Application for works approval

Part V Division 3 of the *Environmental Protection Act 1986*

Works approval number	W6346/2020/1
Applicant	BHP Billiton Iron Ore Pty Ltd
ACN	008 700 981
DWER file number	DER2019/000678
Premises	Wheelarra Hill (Jimblebar) Iron Ore Mine Tenement M266SA NEWMAN WA 6753
Date of report	22 June 2020
Status of Report	Final

1. Definitions

Key terms relevant to this decision report and their associated definitions are listed in Table 1.

Table 1: Definitions

Term	Definition
AER	Annual Environmental Report
Applicant	BHP Billiton Iron Ore Pty Ltd
Category / categories	categories of prescribed premises as set out in Schedule 1 of the EP Regulations
DBCA	Department of Biodiversity, Conservation and Attractions
Decision Report	refers to this document
Delegated Officer	an officer delegated under section 20 of the EP Act
Department	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.
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 *Public Sector Management Act 1994* and is responsible for the administration of the *Environmental Protection Act 1986* along with other legislation
Emission	has the same meaning given to that term under the EP Act.
EP Act	*Environmental Protection Act 1986* (WA)
EP Regulations	*Environmental Protection Regulations 1987* (WA)
EPA	Environmental Protection Authority
GL/a	gigalitres per annum
GWL	Groundwater Well Licence
GWOS	Groundwater Operating Strategy
MAR	managed aquifer recharge
mAHD	metres at Australian Height Datum

Term	Definition
mbgl	metres below ground level
MDD	maximum dry density
Minister	the Minister responsible for the EP Act and associated regulations
ML/day	megalitres per day
MS	Ministerial Statement
Noise Regulations	*Environmental Protection (Noise) Regulations 1997* (WA)
Occupier	has the same meaning given to that term under the EP Act.
Prescribed premises	This 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
Project	Wheelarra Hill (Jimblebar) Iron Ore Mine
PDWSA	Public Drinking Water Source Area
Risk Event	As described in *Guidance Statement: Risk Assessment*
RIWI Act	*Rights in Water and Irrigation Act 1914*
TDS	Total dissolved solids
TEC	Threatened Ecological Communities
TSS	Total Suspended Solids

2. Overview of premises

2.1 Purpose and scope of assessment

On 21 December 2019, BHP Billiton Iron Ore Pty Ltd (the Applicant) applied for a new works approval under Part V, Division 3 of the *Environmental Protection Act 1986* (EP Act) related to an additional surplus water disposal scheme at the Wheelarra Hill (Jimblebar) Iron Ore Mine (the project) located in the Shire of Derby-West Kimberley.

The project has been assessed by the Environmental Protection Authority (EPA) under Part IV of the EP Act. The project is also subject to *Rights in Water and Irrigation Act 1914* (RIWI Act) approval requirements and operates under Groundwater Licence 158795(9).

The scope of this Decision Report includes assessment of emissions and discharges associated with construction and operation of infrastructure as specified in section 2.3 in accordance with DWER's *Guidance Statement: Risk Assessments* (February 2017).

2.2 Classification of Premises

Table 2: Classification of premises and assessed design capacity

Category	Description	Approved design capacity	Additional design capacity
Category 6	Mine dewatering: premises on which water is extracted and discharged into the environment to allow mining of ore.	47,255,000 tonnes per annual period	Additional 32,850,000 tonnes per annual period (totalling 80,105,000 tonnes per annual period)

2.3 Description of proposed activity

The Applicant has applied for a works approval to construct the additional surplus water disposal scheme at its Wheelarra Hill (Jimblebar) Iron Ore Mine, which is a prescribed premises under Licence L5415/1988/9. The current dewatering discharge rate is 47.255 gigalitres per annum (GL/a) and includes discharge to Ophthalmia Dam, Jimblebar Creek, Copper Creek and managed aquifer recharge (MAR).

The Applicant seeks to install additional discharge capacity of 32.85 GL/a, nominally 90 megalitres per day (ML/day), of surplus mine dewater through the construction and operation of a:

- new MAR scheme at Caramulla
- surplus water discharge scheme in Caramulla Creek
- 22 km discharge pipeline capable of transporting 90 ML/day beginning at one Turkeys Nest at the Jimblebar mine.

The Department of Water and Environmental Regulation (DWER) notes that no change to the groundwater abstraction rate of 22 GL/a is proposed for the Jimblebar Hub (which consists of the Wheelarra Hill (Jimblebar) Iron Ore Mine, Orebody 18 and Orebody 31). The water quality of the abstracted water is generally fresh and the quality not expected to change as part of the works approval.

2.3.1 MAR scheme at Caramulla

The MAR scheme will consist of three reinjection bores (Table 3) within a MAR bore construction zone to the east of the current Premises (Figure 1) designed to dispose of up to 10.95 GL/a (30 ML/day). Several monitoring bores will also be used/installed to monitor the MAR as described in Table 3 and shown in Figure 1.

Table 3: MAR scheme groundwater bores

Caramulla bore	Bore type	Status	Easting	Northing
HCM0026	Injection	Drilled	221215	7411515
HCM0027	Injection	Drilled	223313	7411695
HCM0028	Injection	Drilled	225198	7412622
HCM0043	Groundwater Level Monitoring (MAR)	Proposed	220626	7411787
HCM0044	Groundwater Level Monitoring (MAR)	Proposed	222260	7412006
HCM0045	Groundwater Level Monitoring (MAR)	Proposed	224227	7412110
HCM0046	Groundwater Level Monitoring (MAR)	Proposed	226182	7412116
HCM0047	Groundwater Level Monitoring (MAR)	Proposed	225258	7413079
HCM0019	Groundwater Level Monitoring (MAR)	Drilled	225566	7413661
HCM0008	Groundwater Quality Monitoring (MAR)	Drilled	222216	7412043
HCM0017	Groundwater Quality Monitoring (MAR)	Drilled	224255	7412117

DWER notes that a Section 26D licence to construct up to ten bores for the Caramulla MAR hydrogeological investigations was granted in February 2019.

2.3.2 Surplus water discharge scheme at Caramulla Creek

The surplus water discharge scheme at Caramulla Creek consists of a surplus water discharge point into Caramulla Creek (Figure 1). The scheme is designed to dispose of the total capacity of the scheme, however, is operated in aggregate with the MAR scheme. For example, if the MAR scheme is operating at maximum capacity of 30 ML/day, the creek discharge will operate at 60 ML/day.

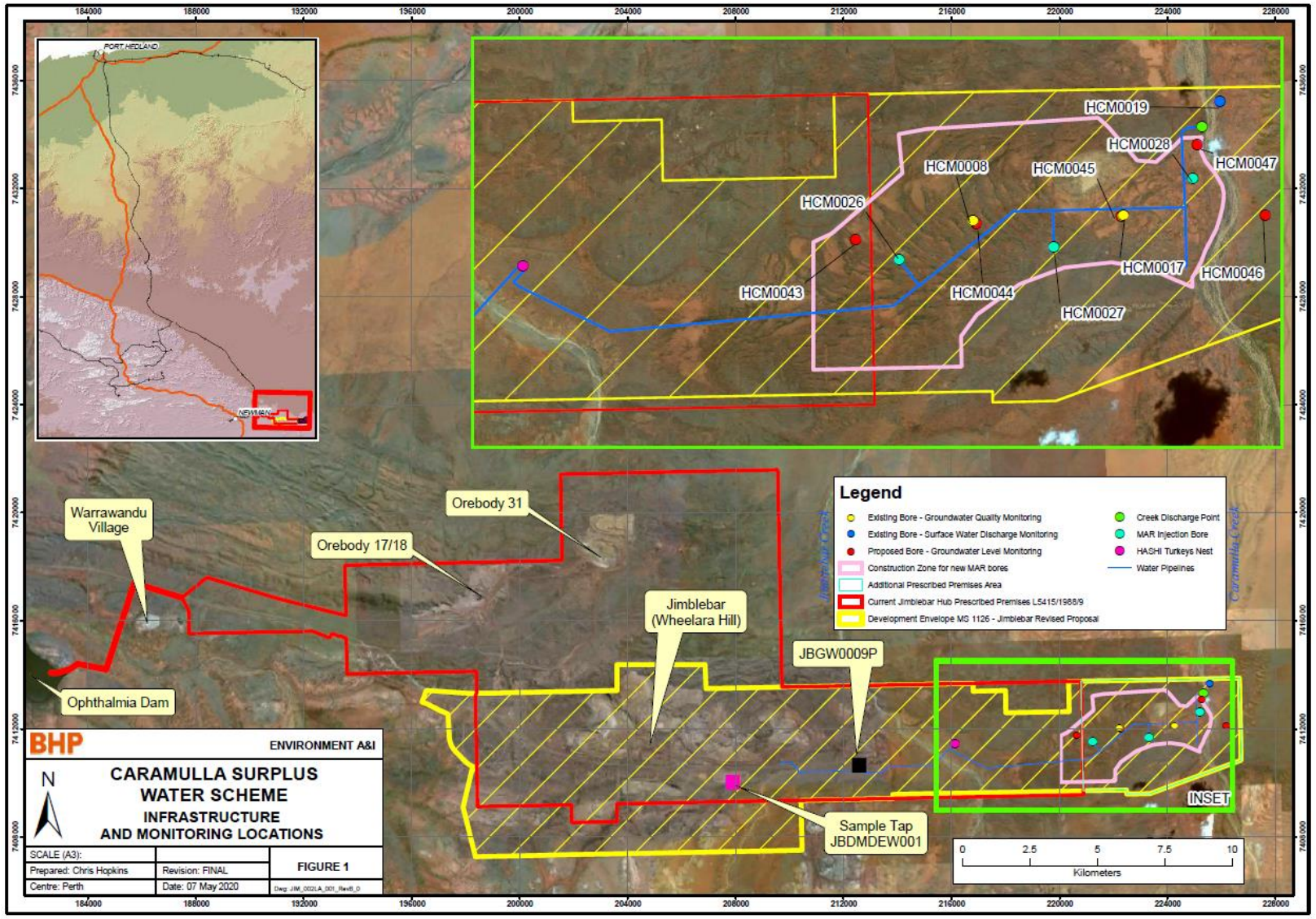

Figure 1: Site Layout Plan

2.3.3 Infrastructure requirements

The infrastructure and equipment are outlined in Table 4.

Table 4: Infrastructure and equipment

Ref	Infrastructure / Equipment	Site Layout Plan reference
1.	Turkeys Nest to hold dewatered groundwater from the Jimblebar Hub. The Turkeys Nest has a capacity of 13 ML with 0.5 m freeboard, and is lined with 1.5 mm HDPE. The embankment is compacted to 98% maximum dry density (MDD) and foundation compacted to 95% MDD, and will include a keyed foundation to aid stability and provide a longer seepage path in the event of a line breach. A drainage bund will be installed to divert stormwater away from the turkeys nest, access and pump station.	Figure 1
2.	MAR scheme at Caramulla within a MAR bore construction zone consisting of three reinjection bores and eight monitoring bores as per Table 3.	
3.	Surplus water discharge scheme consisting of a discharge point located on the bank of the Caramulla Creek at approximately the 100 year flood level (514 mAHD). The discharge point has 18 discharge outlets and approximately 2.5 m of rip-rap protection under the discharge outlets. One cement lined steel pipe, or equivalent, discharge water source pipe split into two perpendicular pipes, leading to 18 discharge outlets.	
4.	Dewatering pipeline connecting the Turkeys Nest to the groundwater reinjection bores, monitoring bores and the Caramulla Creek discharge point. The pipeline will be a nominal 800 mm diameter polyethylene pipe, or equivalent and will be buried at Jimblebar Creek and minor drainage line creek crossings.	

3. Legislative context and other approvals

The overarching legislative framework for this assessment is the *Environmental Protection Act 1986* (EP Act) and Environmental Protection Regulations 1987 (EP Regulations).

Relevant guidance documents are outlined in Appendix 1.

3.1 Works approval and licence history

Table 5 provides the works approval/licence history for the project from November 2000.

Table 5: Works approval and licence history for the project

Instrument	Issued	Nature and extent of works approval, licence or amendment
L5415/1988/1	17/11/2000	First licence noted in the Industry Licensing System.
L5415/1988/2	17/11/2001	Licence reissue.
L5415/1988/3	17/11/2002	Licence reissue.
L5415/1988/4	17/11/2003	Licence reissue.
L5415/1988/5	17/11/2004	Licence reissue.

Instrument	Issued	Nature and extent of works approval, licence or amendment
L5415/1988/6	17/11/2006	Licence reissue.
L5415/1988/7	17/11/2007	Licence reissue.
W4722/2010/1	2/09/2010	Works approval for a new landfill and bioremediation facility.
L5415/1988/8	17/11/2010	Licence reissue.
W4655/2010/1	13/01/2011	Works approval granted for construction of new ore handling infrastructure to increase the capacity of the mine from 15 Mtpa to 45 Mtpa of iron ore. The expansion involves the construction of new process infrastructure including a primary crusher, conveyor systems, a coarse ore stockpile, a new ore handling plant, a product stockyard, a train load out facility and a rail loop. Additional supporting infrastructure includes WWTPs, bulk chemical storage facilities and associated infrastructure.
W5224/2012/1	7/11/2012	Works approval granted for the MAR Project that involves the abstraction of groundwater for the purposes of mining, followed by reinjection of this water into injection bores. There are two stages: • Stage 3a: Injection of approximately 2 ML/day into one of two existing production bores over a period of two to six months. The bores will be retrofitted with headworks appropriate for injection, monitoring and purging. Stage 3a of the trial will guide the planning and design of Stage 3b. • Stage 3b: Injection of approximately 10 ML/day into various combinations of existing retrofitted production bores and new purpose built injection bores.
W5277/2012/1	6/12/2012	Works approval granted for three movable crushers at the premises to supplement ore production through crushing and screening of existing waste stockpile material.
L5415/1988/8	30/05/2013	Licence amendment to: • Add in a category 54 WWTP with the capacity to treat a maximum of 102.5 cubic metres per day (m^3/day) Another WWTP onsite processes 8 m^3/day (total capacity of both plants is 110.5 m^3/day); • Remove conditions (conditions 4, 5 and 6 of the previous licence) relating to the Enviroburner as it no longer present onsite. This was picked up during the inspection conducted by Inspection and Compliance Branch in 2012; • Rename sampling locations for the hydrodynamic trial; • Implement operation of Stage 3a of the hydrodynamic trial; and • Include category 73 for two 1.4 megalitre (ML) vertical cylindrical diesel storage tanks and associated infrastructure.
L5415/1988/8	23/01/2014	Licence amendment to: • Increase category 5 from 15 Mtpa to 51 Mtpa – addition of 6 Mtpa constructed under W5277/2012/1 and 30 Mtpa constructed under W4655/2010/1; • Implement operation of Stage 3b of the hydrodynamic trial – injection of approximately 2 ML/day into one existing production bore (JBGW0076P); • Include groundwater monitoring bores associated with Stage 3b; and • Rename bores associated with Stages 2 and 3a of the hydrodynamic trial.

Instrument	Issued	Nature and extent of works approval, licence or amendment
L5415/1988/8	11/06/2015	Licence amendment to: • Realign the prescribed premises boundary to include Orebody 18 operations (licensed under L8044/1987/2) and the ANSF; • Approve the disposal of wastewater from the ANSF to the Jimblebar Bioremediation Facility • Include a third re-injection bore as part of the Managed Aquifer Recharge (MAR) trial; and • Amend the groundwater monitoring requirements.
L5415/1988/9	5/11/2015	Licence renewal and update to template version 2.9
L5415/1988/9	21/04/2016	Licence amendment to: • Assess the construction and operation of the Orebody 31 dewatering discharge point to Ophthalmia Dam and discharge of up to 16.2 GLpa; • Increase category 6 to include Orebody 18 and Orebody 31 (total 23.5 GLpa discharged via reinjection and discharge to Jimblebar and Copper Creeks and Ophthalmia Dam); • Realign the prescribed premises boundary to include the Orebody 31 deposit; • Consolidate discharge monitoring locations, amend creekline surface water monitoring, including Orebody 18 MAR monitoring requirements and remove requirement to monitor riparian vegetation; and • Remove conditions which duplicate regulation under Part IV of the EP Act.
L5415/1988/9	13/10/2016	Licence amendment to: • Include an additional discharge point to a tributary of Jimblebar Creek; • Amend the Orebody 18 and South Jimblebar MAR programs; • Update conditions relating to sewage monitoring; • Update the prescribed premises address; and • Remove conditions that are not valid, enforceable and/or risk based.
W6042/2017/1	21/07/2017	Works approval granted for a new mine dewater pipeline from Jimblebar operations to Orebody 31 Ophthalmia Dam mine dewater discharge pipeline; and increase category 6 production capacity to account for increase discharge from Jimblebar mining area to Ophthalmia Dam.
L5415/988/9	27/08/2018	Licence amendment 1 to: • Increase the Jimblebar (Wheelarra Hill) category 5 Premises design capacity by 7 Mtpa to 65 Mtpa. This increases the Licence total capacity for category 5 to 82 Mtpa. • Increase the throughput for category 6 to 37.735 GL/a. • Increase the throughput capacity for category 64 to 15,000 tpa. • Increase category 73 to 5,000 m^3. • Removal of monitoring requirements for MAR monitoring bore HSJ0169 and replacement with monitoring bore SJ0571RM. • Removal of rising stage sampler locations JBSW006, JBSW007 and JBSW008 and replacement with the three new rising stage sampler locations JBSW009, JBSW010 and JBSW011. • Administrative changes to the Licence, comprising: • Increasing the volume of nutrient rich water in Table 1.2.4 from 400,000 L to 4,000,000 to correct an administrative error; • Update Table 1.2.6 to remove completed construction requirements; • Replace the reference to L2 to L1 in Table 4.2.1 of the Licence.

Instrument	Issued	Nature and extent of works approval, licence or amendment
L5415/1988/9	19/02/2019	Licence amendment 2 to: • Increase Category 5 approved throughput by an additional 10 million tonnes per annum (mtpa) to a total of 92 mtpa. • Reconfigure the Orebody 18 managed aquifer reinjection (MAR) scheme to increase the maximum design capacity from 8.76 Gigalitres per annum (GL/a) (24 ML/day) to 13.14 GL/a (36 ML/day). • Allow for the construction of a new inert landfill (Category 63). • Amend the prescribed premises boundary to include the expansion of the Orebody 18 MAR scheme. • Add Category 12 to the licence, with an approved throughput of 200 000 tonnes per annual period.
L5415/1988/9	16/07/2019	Licence amendment 3 to: • Construct a new 5 mtpa relocatable crusher. • Increase Category 6 from 37.735 gigalitres per annum (GL/a) to 47.255 GL/a. • Construct a second pipeline from Orebody 31 to Ophthalmia Dam. • Dispose of 16.425 GL/a (average of 45 mega litres per day (ML/d) of surplus water from the Wheelarra Hill (Jimblebar) mining operations to Ophthalmia Dam. • Substitute three of the MAR bores with a depth to groundwater monitoring requirement with three new monitoring bores adjacent to the MAR bores.
L5415/1988/9	30/04/2020	Licence amendment to: • Correct an administrative error associated with the Orebody 18 managed aquifer recharge (MAR) bores. Amendment Notice 3 incorrectly identified the requirement to monitor flow rate and cumulative volumes in monitoring bores HEOP0842P, HEOP0828M and HEOP0838M, instead of the requirement to monitor the flow rate and cumulative volumes in MAR injection bores HEOP0847P, HEOP0843P and HEOP0845P; • Replace groundwater monitoring JBGW0009P with the nearby HSJ0083M. Monitoring JBGW0009P will be decommissioned as part of an expansion to the Primary Crusher 3 run of mine (ROM) pad; • Expand the boundary of the Premises to the south so the description of the Premises boundary in the Existing Licence coincides with the boundary approved via a Section 45C to MS 857 on 9 November 2018; and • Consolidate the Licence by incorporating changes made under Amendment Notices 1-3.
W6346/2020/1	22/06/2020	This works approval for a new mine dewater pipeline from Jimblebar Hub to the Caramulla Creek surplus water discharge scheme and the Caramulla MAR scheme to dispose up to 32.85 GL/a of dewatering discharge.

3.2 Other approvals

Approvals relevant to the premises are outlined in **Table 6**.

Table 6: Relevant approvals

Legislation	Number	Approval
Iron Ore (McCamey's Monster) Authorization Agreement Act 1972	Mining Lease M266SA	Authorise the execution of an agreement relating to the exploration for and the development and treatment of iron ore and for incidental and other purposes.
RIWI Act	Groundwater Well Licence GWL158795(9) (Expires 25 June 2028)	No increase or change to the water licence allocation limit of 22 GL/a is proposed for this Works Approval. Authorised uses under this licence include reinjection and covers up to 3.65 GL/a MAR. As no additional abstraction is required and the relevant tenure is already on the GWL, an amendment is not required. The Groundwater Operating Strategy (GWOS) specifies internal water quality trigger levels for dewatering, and DWER expects that the GWOS will be updated to reflect changes regarding the Caramulla MAR and creek discharge as part of the water balance and management changes. Any creek disturbance as a result of the surplus water discharge does not require a bed and banks permit as the activity occurs on mining tenure and is exempt from the permit, providing the activity does not involve the taking or diversion of water.
EP Act Part IV	Ministerial Statement (MS) 385 (issued 23 May 1995)	Jimblebar Iron Ore Mine Rationalisation and Expansion.
	MS 683 (issued August 2005, supersedes conditions of MS 385)	Wheelarra Hill Iron Ore Mine extension life of mine proposal.
	MS 809 (issued October 2009)	Wheelarra Hill mine modification, increase mining rate from 12 Mtpa to 45 Mtpa, additional clearing, increase water supply, construction of a new rail spur, loop and train load out facilities.
	MS 857 (issued 18 February 2011)	Jimblebar Iron Ore Project – extend existing Wheelarra Hill open pits, develop the South Jimblebar and Hashimoto deposits, increase ore processing to 75 million tonnes per annum, discharge of up to 45 ML/d of excess mine dewater from Jimblebar deposit to Ophthalmia Dam.
	MS 1029 (issued 12 November 2015)	Development of Orebody 31, including the discharge of surplus mine dewater to Ophthalmia Dam and Jimblebar Creek.
	MS 1126 (issued 17 March 2020)	A revised proposal to amalgamate these Ministerial Statements and to add additional operational areas (including the Caramulla surplus water scheme) was referred to the EPA under Section 38 of the EP Act on 29 August 2019 (Assessment 2223) and issued on 17 March 2020.
EP Act Part V: Native Vegetation Clearing Permit	CPS 8123/2 (issued 24 October 2019)	Clearing up to 200 hectares within Mining Lease M266SA. Clearing for exploration, geological/hydrological investigations, construction and maintenance of access roads, pipelines, water bores, monitoring equipment and associated activities.

3.2.1 Part IV Assessment

The EPA report (Assessment 2223) assessed a revision of the existing project, an amendment of the existing proposal to provide additional areas for mining infrastructure (including overburden storage) and the addition of new surplus water management option at Caramulla Creek. The EPA considered Flora and Vegetation, Inland Waters and Terrestrial Fauna as key environmental factors in its assessment.

The existing project was authorised under MS 683, 809, 857, 1029 and 1105; these MS were amalgamated and contemporised under MS 1126, in addition to including the revised proposal. MS 1126 was set on 17 March 2020 based on the outcome of the assessment of the above factors. Conditions within MS 1126 relate to:

- protection of flora and vegetation so that biological diversity and ecological integrity are maintained, and in particular avoid and minimise direct and indirect impacts on flora taxa listed as priority flora, as per the Jimblebar Flora and Vegetation Management Plan;
- protecting subterranean fauna so that biological diversity and ecological integrity are maintained, and avoid and minimise direct and indirect impacts on the Ethel Gorge aquifer stygobiont community Threatened Ecological Community, as per the Subterranean Fauna provisions of the Eastern Pilbara Water Resource Management Plan; and
- maintaining the hydrological regimes and quality of groundwater and surface water so that environmental values are protected, including where relevant avoiding and minimising direct and indirect impacts of the proposal; on poorly represented wetland types; ecosystems which support conservation significant flora/ vegetation, fauna species or communities; and ecosystems which support significant amenity, recreation and cultural values, as per the Jimblebar Water Management Plan.

The EPA report considered that the quality of water being abstracted from Jimblebar and discharged (reinjected) through the MAR scheme was comparable to that in the receiving aquifer and that reinjection is unlikely to significantly change the water quality of the aquifer. The discharge is also of comparable quality to the water quality of Caramulla Creek.

The EPA considered the key measures to avoid/minimise impacts at Caramulla Creek were:

- restricting groundwater rise from the managed aquifer recharge scheme to 25 mbgl to prevent groundwater level rise beyond this limit and to address the uncertainty in the implementation of the MAR scheme;
- managing the surface water wetting front along Caramulla Creek to not extend beyond 34 km downstream of the discharge point, so that it does not reach Jinerabar Pool;
- discharging surplus water into Caramulla Creek to minimise changes to the creek flow path, with discharge infrastructure located to reduce erosion and scouring of the creek;
- monitoring the health of riparian vegetation species along Caramulla Creek as outlined in the Jimblebar Flora and Vegetation Management Plan; and
- gradually reducing water flows in Caramulla Creek at the time of mine closure to allow riparian vegetation time to adjust to changes in the water availability.

Additionally, Caramulla Creek discharge could infiltrate to groundwater and result in local groundwater mounding above the elevated groundwater levels that will result from the MAR scheme. This impact was not specifically identified in the EPA report; however, as per DWER Regional Services (North West Region) advice, while there is uncertainty in the groundwater modelling, the Applicant has appropriate controls and triggers in place to allow for adaptive management.

Therefore, management of impacts from the above are not discussed further in this assessment. Impacts to be discussed in this assessment are as follows:

- construction, such as dust and noise emissions affecting amenity, and pump tests for bores and pipes;
- operation, such as the pipeline delivering abstracted water for disposal.

3.2.2 Part V Licence

The Applicant has identified that following commissioning, an application to amend L5415/1988/9 to include the commissioned scheme will be submitted.

Licence L5415/1988/9 includes conditions relating to monitoring and reporting of point source emissions to surface water and groundwater, and ambient surface water and groundwater. An amendment to Licence L5415/1988/9 will be required to:

- amend the Premises boundary to include the Caramulla MAR scheme and the Caramulla Creek surplus water discharge scheme;
- increase the category 6 production capacity to 80,105,000 tonnes per Annual Period; and
- allow for the additional discharge points for mine dewater to Caramulla MAR and Caramulla Creek from the Jimblebar operations.

The Applicant has advised that there may be a requirement for additional reinjection bores to achieve the reinjection rate of 10.95 GL/a. DWER notes that during commissioning of the MAR scheme, the Applicant will optimise the reinjection program by running the system at less than planned operational levels, then, at incrementally increasing injection rates, determine how the infrastructure and the receiving aquifer manages the pressure of the system. This process will likely indicate whether further reinjection bores would be required. A provision has been made in the works approval to allow installation of additional reinjection bores (and replacement bores for failed bores) to provide flexibility in establishing the reinjection activities prior to updating the licence. The additional (or replacement) bores are to be located within the MAR bore construction zone (Figure 1).

The total anticipated increase the Category 6 production capacity is shown in Table 7.

Table 7: Anticipated total volume discharge for L5415/1988/9

Approval	Total Volume	Description
Approved (L5415/1988/9)	47.255 GL/a	• 12.41 GL/a reinjected to Orebody 18 and South Jimblebar MARs • 2.19 GL/a discharged to Jimblebar Creek and Copper Creek • 32.625 GL/a discharged to Ophthalmia Dam.
This works approval (W6346/2020/1)	32.85 GL/a	• Total discharge capacity of 32.85 GL/a at Caramulla Creek and Caramulla MAR in aggregate, consisting of: o Up to 32.85 GL/a discharged to Caramulla Creek o Up to 10.95 GL/a discharged to Caramulla MAR.
Total (for future licence amendment of L5415/1988/9)	80.105 GL/a (or 80,105,000 tonnes per annual period)	• 12.41 GL/a reinjected to Orebody 18 and South Jimblebar MARs • 2.19 GL/a discharged to Jimblebar Creek and Copper Creek • 32.625 GL/a discharged to Ophthalmia Dam • 32.85 GL/a total discharge capacity at Caramulla Creek and Caramulla MAR in aggregate, consisting of: o Up to 32.85 GL/a discharge to Caramulla Creek o Up to 10.95 GL/a discharged to Caramulla MAR.

4. Receptors

Risk is assessed as a combination of emission sources, the proximity and sensitivity of receptors to those emission sources and any pathways that can allow the emission to reach and potentially harm the receptor.

Table 8 provides a summary of human and environmental receptors in proximity to the premises which have a potential to be impacted from site activities, with screening of receptors for the risk assessment (Section 6), which considers the relevant receptors in the context of emissions and potential pathways.

Table 8: Receptors and distance from activity boundary

Receptors	Distance from activity	Screening for risk assessment
Residential and sensitive premises		
Sylvania Pastoral Station	30 km to the southwest of the MAR bore construction zone	Screened out. Distance is sufficient to inform the risk of emissions as not foreseeable. The Environmental Protection (Noise) Regulations 1997 are applicable. The general provisions of the EP Act apply
Newman township	55 km to the west of the MAR bore construction zone	
Environmental receptors		
Fortescue Marsh	Priority Ecological Community and listed on the Directory of Important Wetlands of Australia as a wetland of national significance. Approximately 90 km north west of the project.	Screened out. Distance is sufficient to inform the risk of emissions as not foreseeable
Public Drinking Water Source Area (PDWSA)	The Newman Water PDWSA (Priority 1) is partially within the eastern edge of L5415/1988/9 Prescribed Premise boundary, approximately 30 km east of the MAR bore construction zone.	Screened out. Distance is sufficient to inform the risk of emissions as not foreseeable
Threatened Ecological Communities (TEC)	There are no TECs or Priority Ecological Communities within the proposed pipeline corridor, MAR bore construction zone and the surplus water discharge to Caramulla Creek. The Ethel Gorge Aquifer Stygobiont TEC is located in Ethel Gorge, directly downstream of the Ophthalmia Dam mine dewater discharge point, and is approximately 50 km west of the works approval area. Ethel Gorge is formed where the Fortescue River flows through the Ophthalmia Range in a northerly direction.	Screened out. Distance is sufficient to inform the risk of emissions as not foreseeable
Threatened/ Priority Flora	No threatened flora present. Two Department of Biodiversity, Conservation and Attractions (DBCA) listed Priority Flora species have been recorded within the project area: • *Eremophila capricornica*: Priority 1; • *Rhagodia* sp. Hamersley (M. Trudgen 17794): Priority 3; These species are wide spread in the local and broader region. All priority flora species will be avoided where practicable.	Screened out. In the event that a priority flora species needs to be disturbed, it will be undertaken in accordance with the conditions of MS 1126 (refer to Section 3.2.1)

Receptors	Distance from activity	Screening for risk assessment
Mulga vegetation	Mulga vegetation has a shallow root system that relies on surface water sheetflow and is considered sensitive to changes in sheetflow patterns. Mulga vegetation may be impacted by the surplus water management infrastructure, particularly pipelines. The total predicted area of indirect impact to vegetation is 967.2 ha, which represents approximately 43 per cent of the known mapped extent in the area. Pipelines will be, where possible, buried or raised to allow sheetflow to pass underneath to prevent ponding and shading of surface water flows. (Source: EPA report 1663)	**Mulga vegetation is a potential receptor for the risk assessment**; however, risk of ponding or shading of surface water is not considered further as it was assessed via EPA report 1663
Riparian vegetation	Riparian vegetation in the Pilbara is locally significant as it provides important habitat for fauna species, including conservation significant species. The proposed surplus water discharge may result in indirect impacts to riparian vegetation due to continuous inundation causing waterlogging and a decline in vegetation health. The change in water availability may also alter the composition of species found within riparian communities. (Source: EPA report 1663)	Screened out. Management of riparian vegetation is undertaken in accordance with the conditions of MS 1126 (refer to Section 3.2.1)
Significant terrestrial fauna	Two significant fauna species have been identified within the project area: • *Dasycercus blythi* (Brush-tailed Mulgara): DBCA Priority 4 • *Merops ornatus* (Rainbow Bee-eater): *Environment Protection and Biodiversity Conservation Act 1999* Migratory / *Biodiversity Conservation Act 2016* Schedule 5. Active Mulgara burrows and Rainbow Bee-eater nests will be avoided where practicable.	Screened out. Clearing associated with the project area will be undertaken in accordance with MS 1126
Subterranean fauna habitat	The EPA report states that prospective habitat for troglofauna is the Tertiary detritals and that subterranean species in detritals tend to be widespread owing to more extensive habitat connectivity. Geological information in the Caramulla MAR area suggests that the Tertiary detritals in the Caramulla area are continuous and widespread. Based on sampling undertaken throughout the wider Jimblebar area, stygofauna are rarely present (less than 3% of samples) at groundwater depths greater than 40 mbgl. Due to the depth of groundwater in the area, it is considered unlikely that the aquifer would host a significant stygofauna community. (Source: EPA report 1663)	**Troglofauna habitat is a potential receptor for risk assessment**; however, stygofauna is screened out as it is unlikely that a significant stygofauna community is present

Receptors	Distance from activity	Screening for risk assessment
Surface water Non-perennial watercourses	The Premises is located in the upper portion of the Fortescue River catchment which drains to the Fortescue Marsh. Two ephemeral watercourses, Jimblebar Creek and Caramulla Creek, and a number of unnamed perennial watercourses flow across the area. These watercourses exhibit a high inter-annual variability of streamflow and long periods of low or no flow, with the majority of streamflow occurring during and immediately after each wet season. The surface water quality within these creeks is fresh (less than 500 mg/L total dissolved solids (TDS)) with pH 6-8 (neutral). The Caramulla Creek main channel typically has a 100 to 200 m bed width with banks 1 to 2 m high.	**Surface water is a potential receptor for the risk assessment**; however, management of the surface water wetting front in the Caramulla Creek is screened out as management is undertaken in accordance with the conditions of MS 1126 (refer to Section 3.2.1)
Groundwater	Regional groundwater level is approximately 50 metres below ground level (mbgl). Water quality is generally of fresh quality (TDS 900 mg/L to 1,500 mg/L). The main use of water is for mining and mine dewatering from iron ore mines.	**Groundwater is a potential receptor for the risk assessment**; however, management of the groundwater level rise screened out as management is undertaken in accordance with the conditions of MS 1126 (refer to Section 3.2.1)

Average annual rainfall is mainly derived from tropical storms and cyclones during summer, producing sporadic, heavy rains over the area. Temperatures are generally high and mean annual rainfall is approximately 330 mm. Evaporation rates are expected to be approximately 8.6 mm per day, and evaporation greatly exceeds rainfall in the region throughout the year and on a month-by-month basis.

5. Monitoring and modelling results

Groundwater

Groundwater quality in the region is classed as generally fresh with typically recorded TDS in the range of 900 mg/L to 1500 mg/L. Depth to groundwater at the nearest bore, JBGW0009P, as reported in the recent Annual Environmental Report (AER) for L5415/1988/09, is greater than 50 mbgl (Table 9). The Applicant expects that similar water levels are present on site.

Groundwater monitoring results for JBGW0009P[1] (Table 10, Figure 1), as reported in the recent AER, shows that TDS varied between 590 to 760 mg/L and pH varied between slightly acidic to slightly basic (5.9 – 9.4). Metals concentrations met ANZECC/ARMCANZ (2000) livestock drinking water quality guidelines and met ANZECC/ARMCANZ (2000) 95% species protection levels for freshwater, with the exception of boron (trigger level 0.037 mg/L) and nitrate (trigger level of 0.7 mg/L) which were exceeded in Quarters 1 and 2 of 2018/2019.

Water quality monitoring undertaken in 2018/2019 for the South Jimblebar creek discharge point, JBDMDEW001, is considered to be representative of the surplus water proposed to be discharged to groundwater via the Caramulla MAR and to surface water at the Caramulla Creek, as it is dewatering water sourced from the Jimblebar Hub.

[1] Noting as per amendment granted 30 April 2020 for L5415/1988/9 that bore JBGW0009P is to be replaced with the nearby HSJ0083M. JBGW0009P will be decommissioned as part of an expansion to the Primary Crusher 3 run of mine (ROM) pad.

The monitoring results for JBDMDEW001 (Table 11, Figure 1) as reported in the recent AER shows that TDS varied between 990 to 1100 mg/L and pH was neutral (6.9 – 7.7). Metals concentrations met ANZECC/ARMCANZ (2000) livestock drinking water quality guidelines and met ANZECC/ARMCANZ (2000) 95% species protection levels for freshwater, with the exception of boron which was exceeded in Quarters 1, 3 and 4 of 2018/2019 and nitrate which was exceeded in Quarters 2, 3 and 4 of 2018/2019.

Considering the quality of the groundwater to be discharged and groundwater quality within the receiving environment are considered to be fresh, and both have some exceedances of freshwater boron and nitrate trigger levels, the water source quality and the groundwater quality in the receiving environment is of similar quality.

Groundwater modelling was reported in EPA report 1663, which found that the largest changes to the existing groundwater levels were predicted to remain within the development envelope, with smaller increases in groundwater levels extending to the east of the development envelope due to local hydrogeological conditions. A clay unit was identified which created uncertainty in the modelling for the MAR scheme. In particular, whether the clay unit created a barrier that would reduce the capacity of the MAR scheme resulting in groundwater mounding and rises in groundwater levels larger than predicted when smaller volumes of water had been injected. EPA considered (Section 3.2.1) that groundwater rise restricted to 25 mbgl was appropriate to prevent groundwater level rise beyond this amount and to address the uncertainty in the implementation of the MAR scheme. DWER Regional Services (North West Region) advised that whilst there is some uncertainty associated with the modelling, the Applicant has appropriate controls and triggers in place to allow adaptive management.

Surface water

Water quality at Caramulla Creek is fresh (less than 500 mg/L TDS) and streamflow occurs during and immediately after each wet season. The quality of water to be disposed is also considered to be fresh, as per monitoring results for JBDMDEW001 (Table 11, Figure 1).

EPA report 1663 found that discharge water is of comparable quality to the water quality of Caramulla Creek. The report noted that modelling for 75 ML/day discharge, the wetting front was predicted to extend up to 34 km downstream of the discharge point, and that the Applicant was proposing to restrict the allowable extent of the wetting front to this 34 km (as per MS 1126). DWER notes that this works approval allows for discharge of up to 90 ML/day (when no MAR is undertaken). The Applicant considered in its referral documentation to EPA that the 75 ML/day prediction was conservative as low infiltration rates were assumed (Low-Loss scenario). EPA Services advised that it had no objection to the Applicant seeking to discharge 90 ML/day rather than the 75 ML/day that was assessed to the Caramulla Creek as no volume limit was set. However, EPA Services noted that the recommended limit was for a 34 km wetting front (as per MS 1126).

Key Findings:

1. Water quality is suitable for livestock.
2. The discharge water source quality and the groundwater quality in the receiving environment is likely to be of similar quality.
3. While there is uncertainty in the groundwater modelling, restricting groundwater rise to 25 mbgl (as per MS 1126) addresses the uncertainty. The Applicant has appropriate controls and triggers in place to allow adaptive management.
4. The discharge water source quality and the surface water quality in the Caramulla Creek (when flowing) is of comparable quality.
5. No volume limit was set for discharge into Caramulla Creek; however, the recommended wetting front limit is 34 km (as per MS 1126).

Table 9: Depth to groundwater at JBGW0009P

Sample month	Depth to groundwater (mbgl)	Sample month	Depth to groundwater (mbgl)
July 2018	51.71	January 2019	52.21
August 2018	51.64	February 2019	52.41
September 2018	51.81	March 2019	53.81
October 2018	51.81	April 2019	52.61
November 2018	51.91	May 2019	52.72
December 2018	57.91	June 2019	52.83

Table 10: Groundwater monitoring undertaken in 2018/2019 for JBGW0009P

Parameter	Units	21/07/2018	16/11/2018	19/02/2019	24/05/2019
pH	--	6.8	6.7	9.4	5.9
Electrical Conductivity	µS/cm	1400	1300	1100	1200
Total Dissolved Solids (TDS)	mg/L	760	650	590	610
Aluminium	mg/L	<0.005	<0.005	<0.005	<0.005
Arsenic	mg/L	<0.001	<0.001	<0.001	<0.001
Barium	mg/L	0.026	0.013	0.007	0.024
Boron	mg/L	**0.39**	**0.41**	0.36	0.34
Cadmium	mg/L	<0.0001	<0.0001	<0.0001	<0.0001
Calcium	mg/L	32	20	11	16
Chloride	mg/L	280	270	260	290
Chromium	mg/L	<0.001	<0.001	<0.001	<0.001
Copper	mg/L	<0.001	<0.001	<0.001	<0.001
Fluoride	mg/L	0.4	0.4	0.4	0.4
Iron	mg/L	0.16	<0.005	<0.005	0.97
Lead	mg/L	<0.001	<0.001	<0.001	<0.001
Magnesium	mg/L	55	51	32	30
Manganese	mg/L	0.37	0.18	0.017	0.35
Mercury	mg/L	<0.00005	<0.00005	<0.00005	<0.00005
Molybdenum	mg/L	0.001	0.001	<0.001	<0.001
Nickel	mg/L	<0.001	<0.001	<0.001	<0.001
Nitrate as N	mg/L	**2.2**	**9.4**	0.079	0.14
Potassium	mg/L	12	12	12	12
Selenium	mg/L	0.003	0.004	0.003	<0.001
Silica	mg/L	13	6.5	1.5	1.4
Sodium	mg/L	130	130	130	140
Sulfate as SO_4^{2-}	mg/L	100	96	86	83
Total Hardness as $CaCO_3$	mg/L	310	260	160	170
Total Suspended Solids (TSS)	mg/L	23	12	12	8
Zinc	mg/L	<0.005	<0.005	<0.005	<0.005
$CaCO_3$ (Total Alkalinity)	mg/L	74	56	7	62

Bold text – exceeds trigger levels for ANZECC/ARMCANZ (2000) 95% species protection levels for freshwater.

Table 11: Water quality monitoring undertaken in 2018/2019 for JBDMDEW001

Parameter	Units	09/08/2018	14/11/2018	19/02/2019	25/05/2019
pH	--	7.5	7.7	6.9	6.9
Electrical Conductivity	µS/cm	2000	1800	1800	1800
Total Dissolved Solids (TDS)	mg/L	1100	990	1000	1000
Aluminium	mg/L	<0.005	<0.005	<0.005	<0.005
Arsenic	mg/L	<0.001	<0.001	<0.001	<0.001
Barium	mg/L	0.022	0.021	0.022	0.020
Boron	mg/L	**0.62**	0.34	**0.57**	**0.56**
Cadmium	mg/L	<0.0001	<0.0001	<0.0001	<0.0001
Calcium	mg/L	73	66	71	75
Chloride	mg/L	300	270	280	290
Chromium	mg/L	<0.001	<0.001	<0.001	<0.001
Copper	mg/L	<0.001	<0.001	<0.001	<0.001
Fluoride	mg/L	0.7	0.7	0.7	0.6
Iron	mg/L	<0.005	<0.005	<0.005	<0.005
Lead	mg/L	<0.001	<0.001	<0.001	<0.001
Magnesium	mg/L	75	65	71	73
Manganese	mg/L	0.019	0.005	0.11	0.063
Mercury	mg/L	<0.00005	<0.00005	<0.00005	<0.00005
Molybdenum	mg/L	<0.001	<0.001	0.002	0.001
Nickel	mg/L	<0.001	<0.001	0.001	<0.001
Nitrate (NO_3)	mg/L	0.28	**6.2**	**0.81**	**0.76**
Potassium	mg/L	9.7	10	9.5	9.7
Selenium	mg/L	<0.001	<0.001	<0.001	<0.001
Silica	mg/L	15	19	21	18
Sodium	mg/L	180	170	170	180
Sulfate as SO_4^{2-}	mg/L	230	210	220	220
$CaCO_3$	mg/L	260	240	300	240
Total Suspended Solids (TSS)	mg/L	<5	<5	<5	<5
Zinc	mg/L	0.02	0.008	0.031	0.015

Bold text – exceeds trigger levels for ANZECC/ARMCANZ (2000) 95% species protection levels for freshwater.

6. Risk assessment

The identification of the sources, pathways and receptors to determine Risk Events are set out in **Table 12** and **Table 13**, consistent with the *Guidance Statement: Risk Assessments*. 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. Emissions during construction and operation have been assessed separately to allow clear delineation of activity phases.

The works approval that accompanies this report authorises construction and time-limited operations. A licence is required to operate the premises following the time-limited operational phase authorised under the works approval.

6.1 Risk assessment

Table 12: Identification of emissions, pathway, receptors and regulatory controls during construction

Risk Events						Consequence rating (Table 14)	Likelihood rating (Table 15)	Risk (Table 16)	Reasoning and regulatory controls
Sources/Activities		Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts				
MAR scheme at Caramulla Creek (Category 6)	Purging (pump testing) of the new MAR reinjection bores and pipework	Discharge to surface water	Surface water - perennial watercourses	Direct discharge of water to waterways (sedimentation)	Potential impact on aquatic organisms and/ or riparian vegetation.	Slight	Unlikely	**Low** Acceptable, not subject to controls	To confirm bore yield and integrity from the bores, pump testing with water is required. The Applicant has committed to the following management measures: • Test-water directed to nearby drainage lines via a lay-flat pipe. • Test water quality tested to ensure disposed water will not pose a risk to watercourses. • Regular inspection for potential erosion. The Delegated Officer considers that as the source water is of good quality and that the impacts are short-term, the proposed management measures adequately mitigate the risk to surface water, and considers that additional regulatory controls are not required to mitigate this risk.

Table 13: Identification of emissions, pathway, receptors and regulatory controls during commissioning and operation

Risk Events						Consequence rating Table 14)	Likelihood rating Table 15)	Risk (Table 16)	Reasoning and regulatory controls
Sources/Activities		Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts				
MAR scheme at Caramulla Creek (Category 6)	Operation of three new reinjection bores in the MAR bore construction zone located to the west of the current scheme	Discharge to groundwater	Troglofauna habitat	Direct discharge of water to groundwater (via reinjection)	Degradation of receiving aquifer groundwater quality due to reinjecting water of differing quality impacting health and survival of troglofauna	Minimal onsite impact **Slight**	Not likely to occur in most circumstances **Unlikely**	**Low** Acceptable, not subject to controls	The Delegated Officer notes that restricting groundwater rise is managed via the Jimblebar Water Management Plan (as per the MS 1126). The Applicant has stated that commissioning the program will be undertaken by running the system at less than the planned operational levels to equalise the system, calibrate all equipment, then at incremental injection rates determine how the infrastructure and receiving aquifer copes with the pressure of the system. The Applicant has advised that, as the water quality of the source and receiving aquifers is expected to be similar, reinjection is not expected to significantly alter the chemistry of the receiving aquifer, as per results of surveys from adjacent Applicant MAR schemes at Jimblebar and Orebody 18. The Applicant has committed to implementing the following monitoring measures: • abstracted groundwater quality tested quarterly at the Turkeys Nest • quarterly water quality testing will occur at two already installed monitoring bores (HCM0008 and HCM0017). The Delegated Officer considers that reporting results of the above monitoring is required via compliance reporting in the works approval prior to issuing an amendment to the licence L5415/1988/9. The Delegated Officer notes that a suite of parameters are analysed and compared to site specific trigger values in licence L5415/1988/9 (existing condition 3.5.1). The Delegated Officer notes that there is the potential for low level, localised impact to subterranean fauna (troglofauna) as a result of the MAR scheme. The Applicant stated that 15 troglofauna species have been recorded in the project area, with five species recorded only from, or within the immediate surrounds of, the MAR project area. The Applicant also stated that the prospective habitat for troglofauna is the Tertiary detritals, which tend to be widespread owing to more extensive habitat connectivity, and that the geology of the area would suggest that the Tertiary detritals in the Caramulla area are continuous and widespread. The Delegated Officer considers that, while there will be impacts to the availability of troglofauna habitat, the habitat is likely to be continuous and widespread. The Delegated Officer also considers that, while the quality of the water to be discharged is expected to be of comparable quality to the receiving aquifer, the quality of the water to be discharged and the quality of the receiving aquifer should be tested and analysed and provided as part of the compliance reporting in the works approval. <u>Works approval and licence controls:</u> • Compliance reporting including monitoring results.

Risk Events						Consequence rating Table 14)	Likelihood rating Table 15)	Risk (Table 16)	Reasoning and regulatory controls
Sources/Activities		**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential adverse impacts**				
Surplus water discharge scheme at Caramulla Creek (Category 6)	Operational discharge of excess mine dewater to the surface water of Caramulla Creek	Discharge to surface water	Surface water – Caramulla Creek bank at the surface water discharge point	Direct discharge to waterways	Erosion at the surface water discharge point	Minimal onsite impact **Slight**	Not likely to occur in most circumstances **Unlikely**	**Low** Acceptable, not subject to controls	The Delegated Officer notes that management of the Caramulla Creek wetting front threshold and restricting groundwater rise is managed via the Jimblebar Water Management Plan (as per the MS 1126). The Applicant has stated that commissioning the discharge of excess mine dewater at the surface discharge point will be undertaken by running the system at less than the planned operational levels to equalise the system and calibrating all of the equipment. The discharge rates are incrementally increased to determine how the infrastructure and Caramulla Creek copes with the volume of discharge (i.e. how rapidly the wetting front extends and recedes; and an indication as to the likely maximum discharge rate that can be achieved without exceeding the wetting front limit). Commissioning of the discharge point is expected to take up to two months. The Applicant has committed to the following management measures: • Erosion controls built as part of the discharge point design (i.e. rip rap) • Discharges to commence using low discharge volumes, allowing erosion to be identified early • Discharge point will be inspected regularly to identify if erosion is occurring • If erosion does occur, additional erosion control measures will be implemented (e.g. extending rip rap) and repairs undertaken, if required. The Delegated Officer considers that the Applicant controls are sufficient mitigate the risk of erosion at the surface water discharge point. The Delegated Officer considers that, in accordance with DWER Guidance Statement: Risk Assessments (DER, 2017a), as the above controls lower the risk of impacts, they will be conditioned in the works approval and licence (where applicable). <u>Works approval and/or licence controls:</u> • Requirement to have installed infrastructure to specifications. • Inspect the area around the discharge point regularly to identify if erosion is occurring.
Pipeline from mining operations to the Caramulla Creek (Category 6)	Rupture of pipeline transporting water	Discharge to the environment	Mulga vegetation and associated soils	Direct discharge to land	Impacts to vegetation and soil due to inundation/erosion	Minimal onsite impact **Slight**	Not likely to occur in most circumstances **Unlikely**	**Low** Acceptable, not subject to controls	The Applicant has committed to the following management measures: • water will be delivered through surface laid polyethylene pipelines before being injected • telemeted flowmeters will be located at the start of the pipe and installed at each bore to detect possible leaks. The Delegated Officer considers that a flow meter to calculate flow should be installed and that the pipeline should be inspected regularly. The Delegated Officer considers that, with the Applicant and other controls and the good quality of the water being transported in the pipeline, the risk associated with pipeline rupture to the environment (on vegetation and soils) is low. The Delegated Officer considers that, in accordance with DWER Guidance Statement: Risk Assessments (DER, 2017a), as the above controls lower the risk of impacts, they will be conditioned in the works approval and licence (where applicable). <u>Works approval and/or licence controls:</u> • Requirement to have installed the infrastructure to specifications. • Inspect the pipeline regularly.
Turkeys nest from mining operations to the Caramulla Creek (Category 6)	Overtopping and seepage at Turkeys Nest	Discharge to the environment	Groundwater approximately 50 mbgl Troglofauna habitat	Direct discharge to land	Changes to groundwater quality and quantity impacting health and survival of troglofauna.	Minimal onsite impact **Slight**	Not likely to occur in most circumstances **Unlikely**	**Low** Acceptable, not subject to controls	The Applicant has committed to the following management measures: • Turkeys Nest will be lined with HDPE, with the foundation compacted to 95% MDD and the embankment compacted to 98% MDD • Turkeys Nest will include a keyed foundation to aid stability and provide a longer seepage path in the event of a line breach • Turkeys Nest will include a drainage bund to divert stormwater. The Delegated Officer considers that a flow meter to calculate flow should be installed. The Delegated officer considers that, with the Applicant and other controls and the good quality of the water being transported through the Turkeys Nest, the risk associated with overtopping or seepage to the environment is low. The Delegated Officer considers that, in accordance with DWER Guidance Statement: Risk Assessments (DER, 2017a), as the above controls lower the risk of impacts, they will be conditioned in the works approval and licence (where applicable). <u>Works approval and/or licence controls:</u> • Requirement to have installed the infrastructure to specifications.

6.2 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 14**.

Table 14: 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 15**.

Table 15: 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	• **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	• 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	• **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	• **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	• **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	• **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	• **onsite impacts**: low level • **offsite impacts local scale**: minimal • **offsite impacts wider scale**: not detectable • Specific Consequence Criteria (for environment) likely to be met	• 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	• **onsite impact**: minimal • Specific Consequence Criteria (for environment) met	• **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.

6.3 Acceptability and treatment of Risk Event

DWER will determine the acceptability and treatment of Risk Events in accordance with the Risk treatment **Table 16**.

Table 16: 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.

7. Determination of Works Approval conditions

The conditions in the issued Works Approval in Attachment 1 have been determined in accordance with DWER Guidance Statement: Setting Conditions (October 2015). Table 17 provides a summary of the conditions to be applied to this Works Approval.

Table 17: Summary of conditions to be applied

Condition Reference	Grounds
Construction phase	
Infrastructure and Equipment Condition 1	This condition requires that infrastructure is constructed and designed as per the supporting documents. The condition is valid, risk-based and contains appropriate controls.
Compliance reporting Conditions 2 and 3	These conditions require a compliance report to be provided following construction completion. These conditions are valid, risk-based and consistent with the EP Act.
Time limited operations phase	
Commencement and duration Conditions 4 and 5	These conditions require that compliance and commissioning reports have been received prior to time limited operations commencing and sets operational requirements. Environmental compliance is a valid, risk-based condition to ensure appropriate linkage between the licence and the EP Act

Condition Reference	Grounds
Time limited operations requirements Conditions 6, 7, 8 and 9	These conditions require data collection on aspects of the project. These conditions are valid, risk-based and consistent with the EP Act.
Monitoring during time limited operations Conditions 10 to 13	These conditions require water quality and quantity monitoring during time limited operations. These conditions are valid, risk-based and consistent with the EP Act.
Compliance reporting Conditions 14 and 15	These conditions require a time limited operations report be provided with a summary of the performance of the infrastructure and details on amount of discharge. These conditions are valid, risk-based and consistent with the EP Act.
Record-keeping	
Records and reporting Conditions 16, 17 and 18	These conditions are valid and are necessary administration and reporting requirements to ensure compliance.

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 works approval under the EP Act.

8. Licence controls

An amendment to Licence L5415/1988/9 will be required to increase the Category 6 production capacity to allow for the additional discharge points for mine dewater to the proposed MAR scheme and Caramulla Creek surplus discharge point, and to amend the premises boundary. It should be noted that controls will be subject to compliance with conditions of the issued Works Approval. Controls may change if additional information becomes available to further inform the risk assessment (as per DWER Guidance Statement: Risk Assessments, February 2017).

9. Consultation

Table 18 identifies the consultation undertaken for the works approval.

Table 18: Consultation

Method	Comments received	DWER response
Application advertised on DWER website on 17 February 2020	None received	N/A
Local Government Authority advised of proposal on 13 February 2020	The Shire of East Pilbara replied on 17 February 2020 advising that the Shire had no objection to the proposal, provided that the Applicant notify Council of any planned works prior to commencement, and that relevant approvals are obtained from Council (e.g. Approval of any Wastewater System, Washdown Bay, Food Business Approval). The Shire advised that Development Approval would not be required. The Shire advised that it would be interested in knowing where the workforce will be living and be involved in any post mining land use/closure plans at the appropriate time.	DWER noted this response on 17 February 2020.
Other Stakeholders advised of proposal on 12 and 13 February 2020	Department of Mines, Industry Regulation and Safety (DMIRS) advised that a Mining Proposal has not yet been received for the proposed discharge scheme.	DWER notes that it is the Applicant's responsibility to seek relevant regulatory approval from other Decision Making Authorities.
Applicant referred draft documents (comments received 15 June 2020)	Summarised in Appendix 2	Summarised in Appendix 2

10. Conclusion

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

Alana Kidd
MANAGER, RESOURCE INDUSTRIES
INDUSTRY REGULATION
An officer delegated by the CEO under section 20 of the EP Act

Appendix 1: Key documents

Document title	Availability
Works Approval (W6345/2020/1) application form and supporting documentation (December 2019)	DWER records: DWERDT238096
Guidance Statement: Regulatory principles. Department of Environment Regulation, Perth. July 2015	Accessed at www.dwer.wa.gov.au
Guidance Statement: Setting conditions. Department of Environment Regulation, Perth. October 2015	
Guidance Statement: Licence duration. Department of Environment Regulation, Perth. August 2016	
Guidance Statement: Risk Assessments. Department of Environment Regulation, Perth. November 2016	
Guidance Statement: Decision Making. Department of Environment Regulation, Perth. November 2016.	
Industry Regulation Guide to Licensing. Department of Water and Environmental Regulation, June 2019.	
Australian and New Zealand Guidelines for Fresh and Marine Water Quality; Volume 1, October 2000	Accessed at https://www.waterquality.gov.au/sites/default/files/documents/anzecc-armcanz-2000-guidelines-vol1.pdf

Appendix 2: Summary of Works Approval Holder's comments on draft conditions

Condition	Summary of Licence Holder's comment	Department's response
Condition 1	To allow the construction of additional bores without the need for further works approval/licence amendment(s) in the event that additional bores are required to meet the proposed design capacity or if a reinjection bore fails. Any new bores will be constructed within the MAR Bore Construction Zone and designed as per previously submitted design specifications. DWER will be notified one month prior to construction of any additional bores. Following commissioning, any new bores will be operated under time-limited operations (under the works approval) or under L5415/1988/9.	The Delegated Officer supports allowing flexibility in establishing the reinjection activities prior to updating the licence. The Delegated Officer notes that during commissioning of the MAR scheme, the Applicant will optimise the reinjection program by running the system at less than the planned operational levels to equalise the system, calibrate all of the equipment, then at incremental injection rates, determine how the infrastructure and the receiving aquifer manages the pressure of the system. The Delegated Officer expects this process will likely indicate whether further reinjection bores would be required and a provision has been made in the works approval to allow installation of additional reinjection bores. The works approval has been amended to include additional reinjection bores that can be installed within the MAR bore construction zone (new condition 8 within the works approval). The Delegated Officer notes that if the reinjection bores fail, they will require replacing. Similarly to the above to provide some flexibility, the works approval has been amended to include replacement bores for reinjection bores. Replacement bores are to be located within the MAR bore construction zone and the failed bores are to be fully decommissioned (new condition 8 within the works approval).
Condition 2	Request that the water bores meet the *Minimum Construction Standards for Water Bores in Australia* (3rd Edition, 2012), rather than other standards.	The Delegated Officer notes that the risk assessment has indicated that the operations are a lower risk and therefore, the standard provided is supported for construction of monitoring bores. In addition, the standard has been added into condition 1 and condition 2 has been deleted. Submission of bore logs are required as part of reporting in condition 4 (now condition 3)
Condition 6	Request the clarification of the time allowed for time limited operations.	No change to the condition. The condition allows 180 days for time-limited operation to allow for the transition from the works approval to the licence. If an amendment to licence L5415/1988/9 has not been granted by the end of time limited operations, operation of the elements in the works approval are not permitted until the amendment is granted. Note: the revised condition number is condition 5.
Condition 7	Request that the discharge amounts during time-limited operations is revised to 32.85 GL/a in aggregate, with 10.95 GL/a of the larger amount from the groundwater reinjection bores.	No change to condition. The condition reflects the requirements of time limited operations as outlined above. Note: the revised condition number is condition 6.
Condition 10, Table 6	Sampling at the Turkey's Nest and Caramulla Creek surplus discharge point represents a duplication of sampling and the Caramulla Creek surplus discharge point should not be included within the condition.	The Delegated Officer agrees that the points would be a duplication and the text in Condition 10, Table 6 has been amended to reflect this.