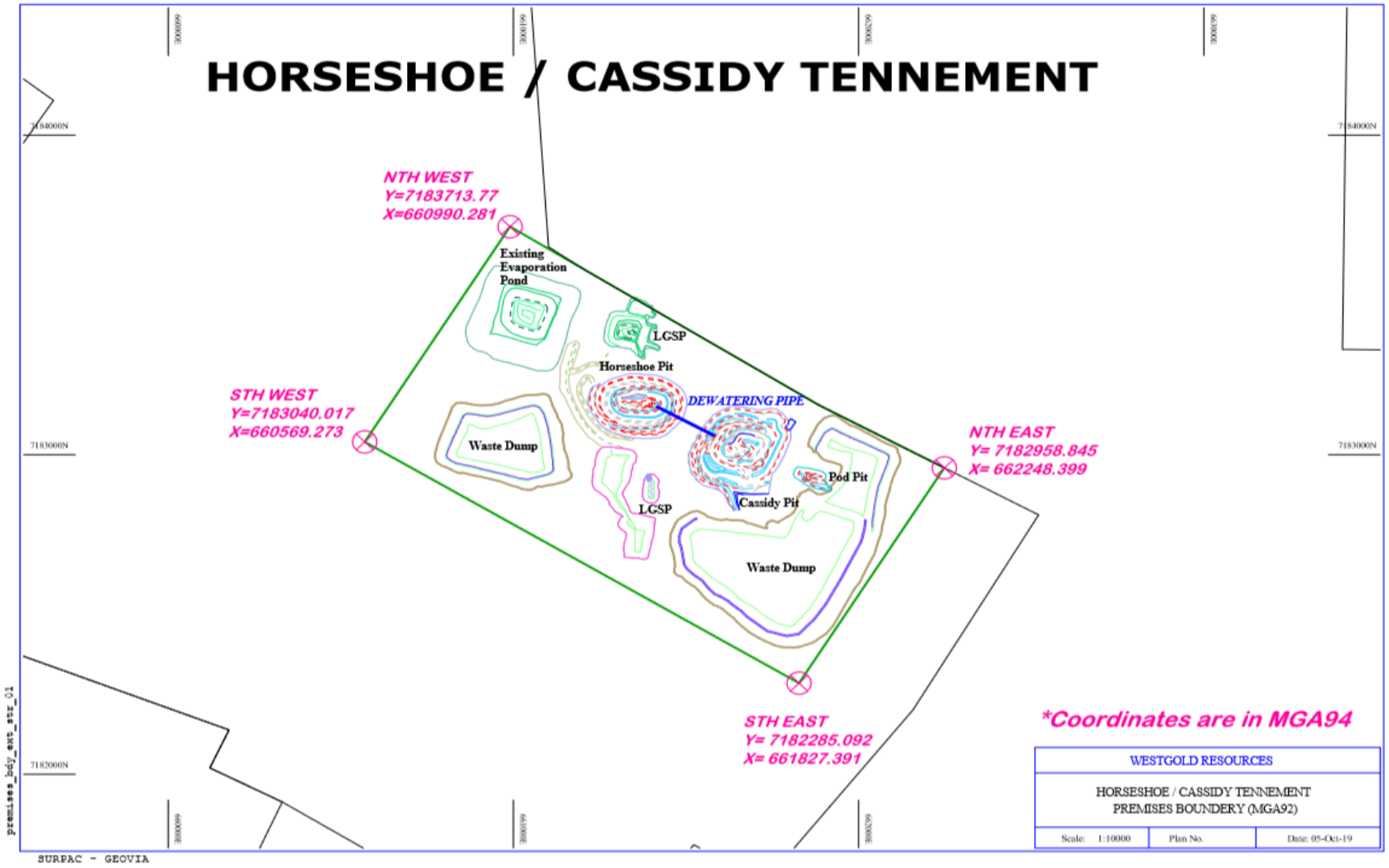

Figure 3: Horseshoe Project – premises boundary and location of mine dewater pipeline and discharge point

3.2 Infrastructure and equipment

The mine dewatering equipment and infrastructure, as it relates to Category 6 activities, is detailed in Table 3.

Table 3: Category 6 equipment and infrastructure

	Category 6 equipment and infrastructure
1	In-pit pontoon pumps
2	Generator
3	500m to 1km long dewater pipeline
4	Pipeline spill containment bund

4. Legislative context

Other approvals relevant to the premises are outlined in Table 4 below.

Table 4: Other approvals relevant to the premises

Legislation	Number	Approval
Mining Act 1978	N/A	The Applicant has advised a Mining proposal and Mine Closure Plan will be submitted to DMIRS for assessment.
Rights in Water and Irrigation Act 1914	GWL159877(8)	Licence to take water with an annual abstraction limit of 3,700,000 kL. Licence authorises abstraction from multiple tenements including tenement M52/338 for dust suppression and exploratory drilling.

4.1 Part V of the EP Act

4.1.1 Applicable regulations, standards and guidelines

The overarching legislative framework of this assessment is the EP Act and EP Regulations.

The guidance statements which inform this assessment are:

- *Guidance Statement: Regulatory Principles (July 2015)*
- *Guidance Statement: Setting Conditions (October 2015)*
- *Guidance Statement: Licence Duration (August 2016)*
- *Guidance Statement: Decision Making (April 2019)*
- *Guidance Statement: Risk Assessments (February 2017)*
- *Guidance Statement: Environmental Siting (November 2016)*

5. Siting

5.1 Residential and sensitive premises

The distances to residential and sensitive land uses are detailed in Table 5.

Table 5: Sensitive land uses and distance from activity boundary

Sensitive land uses	Description and/or distance from prescribed premises
Occupants of mine camp located within tenement L52/155 held by Prospex Resources	Located approximately 3.6kms west-north-west of the Horseshoe and Cassidy Pit areas. DMIRS Mineral Titles Online data indicates tenement L52/155 incorporates a minesite accommodation facility. DWER's GIS further indicates the presence of an existing mine camp within tenement L52/155. DWER's GIS notes tenement L52/155 includes a camp bore attributed to licence to take groundwater GWL201927.
Grain bore Dandy well	The Applicant has identified Grain bore and Dandy well which may be down-hydraulic gradient from the premises on a regional scale. Grain bore and Dandy well are located within Milgun Station approximately 8km to the north and 10km to the north-west of the premises respectively.

5.2 Specified ecosystems and environmental receptors

Specified ecosystems are areas of high conservation value and special significance that may be impacted due to Emissions and Discharges from the Premises. The distances to specified ecosystems are shown in Table 6.

Table 6 also identifies the distances to other potential environmental receptors which do not fit the definition of a specified ecosystem.

Table 6: Specified ecosystems and environmental receptors

Specified ecosystems	Description and/or distance from prescribed premises
Priority Ecological Community Buffer Zone – Robinson Range vegetation complexes (banded ironstone formation)	Approximately 400m south-west of Horseshoe and Cassidy Pits.
Other environmental receptors	
Soils and sediments	Soils on and off site Sediments within ephemeral creeks on and off site
Unnamed ephemeral creeks and riparian vegetation	There are approximately four ephemeral creeks within the project tenement (M52/338). Two of these creeks are located in the vicinity of Horseshoe and Cassidy Pits and are expected to contain native vegetation. These creeks are expected to flow to the north and off site, towards the Milgun Station boundary approximately 2.5kms north of Horseshoe and Cassidy Pits. The creeks are only expected to flow following

	infrequent high rainfall events.
Native vegetation	The occurrence of native vegetation within the existing mine area is expected to be minimal. However, native vegetation is expected to occur in areas surrounding the existing mine area. Native vegetation appears to be concentrated in creek lines in the vicinity of the mine area.
Groundwater	The pre-mining water table was approximately 25m deep, i.e. approximately 510m AHD. Pre-mining groundwater levels would have sloped down from about 510m AHD at the mine site to approximately 480m AHD at the Gascoyne River approximately 30km to the north.
Cattle (if any) at Milgun Station	The Milgun Station boundary is located approximately 2.5kms to the north of Horseshoe/Cassidy Pits.

6. Pit water quality

The Applicant submitted pit water quality analysis data for sampling events completed in 2012, and 2016 to 2018. DWER has compared the analysis data with recognised assessment levels including:

- Drinking water health values - detailed in *National Water Quality Management Strategy Australian Drinking Water Guidelines* (NHMRC & NRMMC, 2011);
- Trigger values for freshwater (slightly-moderately disturbed ecosystems) – detailed in *Australian and New Zealand Guidelines for fresh and marine water quality* (ANZECC & ARMCANZ, 2000).
- Recommended concentrations of total dissolved solids in drinking water for livestock – detailed in *Australian and New Zealand Guidelines for fresh and marine water quality* (ANZECC & ARMCANZ, 2000).
- Recommended water quality trigger values for heavy metals and metalloids in livestock drinking water – detailed in *Australian and New Zealand Guidelines for fresh and marine water quality* (ANZECC & ARMCANZ, 2000).

A summary of the pit water quality assessment is provided in sections 6.2 and 6.3 below.

6.1 Horseshoe Pit water quality

pH values range from 7.4 to 8.7 and total dissolved solids range from 17,100 to 22,000 mg/L. Horseshoe Pit water is therefore considered to be slightly alkaline and is classed as saline.

Exceedances of the assessment levels were noted as outlined below:

- Drinking water health values for boron, lead, selenium and potentially hexavalent chromium.
- Freshwater ecosystem trigger values for boron, selenium, zinc and potentially hexavalent chromium.
- Livestock (cattle) drinking water guideline values for total dissolved solids and trigger value for boron.

6.2 Cassidy Pit water quality

pH values ranged from 8.1 to 8.8 and total dissolved solids ranged from 33,500 to 50,000 mg/L. Cassidy Pit water is therefore slightly alkaline and is classed as hypersaline.

Exceedances of the assessment levels were noted as outlined below:

- Drinking water health value for boron.
- Freshwater ecosystem trigger values for boron, cadmium, copper, nickel, selenium and potentially hexavalent chromium.
- Livestock (cattle) drinking water guideline values for total dissolved solids and trigger value for boron.

7. Hydrogeological assessment and dewater discharge predictions

The Applicant engaged Rockwater Consultants (2018) to undertake a desktop hydrogeological assessment of Horseshoe and Cassidy Pits, and an assessment of dewater disposal options. Findings from the Rockwater Consultants assessment that are relevant to the Works Approval application are outlined below:

- The rocks in and surrounding the pits, in particular the siltstone and wacke country rocks, are generally of low hydraulic conductivity (permeability). The mineralised zones and the japeroidal pods are likely to be moderately permeable; and transition zone rocks (between weathered and fresh) are also likely to be permeable, and there may also be fractured rocks along fault zones and the margins of the dolerite dyke. However, the pods and mineralised zones are not extensive, and so long-term dewatering rates are likely to be limited.
- The original water table was approximately 25m deep, i.e. approximately 510m AHD. Pre-mining groundwater levels would have sloped down from about 510m AHD at the mine site to approximately 480m AHD at the Gascoyne River approximately 30km to the north.
- Geological mapping by Groves (1996) indicates there is no continuity of rock units between Horseshoe and Cassidy Pits, and so there is unlikely to be significant hydraulic connection between the pits. This is supported by the substantial (15m) difference in the pit lake levels. However, there is likely to be hydraulic connection via the mineralised zones in Cassidy and The Pod Pits.
- The pit water levels have stabilised at approximately 490m AHD for Horseshoe pit and 474.5m AHD for Cassidy Pit, or 20m to 35m below the original static water level.
- Horseshoe and Cassidy Pits have become groundwater sinks.
- There is a large volume of water to be pumped from the Horseshoe Pit, as well as water stored in the rocks to be mined and water in rocks outside of the mining area (that will be drained during dewatering).
- A combination of in-pit pumps, in-pit bores and sumps will probably be needed to dewater Horseshoe Pit.
- Horseshoe Pit contains an estimated 282,000 m^3 of water. Cassidy Pit has an estimated 2,097,000m^3 of available volume above the pit lake – it is therefore predicted Cassidy pit has ample storage volume. Little recirculation is expected between the pits.
- The storage of water in Cassidy Pit may possibly cause pit water to flow back into the surrounding groundwater.

8. Risk assessment and regulatory controls

In undertaking its risk assessment DWER will identify all potential emissions pathways and potential receptors to establish whether there is a Risk Event which requires detailed risk assessment. 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. Where there is no actual or likely pathway and/or no receptor, the emission will be screened out and will not be considered as a Risk Event.

Tables 7 and 8 below detail the completed risk assessment. Risk ratings have been assessed for each key emission source and take into account potential source-pathway-receptor linkages. The mitigation measures / controls proposed by the Applicant have been considered in determining the risk rating. Risk events associated with construction and operational activities have been assessed separately. The conditions of the Works Approval and Licence will be set to give effect to the determined regulatory controls.

The Works Approval that accompanies this report authorises the specified construction activities only. Following completion and compliance with the Works Approval, a prescribed premises category 6 Licence will be required to authorise emissions associated with the operation of the premises, i.e. the mine dewater discharge activity. The Licence conditions will not be finalised until DWER assesses the Licence application.

Table 7: Risk assessment for construction activities

Risk Event				Consequence rating*	Likelihood rating*	Risk*	Reasoning	Regulatory controls
Source/Activities	**Potential emissions**	**Potential receptors, pathway and impact**	**Applicant controls**					
Category 6 ***Installation of mine dewater discharge pipeline; and*** ***Construction of pipeline spill containment bund***	Noise	Nil	N/A	N/A	N/A	N/A	Noise emissions from the specified construction activities are expected to be minor and short-term, and there are no residences in the vicinity of the work area (the nearest residential premises is the Prospex Resources mine camp located approximately 3.6km north-west of the premises). Noise emissions are therefore not expected to present an adverse risk.	Noise emissions will not be regulated through conditions on the Works approval. However, the applicant is required to comply with the *Environmental Protection (Noise) Regulations 1997.*
	Dust	Nil	N/A	N/A	N/A	N/A	Dust emissions from the specified construction activities are expected to be minor and short-term, and there are no residences in the vicinity of the work area (the nearest residential premises is the Prospex Resources mine camp located approximately 3.6km north-west of the premises). Dust emissions are therefore not expected to present an adverse risk.	N/A

Table 8: Risk assessment for operational activities

Risk Event				Consequence rating**	Likelihood rating**	Risk**	Reasoning	Regulatory controls
Source/ Activities	**Potential emissions**	**Potential receptors, pathway and impact**	**Applicant controls**					
Category 6 ***Discharge pipeline rupture/leaks***	Mine dewater from Horseshoe pit is - slightly alkaline, very saline and has elevated metal concentrations	**Receptor:** Prospex Resources camp water supply bore within tenement L52/155. **Pathway:** None **Impact:** Nil	N/A	N/A	N/A	N/A	Considering the topography at the premises, an accidental leak of dewater is expected to flow downgradient and to the north of Horseshoe and Cassidy Pits. Leaked dewater is not expected to flow towards the camp bore located to the west-north-west. There is also a significant separation distance to the Prospex Resources bore, i.e. a 3.6km buffer. There is therefore no foreseeable risk event in this case.	N/A
		Receptor: Cattle (if any) within Milgun Station **Pathway:** None **Impact**: Nil		N/A	N/A	N/A	An accidental leak from the dewater discharge pipeline is not expected to migrate through to Milgun Station which is located approximately 2.5km to the north of Horseshoe/Cassidy Pits. There is no foreseeable risk event in this case.	N/A
		Receptors: Priority Ecological Community (PEC) – Robinson Range vegetation complexes (banded ironstone formation) **Pathway:** None **Impact:** Nil		N/A	N/A	N/A	An accidental leak from the dewater discharge pipeline is not expected to spray on to, or migrate to, the PEC buffer zone which is located approximately 400m and upgradient of Horseshoe/Cassidy Pits. There is no foreseeable risk event in this case.	N/A

Risk Event				Consequence rating**	Likelihood rating**	Risk**	Reasoning	Regulatory controls
Source/ Activities	**Potential emissions**	**Potential receptors, pathway and impact**	**Applicant controls**					
Category 6 ***Discharge pipeline rupture/leaks***	Mine dewater from Horseshoe pit is - slightly alkaline, very saline and has elevated metal concentrations	**Receptors:** Soils and remnant native vegetation Unnamed ephemeral creeks – including sediments and riparian vegetation. **Pathway:** An uncontrolled leak from the overland section of the dewater pipeline. Spilled dewater may be conveyed downgradient and to the north, towards ephemeral creeks off- site. **Impact:** Salinisation and potential contamination of soils and creek sediments. Adverse impact on vegetation health.	Installation of HDPE dewater discharge pipeline; Installation of pipeline spill containment bund; Daily inspections of dewater discharge pipeline.	Moderate	Unlikely	Medium	A consequence rating of moderate has been determined due to the potential for spilled mine dewater to migrate downgradient and off-site, potentially causing soil/sediment contamination and adverse effects on native vegetation. Impacts however are expected to be on a local scale. Controls will include installation of a pipeline spill containment bund, daily inspection of the discharge pipeline and ceasing of pumping in the event of a leak. The likelihood of the risk event is therefore rated as unlikely.	The risk event is acceptable subject to the following regulatory controls: **Infrastructure requirements (Works Approval controls)** Installation of pipeline spill containment bund **Operational requirements (Licence controls)** Requirement to undertake daily inspections of the discharge pipeline and to cease discharge in the event of a pipeline leak (further discharge conditional on pipeline repairs being completed).
Category 6 ***Use of dewater discharged into Cassidy Pit for dust suppression within the Premises***	Mine dewater from Horseshoe/Cassidy Pits is: Slightly alkaline and very saline; Contains metal concentrations exceeding drinking water health values, freshwater ecosystem trigger values and livestock drinking water values.	**Receptors:** Soils and remnant native vegetation Priority Ecological Community (PEC) – Robinson Range vegetation complexes (banded ironstone formation). **Pathway:** Direct contact with soils Over spray onto vegetation **Impact:** Salinisation and potential contamination of soils Adverse impact on vegetation health.	Nil	Minor	Possible	Medium	Dust suppression will be undertaken within the premises boundary, i.e. within and in the vicinity of the mine pits. A consequence rating of minor has been determined as salinisation and potential contamination of soils is expected to be restricted to active mine areas.In addition there is limited remnant vegetation within the mine pit. There is potential for over spray from dust suppression activities into the PEC buffer zone area. However impacts in this regard are expected to be minor and deemed acceptable, subject to regulatory controls.	The risk event is acceptable subject to the following regulatory controls: The Licence (and time limited operation in works approval) will condition use of mine dewater for dust suppression within the premises boundary. Mine dewater is not to contact with vegetation.

9. Consultation

The Works Approval application was advertised on 22 July 2019. No submissions were received.

The Application was referred to the Department of Mines, Industry Regulation and Safety (DMIRS) on 16 July 2019. Comment was received from DMIRS on 26 July 2019 advising that the associated Mining Proposal for the project had not been received and therefore has not been approved by DMIRS.

DWER advises that the grant of the Works Approval does not exempt the Applicant from obtaining other required approvals for the project.

10. Applicant's comments

The Applicant was provided with the draft Decision Report and draft Works Approval on 13 September 2019. The Applicant provided comments which are summarised, along with DWER's response, in Appendix 2.

11. Conclusion

This assessment of the risks of activities on the Premises has been undertaken with due consideration of a number of factors, including the documents and policies specified in this Decision Report.

Based on this assessment, it has been determined that the Issued Works Approval will be granted subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

Alana Kidd

Manager, Resource Industries

Regulatory Services

Delegated Officer under section 20 of the *Environmental Protection Act 1986*

Appendix 1: Key documents

Document title	In text ref	Availability
Application for Works Approval, Horseshoe Project, including: - Application form, dated 27 March 2019 - Supplementary report, dated March 2019 - Hydrogeological assessment of Horseshoe and Cassidy Pits, dated October 2018 - Level 1 flora and fauna survey, dated August 2013	Application	A1776306
Comments received from applicant on draft works approval and draft decision report, received 7 October 2019	N/A	A1830367

Appendix 2: Summary of applicant's comments on risk assessment and draft conditions

Condition	Summary of Applicant's comment	DWER response
Schedule 1 – Premises map	The Applicant provided an updated premises map and premises boundary coordinates as requested by DWER - the premises includes a defined area within tenement M52/338 and does not include tenement L52/102.	Schedule 1 of the Works Approval has been updated to clarify the premises boundary. Table 8 of the Decision Report and Condition 7 of the Works Approval has been updated – this clarifies that the use of mine dewater for dust suppression is not proposed (and is excluded) within tenement L52/102.
Condition 1 (Table 2) – infrastructure and equipment requirements table	Spill containment bunds will be constructed to a height 300mm above the top of the pipeline and constructed in such a way as to direct any leakage back into a pit.	Condition 1 (Table 2) updated to incorporate the Applicant's design specifications for the dewater pipeline spill containment bund.

Attachment 1: Issued Works Approval W6257/2019/1