



Application for Licence

Division 3, Part V *Environmental Protection Act 1986*

Licence Number	L9058/2017/1
Applicant	Sandfire Resources NL
ACN	105 154 185
File Number	DER2017/00700-1
Premises	Monty Project Mining tenements M52/1071 Shire of Meekatharra WA
Date of Report	05 December 2018
Status of Report	Final

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Appendix 1: Key documents

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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
Applicant	Sandfire Resources NL
ACN	Australian Company Number
ANZECC	Australia and New Zealand Environment and Conservation Council
AMD	Acid and Metalliferous Drainage
ARI	Average Recurrence Interval
Category/ Categories/ Cat.	Categories of Prescribed Premises as set out in Schedule 1 of the EP Regulations
Compliance Report	means a report in a format approved by the CEO as presented by the Licence Holder or as specified by the CEO (guidelines and templates may be available on the Department's website).
CS Act	<i>Contaminated Sites Act 2003 (WA)</i>
Decision Report	refers to this document.
Delegated Officer	an officer under section 20 of the EP Act.
DBCA	Department of Biodiversity, Conservation and Attractions
DMIRS	Department of Mines Industry Regulation and Safety
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 <i>Public Sector Management Act 1994</i> and is responsible for the administration of the <i>Environmental Protection Act 1986</i> along with other legislation.
EC	Electrical conductivity
EPA	Environmental Protection Authority
EP Act	<i>Environmental Protection Act 1986 (WA)</i>
EP Regulations	<i>Environmental Protection Regulations 1987 (WA)</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>

	(Cth)
Ha	Hectares
HDPE	High Density Polyethylene
km	Kilometres
kL	Kilolitres
Licence Holder	Sandfire Resources NL
m	metres
mm	millimetres
m ³	cubic metres
NAF	Non-Acid Forming
PAF	Potentially Acid Forming
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
Primary Activities	as defined in Schedule 2 of the Licence
Risk Event	As described in <i>Guidance Statement: Risk Assessment</i>
RIWI Act	<i>Rights in Water and Irrigation Act 1914</i>
TDS	Total dissolved solids

2. Purpose and scope of assessment

A concurrent application for a Works Approval and Licence was submitted by Sandfire Resources NL (the Applicant) for mine dewater discharge and crushing and screening activities at its Monty Project copper mine. This is to enable the Applicant to develop its premises from an exploration phase to an operational underground copper mine.

The premises are located within mining tenement M52/1071 in the Shire of Meekatharra, approximately 10km east of the Applicant's existing DeGrussa copper mine.

Works Approval W6054/2017/1 was issued for development of the Premises on 6 September 2017. The Applicant submitted a Works Compliance Report on 9 April 2018.

This Decision Report assesses emissions and discharges associated with Category 6 and Category 12 activities noted in Table 2 below.

Table 2: Prescribed Premises Categories

Classification of Premises	Description	Approved Premises production or design capacity or throughput
Category 6	Mine dewatering: Premises on which water is extracted and discharged in to the environment to allow mining of ore	800,000 tonnes per year
Category 12	Screening etc. of material: Premises (other than premises within category 5, 8 or 9) on which material extracted from the ground is screened, washed, crushed, ground, milled, sized or separated	130,000 tonnes per year

2.1 Application details

Table 3 lists the documents submitted during the assessment process.

Table 3: Documents and information submitted during the assessment process

Document/information description	Date received
DWER application form for works approval and licence. Submission included – Monty Project Surface Water Management Study, Rev B, 3 April 2017; Hydrogeological assessment report, Rev B, 3 November 2016.	15 May 2017
Letter of Authority from Talisman Mining Ltd	15 May 2017
Response to additional information request	24 July 2017
Information on Department of Mines Industry Regulation and Safety (DMIRS) approval of the Mining Proposal and Closure Plan; Dewatering Pond design; and water monitoring program.	15 August 2017
Works Approval Compliance report – dated 9 April 2018	9 April 2018
Copy of Mining Proposal for the development of the Monty Project, Version 2.0, dated 16 June 2017. Submission included copy of - Monty Project Waste Rock Characterisation Report, September 2016.	1 May 2018

Applicant's comments on draft Licence and draft Decision Report – separate submissions dated 18 October 2018 and 26 October 2018	18 October 2018 & 26 October 2018
Works approval compliance report – dated 14 November 2018	14 November 2018
Applicant's comments on updated draft Licence and draft Decision Report – submission dated 28 November 2018	28 November 2018

3. Background

The Monty Project is a 70:30 unincorporated joint venture between Sandfire Resources NL and Talisman Mining respectively. The Application, which was submitted by Sandfire Resources NL, included written authorisation signed by the Managing Director of Talisman Mining for Sandfire Resources NL to act on its behalf.

The Premises lie within Unallocated Crown Land, previously the former Doolgunna Pastoral Station. The Applicant notes deregistration of the pastoral lease occurred in 2001, with the land subsequently identified as a proposed conservation park. The Applicant noted it has consulted with the Department of Biodiversity, Conservation and Attractions in regard to the status of the conservation park, with the outcome being uncertainty on when, or if, the area will be legally gazetted as a conservation park. The current tenure for the land is Unallocated Crown Land in parallel with mining tenure.

The Monty Project Premises operates as an integrated satellite operation to the DeGrussa Project. Access to the Monty Project Premises is via a haul road extending from the DeGrussa Premises along mining tenement L52/170 to M52/1071 as shown in Figure 1.

The Life of Mine is estimated to be 4 years, with a production rate of 400,000 tonnes per annum (equates to ~ 1,600,000 tonnes over the Life of Mine (LoM)). An additional 800,000 tonnes of waste will be generated over the LoM. Ore will be stockpiled at Monty prior to cartage to the DeGrussa operation for processing. Continuous operation is planned, i.e. 24 hours per day, seven days a week and 365 days per year.

The underground mine is expected to reach a depth of ~390m below surface and ~340m below the pre-mining water table.

The site layout is shown in Figure 2.

The DeGrussa operation has a Prescribed Premise Licence (L8558/2011/1) which includes Category 5 (processing or beneficiation of metallic or non-metallic ore) up to a threshold of 2,050,000 tonnes per annual period.

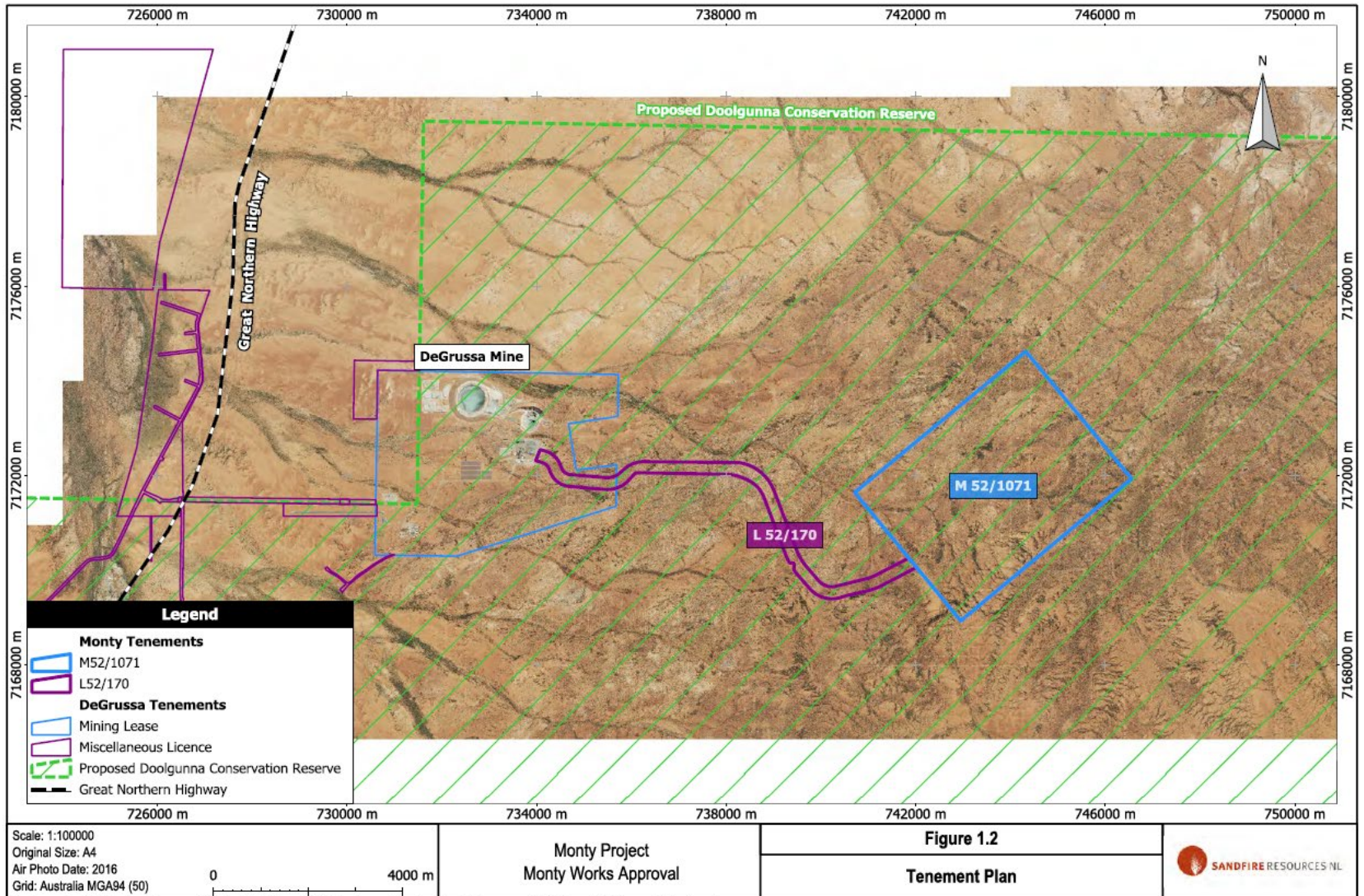


Figure 1: The Monty Project Premises and DeGrussa Premises

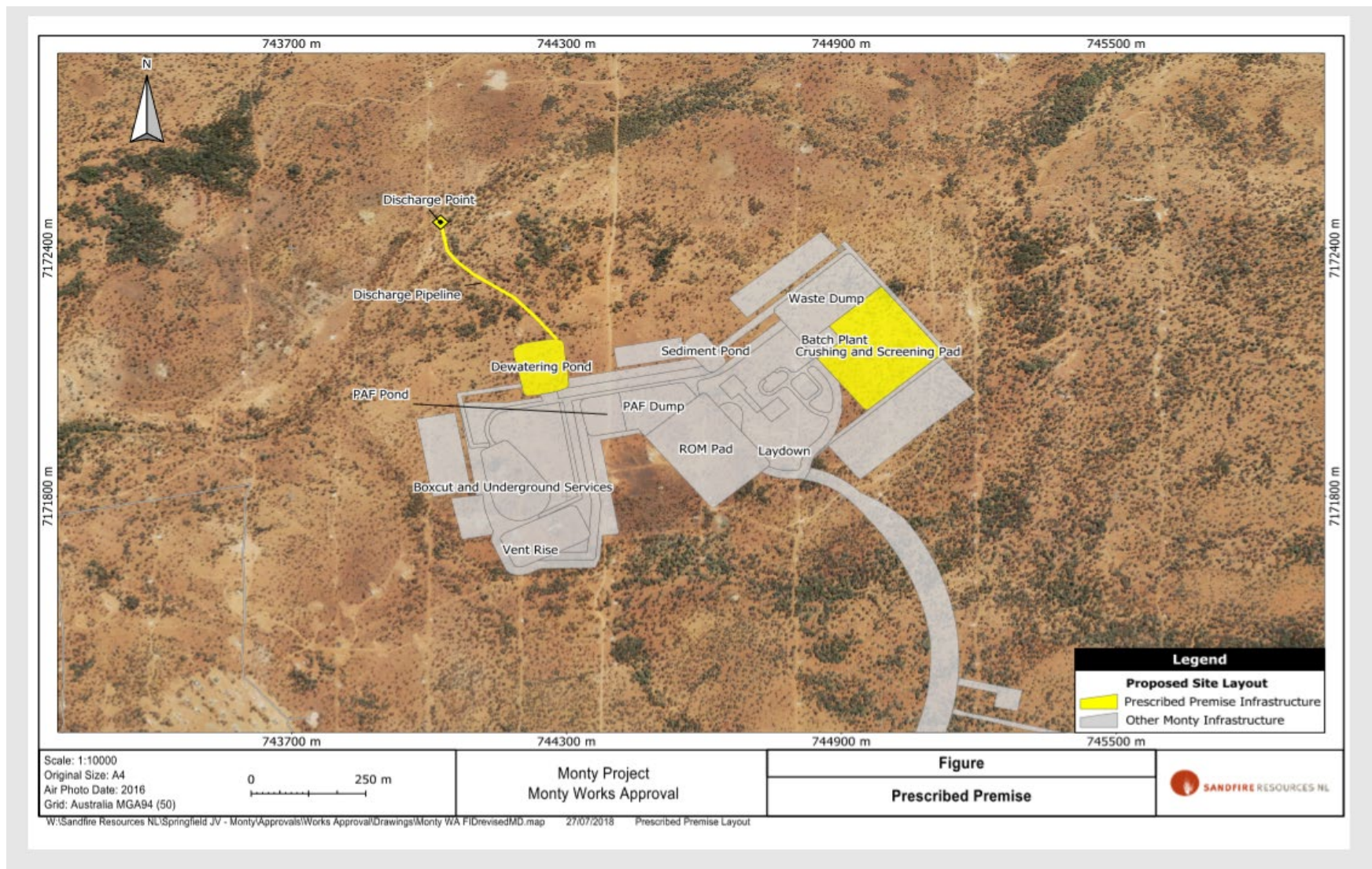


Figure 2: The Monty Project Premises site layout within tenement M52/1071

4. Overview of Premises

4.1 Operational aspects

4.1.1 Mine dewatering and discharge of dewater effluent

The Monty underground mine is mined from a boxcut. Underground mining methods implemented are long hole open stoping (both transverse and longitudinal) with minor areas of jumbo cut and fill, or uphole benching in some narrower areas. Ore is hauled to the surface using underground trucks.

Dewatering is undertaken to enable mining below the water table. This is undertaken by passive dewatering involving the collection of groundwater inflows within the mine workings in sumps (or to underground drain holes) and pumping of dewater to the surface. At the surface, dewater is directed to two HDPE lined discharge ponds.

The Applicant conducted a hydrogeological assessment to support its application for a licence to take groundwater under the *Rights in Water and Irrigation Act 1914*. Therein, the Applicant noted the local aquifers at Monty are fractured and jointed doleritic basement rocks. Apart from some elevated permeability, associated with the orebody and two faults close to the orebody, the basement rocks are described as generally tight with low permeability and transmissivity.

The predicted total dewatering requirements for the underground mine (for base case aquifer conditions) range up to 16L/s. Sensitivity/uncertainty analysis indicates this may exceed 30L/s for extreme (very unlikely) cases. Further, the Applicant notes predicted dewatering rates will range from 250,000 kL/yr in year 1 to around 660,000 kL/yr in year 4.

At the end of mining, the deepest mine workings will be around 390m below ground level and around 340m below the pre-mining water table. Groundwater levels within the orebody and immediate surrounds will draw down to (or close to) these levels. However, given the general hydrogeological nature of the basement rocks surrounding the orebody, it is not expected that drawdowns will propagate very far from the mine.

Water from dewatering will be used to meet site water requirements. Surplus dewater will be discharged to North Creek. The Applicant has installed a HDPE pipeline approximately 450m in length that will convey dewater effluent from the dewatering ponds to North Creek.

The location of the mine, dewatering ponds and discharge pipeline is illustrated in Figure 2.

4.1.2 Crushing and Screening Pad and Plant

The Project requires waste rock material to be crushed and screened to provide road base; aggregate for shotcrete; and Cement Aggregate Fill (CAF). Non-Acid Forming (NAF) waste rock will be crushed/screened.

Crushing and screening operations are undertaken within a designated 4.3ha pad, adjacent to

the NAF Waste Dump and Batch Plant (Figure 2). The Crushing and Screening plant includes the following:

- Jaw crusher – to reduce waste rock to -75mm or -40mm depending on the product to be produced;
- VSI Crusher – to reduce -40mm material to -8 to -10mm; and
- Screening Plant – to remove oversize from the final product.

Throughput is a maximum of 130,000 tonnes per annum. Dust minimisation is undertaken through use of water carts and fixed water sprays.

4.2 Infrastructure

The infrastructure in relation to Category 6 and 12 Prescribed Premises is detailed in Table 4.

Table 4: Monty Project infrastructure

Infrastructure	
Prescribed Activity Category 6	
1	Pumps
2	HDPE lined dewatering ponds
3	450m of 315mm diameter HDPE dewater discharge pipeline
4	Flow meter, leak detection sensors and isolation valves fitted to the pipeline
5	Discharge point erosion control - rock rip rap at discharge point
Prescribed Activity Category 12	
1	Jaw crusher
2	Vertical shaft impact crusher
3	Screening plant
4	Water carts for dust suppression
5	Loader

4.3 Exclusions to the Premises

Additional activities that will be undertaken by the Applicant that are not within the scope of this assessment are:

- Clearing of native vegetation (permit Number CPS 7541/1).
- Mining of ore, haulage and processing.
- Sewage (wastewater) treatment. The sewage treatment plant generates less than 20m³ per day of waste, which is below the threshold for Registration as a Category 85 Prescribed Premises.
- Concrete batching; concrete produced for onsite use.

- Waste disposal. Putrescible and recyclable waste are disposed of at the DeGrussa Premises under Licence L8558/2011/1. This permits disposal of up to 1,300 tonnes of class II putrescible waste each year as a Category 64 Prescribed Premises.
- Storage and use of chemicals and fuel. The applicant has advised that two 100kL self-bunded diesel tanks are installed. This falls below the threshold for a Category 73 Prescribed Premises.
- Electricity generation. The applicant has advised that onsite power generation is by diesel generators with a maximum power output of 4MW. As this does not trigger a Prescribed Premises it does not form part of this assessment.
- Groundwater abstraction. This is regulated under the *Rights in Water and Irrigation Act 1914*.
- Construction of additional infrastructure and supporting facilities (including offices, workshops and roads).
- Activities at the DeGrussa mine. These activities are subject to Licence L8558/2011/1 and therefore do not form part of this assessment.

5. Legislative context

Table 5 summarises approvals relevant to the assessment.

Table 5: Relevant approvals and tenure

Legislation	Number	Entity	Approval
<i>Environmental Protection Act 1986</i>	CPS7541/1	Sandfire Resources NL	Permit CPS7541/1 grants approval to clear 157.6 hectares (ha) of vegetation on mining tenements M52/1071 and L52/170. Authorisation granted 8/7/17).
<i>Mining Act 1978</i>	Registration ID 66125	Sandfire Resources NL	Mining proposal with mine closure plan. Approved by Department of Mines, Industry, Regulation and Safety (DMIRS) on 3/7/17).
<i>RIWI Act 1914</i>	GWL 200031(1)	Sandfire Resources NL	Application for licence to take groundwater - 800,000 kL per year. Approved by DWER on 29/6/17.

5.1 Part IV of the EP Act

The proposal has not been referred for assessment under Part IV of the EP Act. The Delegated Officer has determined that no referral is necessary in consideration of the risk assessment described herein.

5.2 Environment Protection and Biodiversity Conservation Act 1999 (Cth)

The proposal has not been referred for assessment under the EPBC Act. The Delegated Officer has determined that no referral is necessary in consideration of the risk assessment described herein.

5.3 Part V of the EP Act

5.3.1 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: Land Use Planning (February 2017)*
- *Guidance Statement: Licence Duration (August 2016)*
- *Guidance Statement: Publication of Annual Audit Compliance Reports (May 2016)*
- *Guidance Statement: Decision Making (February 2017)*
- *Guidance Statement: Risk Assessments (February 2017)*
- *Guidance Statement: Environmental Siting (November 2016).*

5.3.2 Works approval history

Table 6 summarises the works approval history for the premises.

Table 6: Works approval history

Instrument	Issued	Nature and extent of works approval
W6054/2017/1	6 September 2017	Approval for works in relation to Category 6 and Category 12 Prescribed Premises
W6054/2017/1 - Amendment Notice 1	12 March 2018	Amendment to proposed works in relation to Category 6 Prescribed Premises.

5.3.3 Works approval description and compliance

Works Approval W6054/2017/1 was granted to Sandfire Resources for the construction of infrastructure to capture and allow the discharge of dewater. This included the construction and installation of the following:

- Pumps
- HDPE lined dewatering ponds
- HDPE dewater discharge pipe
- Flow and leak detection sensors and isolation valves in the pipelines
- Discharge point erosion control measures – rock rip rap.

In addition, the Works Approval authorised the installation of the following crushing and screening equipment:

- Jaw crusher
- Vertical shaft impact crusher
- Fixed water sprays (on crushers)

- Screening plant
- Water carts.

Amendment Notice 1 for W6054/2017/1 authorised a change to the dewater discharge location. This maintained the planned discharge to North Creek, however moved the discharge location approximately 400m to the south-west. This relocation included the realignment of the pipeline corridor associated with the discharge point.

On 9 April 2018 and 14 November 2018 Sandfire Resources submitted Works Approval Compliance reports. The reports confirmed the following:

- Completion of a liner installation and integrity check for the dewatering pond;
- Installation of dewater discharge pipeline fitted with flow meter, leak detection sensor and isolation valve;
- Installation of rock rip rap at the discharge point; and
- Deployment of the crushing and screening plant and water carts at the Premises.

The Works Approval Compliance reports are acceptable.

5.3.4 Clearing

Sandfire Resources obtained approval to clear 157.6 Hectares (Ha) of native vegetation within L52/170 and M52/1071 (Clearing permit CPS7541/1). Sandfire Resources is required to retain several areas of native vegetation along drainage lines that are predominantly to the west of M52/1071 and two areas east of M52/1071.

5.4 Contaminated sites

The Premises are not located within, or in the vicinity of, a site recorded and classified under the *Contaminated Sites Act 2003*. The nearest such site is located approximately 21km north of tenement M52/1071.

6. Location and siting

6.1 Siting context

The Premises are located approximately 900km north of Perth and 150km north east of Meekatharra as shown in Figure 4.



Figure 3: The Monty Project Premises regional location

6.2 Climate

The Applicant has provided monthly mean rainfall data recorded at the DeGrussa field weather station over 2012 to 2016. Figure 6 indicates rainfall primarily falls from December to March. Approximately 300mm mean rainfall per annum has been recorded at the DeGrussa weather station.

Average maximum temperatures (recorded at Meekatharra airport) vary between 19.0°C and 38.3°C. Average minimum temperatures vary between 7.4°C and 24.4°C. January is the hottest month with July being the coolest.

Mean annual pan evaporation at Meekatharra Airport is 2,983 mm.

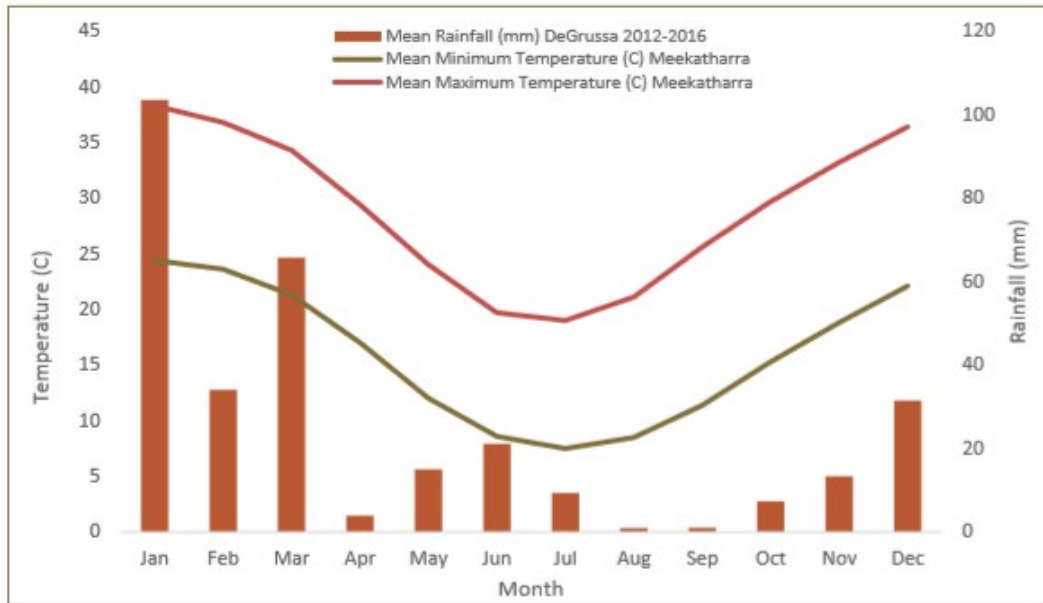


Figure 4: Monthly Mean Rainfall at DeGrussa weather station (2012-2016) and long-term temperatures at Meekatharra airport (BoM 2015)

6.3 Residential and Sensitive Premises

The distances to residential and sensitive land uses are detailed in Table 7.

Table 7 Receptors and distance from activity boundary

Sensitive Land Uses	Distance from Prescribed Activity
Doolgunna Homestead	Doolgunna Homestead is located ~23km south west of the Premises.
Pastoral/stock bores	The Applicant notes there are old pastoral wells in the region, including three reportedly active wells. The nearest active well is approximately 9km to the north-west of the Premises

6.4 Specified ecosystems

Specified ecosystems are areas of high conservation value and special significance that may be impacted as a result of activities at or Emissions and Discharges from the Premises. The distances to specified ecosystems are shown in Table 8. Table 8 also identifies the distances to other relevant ecosystem values which do not fit the definition of a specified ecosystem.

Table 8: Environmental values

Specified ecosystems	Distance from the Premises
Parks and Wildlife Managed Lands and Waters	The Premises lie within Unallocated Crown Land. This land was previously a pastoral station (Doolgunna Pastoral Station) which was deregistered in 2001 and identified as a proposed conservation park. The land is currently managed by the DBCA, however is currently deemed Unallocated Crown Land.
Priority Ecological Communities (PEC)	DWER's GIS database indicates there are Priority Ecological Communities (PECs) in the region. These are noted below. <ul style="list-style-type: none"> ▪ Three Rivers Plutonic Calcrete Priority 1 buffer zone (invertebrates in groundwater calcretes) – located ~35kms north-west of the Premises. ▪ Blech Land System Priority 3 buffer zone – located ~8kms north of the Premises. ▪ Doolgunna Calcrete Priority 1 buffer zone (invertebrates in groundwater calcretes) – located ~14kms west of the Premises. ▪ Robinson Range Banded Ironstone Formation Priority 1 buffer zone (vegetation complexes) – located ~18kms west of the Premises.
Biological component	Distance from the Premises
Threatened/Priority Flora	Flora surveys by the Applicant have not identified any rare flora. However, two Priority species were recorded: <ul style="list-style-type: none"> ▪ Priority 1 species <i>Euphorbia sarcostemmoides</i> was located in the north west corner of the Premises. This species is understood to occur on sandstone ridges and quartzite hills (Western Australian Herbarium, 1998-) ▪ Priority 3 species <i>Sida picklesiana</i> was recorded across the Premises.
Threatened/Priority Fauna	The Applicant conducted a level 1 fauna survey in October 2016, which identified 13 protected fauna species that were considered likely to occur in the project area. Six of these have previously been recorded within Doolgunna Station. These were the Malleefowl, Peregrine Falcon, Australian Bustard, Bush Stone-Curlew, Grey Honeyeater and Kultarr.
Other relevant ecosystem values	Distance from the Premises
Ealgareengunna/ Noonyarreena and the Bubbageelgunna Pools	Located approximately 15km west and 18km north-west of the Premises respectively.
North Creek and floodplain – vegetation, sediments/soils and surface water (when creek is flowing).	At the dewater discharge location and downstream.

6.5 Soils and soil properties

The Applicant has conducted an assessment of the topsoil and subsoil material for the Monty Project. The Premises lie within two soil and landform systems, namely the Beasley System and Horseshoe System.

The Beasley System is described as low ridges, hills and laterised residuals above stony footslopes and broad stony lower plains. Soil types associated with the system are - stony soils; red shallow duplex soils; red deep sandy soils; and, red-brown non-cracking clay.

The Horseshoe System is described as gently undulating stony plains and low rounded hills with partially saline drainage foci and alluvial tracts. Soil types associated with the system are - red-brown hardpan shallow loams; red-brown non-cracking clay; red shallow sandy duplex soils; red deep sand; and, red loamy earth.

Soils at the Premises are characterised by very low salinity and moderate to high levels of natural soil acidity.

6.6 Surface water

The Monty Project is located in the eastern headwaters of the southern branch of the Gascoyne River catchment. The Gascoyne River is located approximately 42km north-west of the Premises.

Within tenement M52/1071 a first order tributary of the Gascoyne River, known locally as North Creek, flows across the Premises, generally in a westerly direction. North Creek is ephemeral and flows only during and after rainfall events. Rainfall is highest during significant storm events typically between January and March. Sheet flow across the site may also occur following significant rain events.

The nearest surface water pools to the Premises are the Ealgareengunna / Noonyarreena and the Bubbageelgunna Pools, located approximately 15km west and 18km north-west of the Premises respectively. The pools fill during significant rainfall events and are believed to be perched surface water features. Review of DWER hydrography maps indicate North Creek flows may not typically intersect the pools.

6.7 Material characterisation

The Applicant's *Monty Project Waste Rock Characterisation Report (September, 2016)* indicates mine waste from construction of the boxcut and decline to the ore body is expected to be predominantly fresh, geochemically benign bedrock. Non-mineralised waste to be mined (from Dolerite and Sediment lithologies) is classified as non-acid forming (NAF).

The report indicates mineralised waste material and ore to be mined contained very high total sulfur concentrations and low to moderate Acid Neutralising Capacity (ANC) and such material should be treated/classified as Potentially Acid Forming (PAF). It is expected that PAF material may largely be present at greater depths closer to and within the orebody zone. Figure 6 provides a geological cross section for the mine.

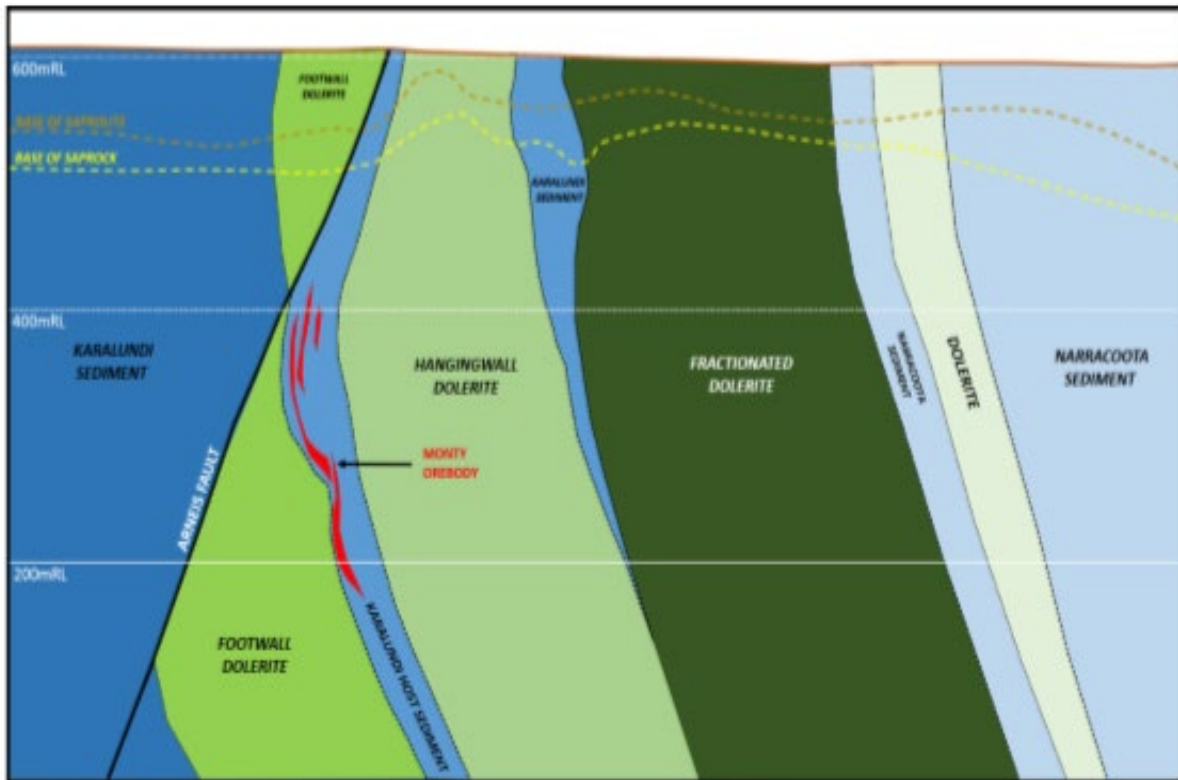


Figure 5: Geological Cross-Section of the Monty Underground Mine

6.8 Groundwater and water sources

The local aquifers at Monty are fractured and jointed doleritic basement rocks. Apart from some elevated permeability, associated with the orebody and two faults close to the orebody, the basement rocks are generally tight with low permeability and transmissivity.

Construction of six groundwater bores at the site intercepted groundwater between 39.5 and 51.9m below ground level. The hydraulic gradient is from east-south-east to west-north-west across the Premises.

The Applicant's baseline groundwater quality analysis indicates groundwater is fresh to brackish (TDS of 510 - 1200mg/L) and neutral to slightly alkaline (pH of 7 – 7.7). Comparison of metals analysis data against the ANZECC/ARMCANZ freshwater trigger values (95% level of protection) indicated some isolated exceedances for Arsenic and Copper, with Boron and Zinc consistently exceeding their respective trigger values.

The DeGrussa Project sources groundwater from a regional paleochannel aquifer and local fractured rock aquifers. DWER's licensed bore maps indicate the DeGrussa Project bores are located ~6 to 15 km to the west of the Monty mining lease. Additionally the Applicant notes there are old pastoral wells in the region, including three reportedly active wells. The nearest active well is reportedly ~9km to the north-west of the Premises.

There are no Public Drinking Water Source Areas (PDWSA's) within 125km of the premises.

7. Consultation

The Applicant has provided a list of consultation events, stakeholders and outcomes dating back to 2005. Stakeholders consulted were DWER, DBCA, neighbouring mining lease holders, DMIRS, indigenous groups and the Shire of Meekatharra.

The Works Approval and Licence application were referred to the Shire of Meekatharra and advertised in the West Australian on 12 June 2017 for a comment period ending on 10 July 2017. No comments were received in relation to this Application.

The application was also referred to the Department of Biodiversity, Conservation and Attractions (DBCA) who responded on 18 August 2017 with comments summarised below:

1. The Premises is located on the former Doolgunna Pastoral lease, managed by the DBCA for the purpose of conservation.
2. The DBCA has previously commented on the mining proposal, native vegetation clearing permit and mine closure plan.
3. It is unclear whether the discharge volumes proposed (800,000 kL per year) have the potential to cause soil saturation that may adversely affect riparian vegetation within the creek line. Vegetation decline and death at the DeGrussa Premises has been observed at the discharge point and attributed to soil saturation from dewatering discharge.
4. If there is potential for soil saturation to occur from the dewatering discharge, vegetation condition should be monitored. Should a monitoring program be required this should be developed and implemented prior to discharge commencing in order to obtain baseline data.
5. The discharge pipeline should be buried to avoid creating landscape disturbances that may impede surface water flows.

8. Risk assessment

8.1 Determination of emission, pathway and receptor

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. The identification of the sources, pathways and receptors to determine Risk Events are set out in Table 9 below.

Table 9: Identification of emissions, pathway and receptors during operation.

Risk Events					Continue to detailed risk assessment	Reasoning
Sources/Activities	Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts		
<p>Mine dewatering and discharge</p>	<p>Dewatering discharge – Dewatering of non-acid forming (NAF) material and subsequent discharge to North Creek and floodplain.</p>	<p>Dewater discharge – including elevated TDS, TSS, metals.</p>	<p>North Creek & floodplain vegetation, fauna, sediments/soils.</p> <p>Vegetation includes Priority 3 species <i>Sida picklesiana</i></p>	<p>Direct contact (with discharge & seepage)</p>	<p>Within discharge zone:</p> <ul style="list-style-type: none"> ▪ Erosion and sedimentation of North Creek; ▪ Soil saturation / water logging; ▪ Decline in vegetation health or death; ▪ Decline in fauna health or death (insects, birds, mammals); and ▪ Contaminated sediments/soils. 	<p>Yes</p> <p>Up to 800,000 kL per year may be discharged to North Creek. This is a significant discharge to a creek that is typically not flowing. As such, there is potential for erosion and additional sediment loading at North Creek.</p> <p>Given the potential discharge rates and the ephemeral nature of North Creek and floodplain, vegetation downstream of the discharge zone may be subject to permanent inundation for the duration of the discharge.</p> <p>Priority 3 species <i>Sida picklesiana</i> has been identified across the Premises and may be impacted by the dewater discharge.</p> <p>A significant and consistent increase in dewater salinity may adversely impact vegetation and contaminate soils within the discharge zone.</p> <p>Existing groundwater analysis indicates the</p>

							potential for elevated Boron and Zinc concentrations above ANZECC (2017) freshwater trigger values. Similar concentrations in dewater discharge may present negative risk to biota at North Creek.
	Dewatering discharge - Dewatering of PAF material at depth (~100m below pre-mining water table) - this activity may result in the oxidation and wetting of PAF within the mine workings and may generate Acid & Metalliferous Drainage, subsequently discharged to North Creek.	Dewater discharge - impacted by AMD	North Creek & floodplain vegetation, fauna, sediments/soils. Vegetation includes Priority 3 species <i>Sida picklesiana</i>	Direct contact	Within discharge zone: <ul style="list-style-type: none"> Acidic and/or contaminated surface water and soil pore water. Contaminated sediments/soils. Decline in vegetation health or death. Decline in fauna health or death (insects, birds, mammals). 	Yes	Mineralised waste and ore material (classified as PAF) will be dewatered and mined. This activity may potentially oxidise PAF material within the underground mine workings, coupled with subsequent wetting of PAF (e.g. through contact with groundwater seepage). Wetting of oxidised PAF material may also occur through groundwater rebound in the event mining/dewatering is temporarily ceased. These events may generate AMD within the mine. Dewater may therefore be impacted by AMD and discharged to North Creek and the surrounding environment.
			Regional pastoral bores - nearest being 9km north-west of the Premises.	Dewater discharge flow to the north-west via creek systems or floodplain. Pastoral bore may be screened within a shallow alluvial aquifer potentially recharged by surface water flow.	Contamination of stock water supply	No	It is considered that dewater discharge is unlikely to impact the nearest pastoral bore to the Premises due to the separation distance between the discharge point and pastoral bore - 9kms north west of the Premises.
	Seepage from dewatering ponds	Dewater discharge	Groundwater	Infiltration from surface to groundwater	Groundwater mounding and potential impact on vegetation from atypical groundwater level; Groundwater contamination	No	Depth to groundwater at the premises is approximately 40 to 50 metres below ground level. Seepage of dewater from the dewatering ponds is unlikely to cause significant elevation of groundwater levels to impact vegetation root zones (estimated to extend to 10 metres below ground level, or

							less). In addition, the dewatering ponds are not considered to be a potential <u>source</u> of groundwater contamination, given the ponds contain groundwater pumped from the local aquifer/s.
	Pond overflow or failure	Dewater discharge	Vegetation in the pond vicinity	Direct contact	Decline in vegetation health	No	Ponds have been designed with a spillway for controlled overflow in the event that a storm event is greater than the design limits of 1:100 year rainfall event of 24 hour average recurrence interval. The Licence Holder will also be monitoring water levels weekly in the dewatering ponds to manage the level and ensure discharge occurs as required, rather than overflow.
Crushing and screening	Operation of crushing and screening plant	Noise	Doolgunna Homestead	Air/wind dispersion	Amenity impacts	No	Doolgunna homestead is located approximately 23km south west of the Premises. It is considered that the separation distance to the dwelling is sufficient to prevent noise related impacts.
	Operation of crushing and screening plant Stockpiling of product/s	Dust	Doolgunna Homestead	Air/wind dispersion	Amenity impacts	No	Doolgunna homestead is located approximately 23km south west of the Premises. It is considered that the separation distance to the dwelling is a suitable buffer to prevent impacts from dust emissions.

8.2 Consequence and likelihood of risk events

A risk rating will be determined for risk events in accordance with the risk rating matrix set out in Table 10 below.

Table 10: Risk rating matrix

Likelihood	Consequence				
	Slight	Minor	Moderate	Major	Severe
Almost certain	Medium	High	High	Extreme	Extreme
Likely	Medium	Medium	High	High	Extreme
Possible	Low	Medium	Medium	High	Extreme
Unlikely	Low	Medium	Medium	Medium	High
Rare	Low	Low	Medium	Medium	High

DWER will undertake an assessment of the consequence and likelihood of the Risk Event in accordance with Table 11 below.

Table 11: Risk criteria table

Likelihood		Consequence		
The following criteria has been used to determine the likelihood of the Risk Event occurring.		The following criteria has been used to determine the consequences of a Risk Event occurring:		
		Environment	Public health* and amenity (such as air and water quality, noise, and odour)	
Almost Certain	The risk event is expected to occur in most circumstances	Severe	<ul style="list-style-type: none"> onsite impacts: catastrophic offsite impacts local scale: high level or above offsite impacts wider scale: mid-level or above Mid to long-term or permanent impact to an area of high conservation value or special significance[^] Specific Consequence Criteria (for environment) are significantly exceeded 	<ul style="list-style-type: none"> Loss of life Adverse health effects: high level or ongoing medical treatment Specific Consequence Criteria (for public health) are significantly exceeded Local scale impacts: permanent loss of amenity
Likely	The risk event will probably occur in most circumstances	Major	<ul style="list-style-type: none"> onsite impacts: high level offsite impacts local scale: mid-level offsite impacts wider scale: low level Short-term impact to an area of high conservation value or special significance[^] Specific Consequence Criteria (for environment) are exceeded 	<ul style="list-style-type: none"> Adverse health effects: mid-level or frequent medical treatment Specific Consequence Criteria (for public health) are exceeded Local scale impacts: high level impact to amenity
Possible	The risk event could occur at some time	Moderate	<ul style="list-style-type: none"> onsite impacts: mid-level offsite impacts local scale: low level offsite impacts wider scale: minimal Specific Consequence Criteria (for environment) are at risk of not being met 	<ul style="list-style-type: none"> Adverse health effects: low level or occasional medical treatment Specific Consequence Criteria (for public health) are at risk of not being met Local scale impacts: mid-level impact to amenity
Unlikely	The risk event will probably not occur in most circumstances	Minor	<ul style="list-style-type: none"> onsite impacts: low level offsite impacts local scale: minimal offsite impacts wider scale: not detectable Specific Consequence Criteria (for environment) likely to be met 	<ul style="list-style-type: none"> Specific Consequence Criteria (for public health) are likely to be met Local scale impacts: low level impact to amenity
Rare	The risk event may only occur in exceptional circumstances	Slight	<ul style="list-style-type: none"> onsite impact: minimal Specific Consequence Criteria (for environment) met 	<ul style="list-style-type: none"> Local scale: minimal to amenity Specific Consequence Criteria (for public health) met

[^] Determination of areas of high conservation value or special significance should be informed by the *Guidance Statement: Environmental Siting*.

* In applying public health criteria, DWER may have regard to the Department of Health's *Health Risk Assessment (Scoping) Guidelines*. "onsite" means within the Prescribed Premises boundary.

8.3 Acceptability and treatment of Risk Event

DWER will determine the acceptability and treatment of Risk Events in accordance with the Risk treatment Table 12 below:

Table 12: Risk treatment table

Rating of Risk Event	Acceptability	Treatment
Extreme	Unacceptable.	Risk Event will not be tolerated. DWER may refuse application.
High	May be acceptable. Subject to multiple regulatory controls.	Risk Event may be tolerated and may be subject to multiple regulatory controls. This may include both outcome-based and management conditions.
Medium	Acceptable, generally subject to regulatory controls.	Risk Event is tolerable and is likely to be subject to some regulatory controls. A preference for outcome-based conditions where practical and appropriate will be applied.
Low	Acceptable, generally not controlled.	Risk Event is acceptable and will generally not be subject to regulatory controls.

8.4 Risk Assessment – discharge of dewater effluent

8.4.1 Description of Risk Event – discharge of dewater effluent

Dewatering of non-acid forming (NAF) material and associated discharge

The mining operation will initially involve mining and dewatering of non-acid forming (NAF) material up to approximately 100m below the pre-mining water table. Mine dewater will be pumped to the dewatering ponds, followed by discharge to North Creek.

The dewater discharge activity may generate erosion at the discharge location and downstream, and add additional sediment loads to the creek. This may impact the stability, morphology and potentially the hydrology of the creek.

There is also potential for vegetation (adapted to ephemeral creek flows) to be subjected to abnormal inundation, potentially impacting vegetation health. Additionally, a significant increase in dewater salinity may adversely impact vegetation and contaminate soils within the discharge zone.

Baseline analysis indicates groundwater at the site typically has dissolved metal concentrations below the ANZECC (2017) 95% protection trigger values for freshwater, however some exceedances have been measured as noted in Section 7.8.

Dewatering of potential acid forming (PAF) material and associated discharge

Underground mining will include mining of mineralised waste and ore which have been classified

as PAF material. PAF material is located below the pre-mining water table and is expected to be present at depths closer to and within the orebody zone. Figure 7 illustrates the pre-mining water table, the location of the orebody (PAF material) and the predicted drawdown at the end of mining. It is estimated PAF material will generally be mined and dewatered from 100m to 340m below the pre-mining water table.

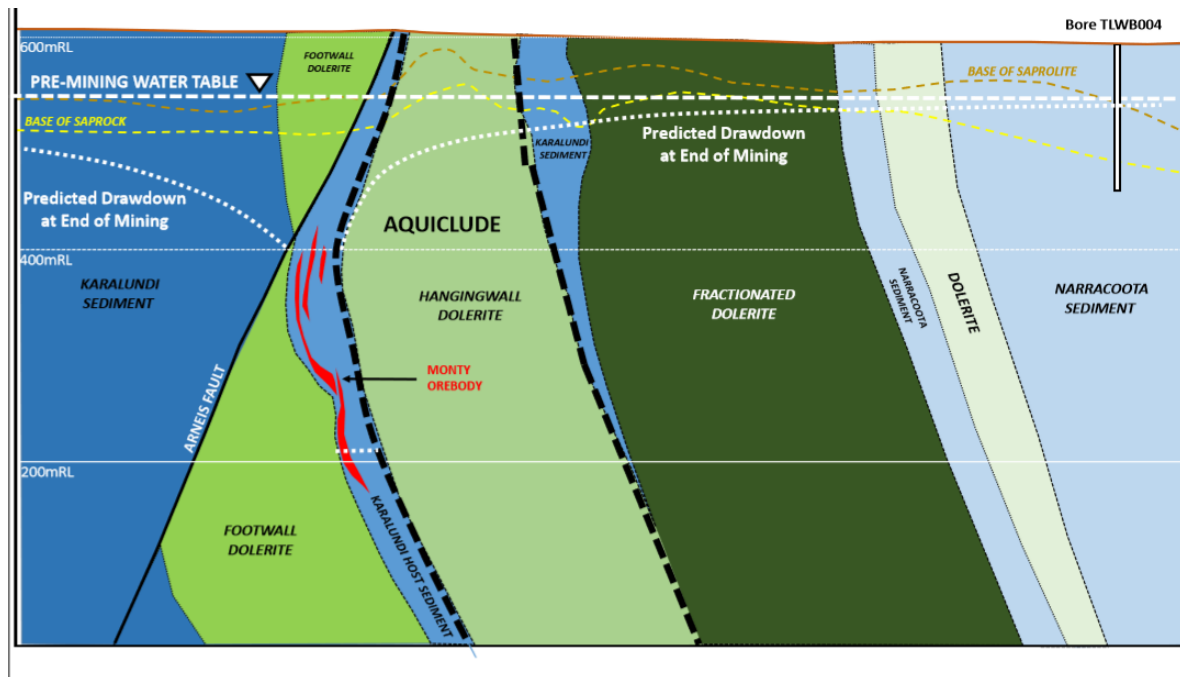


Figure 6: Predicted water level drawdown on geological section – year 4 (variable aquifer). RPS, 2016.

Dewatering of PAF material, as mining progresses, may lead to oxidation of sulfide minerals within the mine workings. Subsequent wetting may generate sulfuric acid, producing hazardous leachate with elevated concentrations of metals, metalloids and sulfate known as Acid and Metalliferous Drainage (AMD).

Circumstances which may generate AMD include the oxidation of sulfide minerals and their subsequent contact with groundwater seepage during active mining/dewatering. Further, in the event mine dewatering is temporarily suspended, subsequent groundwater rebound may also lead to AMD within the mine. Such circumstances may lead to the discharge of AMD to North Creek.

Dewater effluent characterised as AMD could adversely impact North Creek and floodplain, including native vegetation, fauna and sediments/soils within the discharge zone. AMD discharge may also lead to contaminated soil pore water or shallow groundwater within the discharge zone.

The likelihood of AMD generation within the mine is considered to be reduced due to the following factors:

- The likelihood and extent of PAF oxidation is reduced by underground mining of PAF

rock material and passive dewatering of the hard rock aquifer, at relatively low rates, which is expected to result in a relatively steep cone of depression.

- The basement rocks surrounding the orebody are described as generally tight with low permeability and transmissivity, which is expected to mitigate PAF rock exposure to flowing groundwater.

8.4.2 Identification and general characterisation of emission

Dewatering of non-acid forming (NAF) material and associated discharge

The applicant proposes to discharge up to 800,000 kL per year to North Creek. The dewater discharge will have approximately 0.2% sediment content. Baseline groundwater analysis indicates the dewater is expected to be pH neutral to slightly alkaline (pH of 7 – 7.7) and fresh to brackish (TDS of 510 - 1200mg/L). Metal concentrations may largely fall below the ANZECC (2017) 95% protection trigger values for freshwater, however exceedances above the trigger values may occur, in particular for Boron and Zinc as measured in the baseline analysis.

Dewatering of potential acid forming (PAF) material and associated discharge

The Applicant has not undertaken detailed modelling/evaluation on the potential for AMD generation within the mine workings. However, hydrogeological investigations, modelling of mine dewatering requirements/rates and material characterisation work completed by the Applicant has informed the risk assessment. DWER has considered that while there are operational/environmental factors that should reduce the likelihood of AMD discharge, based on the available information, the potential for AMD discharge nonetheless exists.

AMD may have highly acidic to circum-neutral pH values (DITR, 2016) with elevated concentrations of metals, metalloids and sulfate. Visual indicators of AMD may include red coloured or unnaturally clear water and orange-brown iron oxide precipitates in drainage lines (DITR, 2016).

DWER has considered up to 800,000 kL per annum of dewater discharge, with the potential for dewater characterised by lowered pH and increases in dissolved metal concentrations during the life of mine. The Applicants Waste Rock Characterisation Report (September 2016) indicates that PAF material exposed to air and water (as may occur within the mine) is predicted to result in significant increases of dissolved Copper, Iron, Manganese, Lead and Zinc in leachates.

8.4.3 Description of potential adverse impact from the emission

Dewater will be discharged at North Creek, approximately 400m north-west of the dewatering pond (refer to Figure 2). The discharge is generally expected to flow in a westerly direction within the North Creek channel and floodplain (which is typically dry). DWER has considered the distance from the discharge point to the western boundary of tenement M52/1071 (~2.5kms), coupled with the maximum discharge rate (800,000 kL/a), and estimates the discharge zone may primarily fall within the boundary of the tenement. The discharge zone may also extend off-site into other mining tenure held by the Applicant and other parties.

DWER notes that the Premises and the surrounding area fall within Unallocated Crown Land. This land is also a proposed conservation park currently managed by the DBCA.

DWER has considered the potential conservation and ecological values at the Premises and in the surrounding region that may be impacted by dewater discharge from the mine dewatering.

Erosion and modification of the North Creek morphology may occur due to the rate of dewater discharge. North Creek may also be subjected to additional sediment loads potentially across the zone of discharge.

Due to the potential rate and period of dewater discharge vegetation adapted to ephemeral creek hydrology may be subjected to abnormal inundation which may impact on vegetation health.

Priority 3 flora species *Sida picklesiana* and 6 protected fauna (refer to Table 8) may potentially be impacted by the dewater discharge.

Dewatering of non-acid forming (NAF) material and associated discharge

Further to the potential impacts described above, dewatering of NAF material is not expected to lead to AMD discharge, however, baseline groundwater data indicates there is existing potential for elevated metal concentrations in dewater discharge, particularly Boron and Zinc, which may present a negative risk to biota at North Creek.

Dewatering of potential acid forming (PAF) material and associated discharge

In the event dewater is typical of AMD and is discharged to North Creek this could generate a scenario of acidic surface water with elevated metal concentrations ponding over a significant area. Such discharge would also infiltrate into sediments/soils at the Premises. High concentrations of metals may then be deposited, potentially leaving a contamination legacy. AMD discharge interacting with soils at the surface may also generate further release of metals such as Aluminium.

The circumstances described above may adversely impact North Creek floodplain vegetation, invertebrates, birds and mammals exposed to the discharge and/or interacting with the discharge area.

8.4.4 Applicant's controls

This assessment has reviewed the Applicant's proposed controls set out in Table 13.

Table 13: Applicant's controls for discharge of dewater discharge to North Creek

Item	Description	Control and operational details
Controls for dewater discharge		
Dewatering ponds	<p>Two interconnected ponds: 1.3 hectares, 3.5m high, 1V:3H batters</p> <p>Constructed below/above ground using benign waste materials</p> <p>Lined with impermeable 1.5mm HDPE liner</p> <p>Interconnected spillway (between the two ponds) at 0.2m depth; external overflow spillway at 0.125m depth</p> <p>0.3m freeboard from the crest</p>	<p>The dewatering ponds are designed to capture and temporarily detain dewater effluent prior to discharge to North creek. This will assist with mitigating erosion (at the discharge outlet) and sediment discharge.</p> <p>A summary of design and operational details is provided below:</p> <p>The predicted total dewatering requirements for the underground mine (for base case aquifer conditions) range up to 16L/s. The ponds have been designed to capture water at a peak discharge of 25L/sec with 8 hours retention time.</p> <p>Dewater captured in the ponds will be used for site operations or discharged to North Creek. The ponds freeboard will be inspected and maintained.</p> <p>Dewatering water is expected to have 0.2% sediment. In cross section, the ponds are designed to have 0.3m freeboard from the crest, a 0.6m sediment settling zone and 2.6m depth to store sediment for the life of mine (4 years).</p>
Discharge pipeline and outlet erosion controls	<p>HDPE pipeline</p> <p>Flow meter, leak detection sensors and isolation valves fitted to the pipeline</p> <p>Rock rip rap at discharge point</p>	<p>The discharge pipeline will convey dewater effluent from the dewatering ponds to the discharge point.</p> <p>The rock rip rap will mitigate soil/sediment erosion at the discharge point. Monthly inspection of the discharge point will be undertaken to ensure no erosion is occurring.</p>
Dewater discharge monitoring	<p>Sampling of dewater at the dewatering ponds and analysis as described below:</p> <p><u>Monthly</u> field analysis for - pH, EC and temperature.</p> <p><u>Annual</u> laboratory analysis for - pH, EC, TDS, total hardness, total alkalinity, Ca, Mg, Na, K, NH₄, PO₄, CO₃, HCO₃, Cl, SO₄, NO₃, SiO₂, Al, Fe, Mn.</p>	<p>The applicant's proposed dewater discharge monitoring is limited in regard to:</p> <ul style="list-style-type: none"> ▪ The suite of analytes required to identify AMD and monitor metal concentrations; and ▪ The frequency of sampling for laboratory analyses. <p>Additional dewater discharge monitoring requirements are described in Section 9.</p>

8.4.5 Key findings

The Delegated Officer has reviewed the information regarding the discharge of dewater to North Creek and has found:

1. The Applicant has constructed a dewatering pond to temporarily detain dewater and facilitate removal of sediment prior to discharge to North Creek. The discharge

pipeline outlet has been constructed to mitigate erosion at the discharge point.

2. Underground mine dewatering is initially expected to occur across non-acid forming (NAF) material, indicatively to ~100m below the pre-mining water table.
3. Up to 800,000 kL/year of dewater will be discharged to North Creek - the discharge zone is estimated to fall within the Monty Project mining lease. This activity may subject North Creek to erosion and atypical sediment loads downstream of the discharge point. Dewater discharge may also impact native vegetation adapted to seasonal surface water flows. Dewater may also contain metal concentrations above ANZECC (2017) default guideline values for freshwater, namely Boron and Zinc as identified in the baseline water quality assessment. It is noted that dewater will be used onsite for dust suppression, which may result in discharge volumes below the licensed discharge limit.
4. Underground mining will involve dewatering of potentially acid forming (PAF) material, estimated to occur from ~100m below the pre-mining water table to the base of planned mining (~340m below pre-mining water table). This phase of mine dewatering may result in the oxidation of sulfide minerals and generation of AMD within the mine workings. Such events may lead to the discharge of AMD to North Creek. AMD discharge has the potential to adversely impact native vegetation and fauna, coupled with the potential to contaminate soils and pore water within the discharge zone.
5. DWER has considered that there are operational/environmental factors that should reduce the likelihood of AMD discharge (to North Creek). However, based on the available information, including the level of technical assessment/reporting completed by the Applicant, the potential for AMD discharge cannot be excluded.
6. The Applicant has not proposed monitoring of the area of discharge and vegetation within the discharge zone.
7. The Applicant's proposed dewater discharge monitoring is limited in regard to – a) the suite of analytes required to identify AMD and monitor metal concentrations; and, b) the frequency of sampling for laboratory analyses.

8.4.6 Consequence – dewatering of *non-acid forming* material and associated discharge

The Delegated Officer has determined that dewatering of NAF material and associated discharge of dewater may primarily cause on site impacts, particularly to riparian vegetation (including Priority 3 species *Sida picklesiana*) in the vicinity of North Creek. The Delegated Officer considers that the consequence of this risk event occurring is **Moderate**.

8.4.7 Likelihood of Risk Event - dewatering of *non-acid forming* material and associated discharge

The Delegated Officer considers that the discharge of non-AMD dewater may impact the identified receptors. However given discharge rates will vary over the Life of Mine and

considering the results of baseline water quality analysis, it is considered that the risk event could occur at some time, rather than in most circumstances. The Delegated Officer considers the likelihood of the risk event is **Possible**.

8.4.8 Consequence – dewatering of potential acid forming material and associated discharge

In the event dewatering of PAF material leads to the generation and discharge of AMD to North Creek, the Delegated Officer considers impacts to receptors should primarily be on-site in the vicinity of North Creek. Overall, the Delegated Officer considers the consequence of this risk event occurring is **Moderate**.

Likelihood of Risk Event - dewatering of potential acid forming material and associated discharge

The Delegated Officer considers that there are operational/environmental factors that should reduce the likelihood of AMD discharge to North Creek. However, based on the available information, including the level of technical assessment/reporting completed by the Applicant, the potential for AMD discharge cannot be excluded. The Delegated Officer therefore considers the likelihood of the risk event is rated as **Possible**.

8.4.9 Overall rating for risk event - discharge of dewater effluent

The Delegated Officer has compared the consequence and likelihood ratings described above with the risk rating matrix (Table 10) and determined that the overall risk rating for the discharge of dewater is **Medium**.

8.5 Summary of acceptability and treatment of Risk Event

A summary of the risk event and applicant controls detailed herein is provided in Table 14 below.

The Delegated Officer has considered the risk event and gaps in the Applicant's controls and considers the risk event is acceptable subject to additional regulatory controls.

Regulatory controls are described further in section 9.

Table 14: Risk assessment summary

	Description of Risk Event			Applicant controls	Risk rating	Acceptability with controls (conditions on instrument)
	Emission	Source	Pathway/ Receptor (Impact)			
1.	Discharge of dewater to North Creek	Underground mine dewatering	<p>Direct contact.</p> <p>Potential impacts within estimated discharge zone include:</p> <ul style="list-style-type: none"> ▪ Erosion and additional sediment loads; ▪ Acidic and/or contaminated surface water and soil pore water; ▪ Decline in vegetation health or death. ▪ Decline in fauna health or death (insects, birds, mammals); ▪ Contaminated sediments/soils. 	<p>1. Dewatering pond to temporarily detain dewater effluent and facilitate sediment removal prior to discharge;</p> <p>2. Erosion control measures at the discharge outlet;</p> <p>3. Limited groundwater and dewater discharge monitoring.</p>	<p>Moderate consequence</p> <p>Possible likelihood</p> <p>Medium Risk</p>	<p>Acceptable subject to additional regulatory controls</p>

9. Regulatory controls

A summary of regulatory controls determined to be appropriate for the Risk Event is set out in Table 15. DWER has determined controls having regard to the adequacy of controls proposed by the Applicant. The conditions of the Licence will be set to give effect to the determined regulatory controls.

Table 15: Summary of regulatory controls to be applied

		Controls (references are to sections below, setting out details of controls)			
		9.1.1 Mine dewater discharge limit	9.1.2 Infrastructure & equipment	9.1.3 Monitoring requirements	9.1.4 Reporting
Risk Items (see risk analysis in section 8)	<i>Discharge of dewater effluent</i>	●	●	●	●

9.1 Licence controls

9.1.1 Mine dewater discharge limit

The Licence Holder has evaluated mine dewatering requirements and nominated a maximum dewater discharge rate of 800,000 kilolitres/tonnes per annum. Actual discharge rates across the life of mine are forecast to be less than the maximum rate.

The Licence Holder shall not discharge more than 800,000 kilolitres of mine dewater per annum and is required to measure and report discharge volumes.

9.1.2 Infrastructure and equipment

The Dewatering Pond described in Table 13 is considered acceptable to receive and temporarily detain dewater prior to discharge. DWER considers the Dewatering Pond design and operation should reduce sediment loads discharged to North Creek.

Rock rip rap installed at the pipeline outlet is expected to mitigate erosion at the discharge point.

The Licence Holder has installed a flow metering device on the dewater discharge pipeline to measure and report dewater discharge volumes.

9.1.3 Monitoring requirements

DWER has prescribed monitoring requirements additional to monitoring proposed by the Licence Holder. Monitoring requirements are described below and are given effect in the Licence conditions.

9.1.3.1 Discharge zone monitoring

Inspections of the dewater discharge zone are required to facilitate verification of the general area subjected to dewater discharge and changes to the discharge zone (in response to variable discharge rates) during the course of mining. The survey work will also facilitate establishment of vegetation monitoring points (see Section 9.1.3.2).

The Licence Holder is required to conduct quarterly on ground surveys to provide a description of the direction of dewater discharge and the furthest extremity of the discharge.

9.1.3.2 Vegetation monitoring

The risk assessment has identified that dewater discharge may adversely impact native vegetation, either along creek lines or elsewhere within the area of discharge, including potential impact on Priority 3 species *Sida picklesiana*. Monitoring of native vegetation condition is therefore required to facilitate assessment of impacts to be reported in the Annual Environmental Report.

The Licence Holder is required to:

- Establish vegetation monitoring points within the dewater discharge zone within 6 months of the grant of the Licence. The location and number of vegetation monitoring points will be determined by the Licence Holder based on on-ground surveys of the observed and estimated discharge zone.
- Include allowance for the establishment of additional vegetation monitoring points in response to observed amplification of the discharge zone.
- Conduct biannual inspections at the vegetation monitoring points. Required reporting will include a general description of environmental conditions and vegetation condition at the monitoring points based on visual inspection and photographic evidence.

9.1.3.3 Dewater effluent monitoring

The Licence Holder is required to sample dewater effluent and monitor water quality parameters. The objectives of this monitoring include (but are not limited to):

- Monitoring and reporting parameter trends;
- Identify parameter consistencies that have the potential to cause harm to the environment and/or pollution of the environment in the area of discharge.
- Inform assessment of additional measures, if required, to mitigate environmental impacts.

Dewater effluent samples will be collected and analysed as detailed in Table 16 below. The Licence Conditions provide full details on the monitoring requirements.

Table 16 Dewater effluent monitoring schedule

Monitored item	Location	Parameters	Frequency
Dewater discharge volume	Dewater discharge pipeline	Cumulative discharge volume (kL)	Continuous while discharging
Dewatering pond inflow	Dewatering pond inflow pipeline	Field analyses: pH Electrical conductivity Total dissolved solids Temperature	Monthly
		Laboratory analyses: pH Electrical conductivity Total dissolved solids Total Alkalinity	Quarterly
Dewater discharge	Dewatering discharge pipeline	Field analyses: pH Electrical conductivity Total dissolved solids Temperature	Monthly
		Laboratory analyses: pH Electrical conductivity Total dissolved solids Total suspended solids Total Titratable Acidity Total Alkalinity Major ions including - SO ₄ , Cl, Na, K, Ca, Mg, HCO ₃ . Dissolved (filtered) metals/metalloids including – Al, As, B, Cr, Cd, Cu, Fe, Mn, Ni, Pb, Se, Zn.	Quarterly

9.1.4 Reporting

The Licence Holder is required to report compliance with the licence conditions and the outcomes of the prescribed monitoring. An Annual Audit Compliance Report and Annual Environmental Report will be prepared by the Licence Holder and will include the following:

- An audit and description of compliance with the Licence conditions;
- A description of the dewater discharge zone as surveyed during the annual period;
- A general description of vegetation condition at the established monitoring points;
- Dewater discharge flow metering data;
- Dewatering pond inflow and dewater discharge parameter data, reported in table and graphical format, along with an assessment/description of parameter trends;
- Details of any complaints received.

10. Determination of Licence conditions

The conditions in the issued Licence in Attachment 1 have been determined in accordance with the *Guidance Statement: Setting Conditions*. The *Guidance Statement: Licence Duration* has been applied and the issued licence expires on 29 March 2038 in line with the current term of the M52/1071 mining lease.

Table 17 provides a summary of the conditions to be applied to this licence.

Table 17: Summary of conditions to be applied

Condition Ref	Grounds
Emissions and emission limits – Conditions 1 and 3.	These conditions are valid, risk-based and consistent with the EP Act.
Infrastructure and equipment – Condition 2	These conditions are valid, risk-based and contain appropriate controls.
Monitoring, reporting and record keeping Conditions 4 - 16.	These conditions are valid, risk-based and consistent with the EP Act.

DWER notes that it may review the appropriateness and adequacy of controls at any time and that, following a review, DWER may initiate amendments to the licence under the EP Act.

11. Licence Holder's comments

The Licence Holder was provided with the draft Decision Report and draft issued Licence on 25 September 2018. The Licence Holder provided comments on 18 October 2018 and 26 October 2018. A summary of the Licence Holder's comments along with DWER's response is provided in Appendix 2.

An updated draft Decision Report and draft Licence was provided to the Licence Holder on 26 November 2018. On 28 November 2018 the Licence Holder requested to waive the comment period and for the Licence to be issued, with no additional comments made by the Licence Holder.

12. Conclusion

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

The Delegated Officer has determined that the proposed Category 6 Prescribed Premise activity has an overall risk rating of Medium. Additionally the proposed Category 12 Prescribed Premise activity is not considered to present any risk events.

Based on this assessment it has been determined that the Licence will be granted subject to conditions commensurate with the nominated controls.

Alana Kidd

Manager, Resource Industries

Regulatory Services – Environment

Delegated Officer

under section 20 of the *Environmental Protection Act 1986*

Appendix 1: Key documents

	Document title	Availability
1.	Sandfire Resources NL - application for works approval and licence, Monty Project, M52/1071, L52/170 – signed 12 May 2017. Submission included – Monty Project Surface Water Management Study, Rev B, 3 April 2017; Hydrogeological assessment report, Rev B, 3 November 2016.	DWER records - A1474940
2.	Sandfire Resources NL – response to request for further information – dated 24 July 2017	DWER records – A1485314
3.	Sandfire Resources NL – response to request for further information – dated 15 August 2017	DWER records - A1505803
4.	Sandfire Resources NL – works approval compliance report – dated 9 April 2018	DWER records - A1649951
5.	Sandfire Resources NL - copy of Mining Proposal for the development of the Monty Project, Version 2.0, dated 16 June 2017. Submission included copy of - Monty Project Waste Rock Characterisation Report, September 2016.	DWER records - A1674611
6.	Licence Holder's comments on draft Licence and draft Decision Report – separate submissions dated 18 October 2018 and 26 October 2018	DWER records – A1730540, A1732702
7.	Licence Holder's comments on updated draft Licence and draft Decision Report – submission dated 28 November 2018	DWER records – A1743376
8.	Sandfire Resources NL – works approval compliance report – dated 14 November 2018	DWER records – A1739177
9.	ANZECC (2017) Australian and New Zealand Guidelines for fresh and marine water quality – toxicant default guideline values.	http://www.waterquality.gov.au/anz-guidelines/guideline-values/default/water-quality-toxicants/search
10.	ANZECC & NHMRC (1992) Australian water quality guidelines for fresh and marine waters, National Health and Medical Research Council.	
11.	Department of Industry Training and Resources (2016) Preventing acid and	https://archive.industry.gov.au/resource/Programs/LPSD/Pages/LPSDhandbooks.aspx#

	metalliferous drainage – leading practice sustainable development program for the mining industry.	
12.	Swedish Environmental Protection Agency (2002) Alkalinity and acidification in groundwater – technical guidance document published by the Swedish EPA	
13.	Western Australian Herbarium (1998–). FloraBase—the Western Australian Flora. Department of Biodiversity, Conservation and Attractions.	https://florabase.dpaw.wa.gov.au/

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

Assessment /Condition reference	Summary of Applicant's comment	DWER response
Premises / Schedule 1 on Licence	The prescribed premises are located entirely within M52/1071	Tenement L52/170 omitted from the prescribed premises Licence
Definitions - Annual period	Sandfire requests that the Annual Period is from 1 January to 31 December to align with other regulatory reporting requirements.	The Annual Period under the Licence is defined as 1 January to 31 December.
Condition 2 - Table 3	Table 3 refers to water quality monitoring in Condition 5, but it is Condition 6 in the draft Licence.	Condition reference corrected on draft Licence.
Condition 4 – Table 4	Table 4 repeats discharge twice.	Repeated word “discharge” removed from table heading
Risk event – Dewatering of potential acid forming (PAF) material and associated discharge	Sandfire and its consultants consider the risk of AMD discharge from the Monty underground operations has been overstated in the assessment.	<p>DWER has considered the Applicant's comments in relation to the potential for AMD generation within the mine and subsequent discharge of AMD (from the dewatering ponds) and has updated the description of this risk event as detailed in Section 8.4.</p> <p>In summary, DWER considers that there are operational/environmental factors that should reduce the likelihood of AMD discharge to North Creek and/or the surrounding environment.</p> <p>However, based on the available information including the level of technical assessment/reporting completed by the Applicant, the potential for AMD discharge cannot be excluded. DWER has assessed the level of risk in accordance with its <i>Guidance Statement – Risk Assessments</i> and determined “possible” likelihood and “moderate” consequence ratings for the risk event. This results in an overall risk rating of “medium” and</p>

Assessment /Condition reference	Summary of Applicant's comment	DWER response
		acceptable subject to regulatory controls.
Condition 5 – Table 5	Sandfire proposes to conduct biannual vegetation monitoring rather than quarterly monitoring as quarterly changes in vegetation are unlikely to be detected.	Native vegetation monitoring requirements have been clarified and updated, including specification of biannual rather than quarterly monitoring.
Condition 6 – Table 6	Monthly groundwater level and quality monitoring is conducted under GWL200031 (1) and undertaking additional monitoring under L9058/2017/1 results in unnecessary duplication. Sandfire requests that groundwater level and quality monitoring is removed from Table 6	DWER notes the current groundwater monitoring requirements for the project under licence to take water GWL200031 (1). As the Prescribed Premises licence (L9058/2017/1) is intended to regulate emissions from the premises, i.e. mine dewater discharge, DWER has omitted the requirement for duplicate groundwater monitoring under Licence L9058/2017/1.
Condition 6 – Table 6	<p>Sandfire objects to the monthly suite of dewater discharge parameters proposed to be analysed in the field and requests the following changes:</p> <ul style="list-style-type: none"> ▪ Redox potential and dissolved oxygen are removed ▪ Total suspended solids (TSS), Total Titratable Acidity (TTA), and Total Alkalinity (TA) are removed as monthly field monitoring parameters. 	<p>DWER has reviewed the dewater effluent field analyses list and made the following changes:</p> <ul style="list-style-type: none"> ▪ Omitted redox potential, dissolved oxygen, TTA and TA from the field analyses list (note - TTA and TA are retained in dewater discharge laboratory analysis requirements); ▪ Relocated TSS to the laboratory analyses list.
Condition 6 – Table 6	For sampling practicality and risk management, dewater flow may at times be periodic at Monty (e.g. lower inflow and higher use in dust suppression) and it is considered more appropriate to sample dewatering pond inflow and the dewatering discharge point rather than within the cells.	DWER has revised the dewater effluent monitoring schedule to require sampling at the dewatering pond inflow and discharge points.

Assessment /Condition reference	Summary of Applicant's comment	DWER response
<p>Condition 9</p> <p><i>The Licence Holder is required to undertake an assessment of dewater discharge parameter data against the guideline dewater discharge trigger values outlined in Table 7.</i></p>	<p>Sandfire request a copy of any documentation/information that provides clarification on the process of the application of the ANZECC freshwater aquatic 95% protection level guidelines to arid ephemeral creeks. Given various information regarding these updated guidelines is not yet publically available, Sandfire and our specialist consultants are unable to fully understand the technical merits of its application versus application of default guideline values for irrigation or livestock drinking water quality.</p>	<p>DWER has reviewed the requirement to evaluate dewater discharge parameter data against the prescribed <i>guideline dewater discharge trigger values</i>.</p> <p>In summary, in consideration of the overall risk rating and conditional on compliance with other regulatory controls (detailed in this Decision Report), the nominated condition has been omitted from the Licence.</p> <p>The Licence Holder is nonetheless required to report dewater discharge parameter data and trends in the Annual Environmental Report.</p>
<p>Condition 10 and 11</p>	<p>Sandfire requests 90 days to prepare the Compliance Report and Annual Environmental Report, as per the Degruusa Licence L8558/2011/1. This time is required to allow specialist consultants to review the information in the preceding year and report correctly.</p>	<p>DWER endorses a 90 day period to prepare and submit the Annual Audit Compliance Report and Annual Environmental Report for the preceding annual period.</p>

Attachment 1: Licence L9058/2017/1
