MILLENNIUM MINE

Amendments to conditions as a compliance measure required by the EA

Supporting documentation to the Environmental Authority

EPML00819213 amendment application

For

MetRes Pty Ltd

Document Status Sheet

Rev	Date	Description	By	Review	Approved
1	**17-02-2023**	**Supporting documentation**	Francis Kuranchie - Environmental Superintendent		**SD**

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1 Introduction

Millennium Coal Mine is within the Bowen Basin, Queensland and is located approximately 20 kilometers (km) south-east of the township of Moranbah, and 174km east of Mackay and within the Isaac Regional Council Local Government Area (LGA) in Queensland (22° 00' 56.68" S, 148° 15' 09.28" E). The Site terrain is flat to slightly undulating. The Mine consists of two mining areas with six mining leases (ML): the Mavis Downs area (ML 70457, ML 70483 and ML 70485); and the Millennium area (ML 70313, ML 70401, ML 70344), together form a single operational project, the Millennium Mine. Millennium Mine operates under Environmental Authority (EA) EPML00819213.

The primary activities undertaken on site include:

- Open cut mining;
- Underground mining;
- Coal haulage;
- Exploration;
- Tailings and rejects disposal;
- Water management.

1.1 Purpose of this report

This report has been submitted with the Application Form *Application to amend an environmental authority* (ESR/2015/1773) online with the request to amend EA EPML00819213.

Relevantly, the EA requires:

- The provision of mine affected water contaminant release limits for turbidity and suspended solids in Table C2, which the EA states (by way of asterisked footnote at the bottom of page 12) was to be provided to the Department by 7 December 2022; and
- The updating of Table D1 with the results from the assessment required by condition D6, via an amendment process by 31 December 2022 (in accordance with the requirement in condition D7).

Information was provided to the Department on 19th December, 2022 to address the information required for Table C2 and Table D1.

The purpose of this amendment application is to ensure that site information now reflects in the EA to ensure the EA reflects current operating conditions.

The opportunity has also been taken in this amendment application to make some minor administrative updates to some naming conventions within the EA which are inconsistent with site operations, and to remove some references to structures which are no longer in existence on site.

This report supersedes MetRes' previous submission (dated 19/12/22) which was the subject of a Not Properly Made Notice from the Department (Reference A-EA-AMD-100360867) dated 19/01/23.

The information presented in this report provides further clarity on the magnitude of proposed changes, their justification and potential environmental harm (if any). In addition, where relevant, this supporting document presents proposed mitigation measures to effectively manage the proposed amendments.

It should be noted that this updated EA amendment supporting documentation does not present a different technical finding to the data as presented to the Department in the 19/12/22 lodgment but provides further clarification on why the changes are being sought. The exception is the proposed release limits to comply with condition C4, Table C2 and C7. Millennium Mine accept the limits as provided by the Department 20/01/23.

MetRes considers that the approved form and associated supporting information that has been prepared will now allow the EA amendment application to be accepted as properly made in accordance with the *Environmental Protection Act 1994* (EP Act).

It is expected that all the changes requested if granted will not cause any further environmental harm to the receiving environment, beyond current operating conditions. Also, DES proposed release limits for mine affected water have been accepted to be used for this EA

As confirmed in Section 3, the proposed amendments to the mine affected water release limits and REMP trigger values will not result in any additional contamination to receiving surface waters, will not result in any additional releases or emissions to groundwater or land, and will not result in any additional environmental harm to air and noise environmental values.

2 EA amendment application

The *Environmental Protection Act 1994* (EP Act) states the requirements for an environmental authority amendment application. The requirements have been addressed in this report as outlined (Error! Reference source not found.).

Table 1: Legislative Requirements and Response

Requirement	Response
Section 226 of the EP Act:	
a) Be made to the administering authority;	The amendment application has been submitted to the Department of Environment and Science (DES) (the administering authority).
b) Be in the approved form;	The approved form "Application to amend an environmental authority" (ESR/2015/1733), version 20, effective 14 July 2021 was used and submitted online.
c) Be accompanied by the fee prescribed by regulation;	A fee of $355.30 was paid during the online submission with the amendment application as prescribed in Part 2, Schedule 15 of the EP Regulation.
d) Describe the proposed amendment;	See Section 3
e) Describe the land that will be affected by the proposed amendment; and	See Section 4
f) Include any other document relating to the application prescribed by regulation.	All other supporting document prescribed by the regulation has been included in this application.
Section 226A of the EP Act:	
a) Describe any development permits in effect under the Planning Act for carrying out the relevant activity for the authority;	There are no development permits required for the carrying out of the proposed activity.
b) State whether each relevant activity will, if the amendment is made, comply with the eligibility criteria for the activity;	The relevant environmental authority was approved under a site-specific application as the activities do not comply with the eligibility criteria for mining lease activities.
c) If the application states that each relevant activity will, if the amendment is made, comply with the eligibility criteria for the activity-include a declaration that the statement is correct;	The activities do not comply with the eligibility criteria.
d) State whether the application seeks to change a condition identified in the authority as a standard condition;	The relevant environmental authority was approved under a site-specific application and therefore all conditions are site specific and not standard.
e) If the application relates to a new relevant resource tenure for the authority that is an exploration permit or GHG permit-state whether the applicant seeks an amended environmental authority that is subject to the standard conditions for the relevant activity or authority, to the extent it relates to the permit;	The application does not relate to a new relevant resource tenure.
f) Include an assessment of the likely impact of the proposed amendment on the environmental values, including-	See Section 3
i. A description of the environmental values likely to be affected by the proposed amendment;	

Requirement		Response
ii.	Details of emissions or releases likely to be generated by the proposed amendment;	
iii.	A description of the risk and likely magnitude of impacts on the environmental values;	
iv.	Details of the management practices proposed to be implemented to prevent or minimise adverse impacts;	
v.	If a PRCP schedule does not apply for each relevant activity-details of how the land the subject of the application will be rehabilitated after each relevant activity ends;	
g)	Include a description of the proposed measures for minimising and managing waste generated by amendments to the relevant activity; and	See Section 4
h)	Include details of any site management plan or environmental protection order that relates to the land the subject of the application.	A site management plan or environmental protection order does not relate to the land subject of the application.

This application does not relate to a PRCP Schedule, CSG activity or Underground Water Rights. Therefore, section 226B, 227 and 227AA of the EP Act do not apply to this application.

2.1 Application form

This amendment has been submitted with the Application Form *Application to amend an environmental authority* (ESR/2015/1773) online with all responses checked. Other responses to relevant sections of the form can be found in this document (**Table 2**).

Table 2: Application Form Requirements and Response

Form Section	Response
Section 11 – Amend Conditions	See Section 8
Section 13 – Describe the proposed amendment	See Section 3
Section 14 – Describe the land affected	See Section 4
Section 22 – Environmental Values	See Section 5.1

3 Proposed Amendment Description

Overview: Amendments to conditions as a compliance measure required by the EA

Where relevant, this supporting documentation has been developed in consideration of the requirements listed under the following DES Guidelines (and as summarised in Table 3):

- Application requirements for activities with impacts to air (ESR2015/1840, version 4.04) (DES, 2021a);
- Application requirements for activities with impacts to land (ESR/2015/1839, version 4.03) (DES, 2021b);
- Application requirements for activities with impacts to water (ESR2015/1837, version 4.04) (DES, 2021c);
- Application requirements for activities with noise impacts (ESR2015/1838, version 3.06) (DES, 2022a);
- Application requirements for activities with waste impacts (ESR2015/1836, version 5.02) (DES,2021d); and
- Requirements for site-specific and amendment applications – underground water rights (ESR/2016/3275, version 1.03) (DES, 2021).

Based on the Department's Notice received 19/01/23, Millennium Mine has revisited the relevant EA amendment guidelines and additional information requirement as contained within the Notice received. Table 3 presents a review of guidance material, with section 5 presenting a review against assessment level decision for the amendments seeking change in this application.

Table 3: Review of guidance material

Relevant section	Action required	
266A (1)(f)(i)	Describe the environmental values that are likely to be impacted	Summarised in Section 3, Table 4 Appendix B – surface water Appendix C – groundwater
266A (1)(f)(ii)	Detail of emissions and releases likely to be generated by the proposed amendment.	**Surface Water** The proposed water quality is consistent with general Millennium water quality as described 5.1.2 and 5.1.3. The mine affected water release limits and REMP trigger values proposed will not cause additional contamination to receiving waters. Also, no additional emissions are anticipated as a result of this amendment. **Groundwater** This amendment as described in section 3 will not have any additional releases or emissions to groundwater. Rather groundwater networked is being optimised. **Land** This amendment as described in section 3 will not have any additional releases or emissions to land. Also, structure of the land and aesthetics will not be affected through any release. There will be no vegetation clearing associated with this amendment. **Other** Noise and air emissions will be similar to the currently approved impacts.

266A (1)(f)(iii)	Describe the risk and likely magnitude of impacts of the amendment on identified environmental values	Summarised in Section 3, Table 4 Appendix B – surface water Appendix C – groundwater
266A (1)(f)(iv)	Details of management practices proposed to be implemented to prevent or minimise adverse impacts	Summarised in Section 3, Table 4 Appendix B – surface water Appendix C – groundwater
266A (1)(f)(v)	Provide the details of rehabilitation to land that will be impacted by activities associated with this application.	All amendments seeking change (as listed in section 3, Table 4) do not involve any clearing of vegetation or excavation of land. Therefore, no land will be affected as a result of this EA amendment.

The proposed amendments seeking a change to EPML00819213, as part of this application, are summarised in Table 4.

Technical reports to support the information presented in Section 3 is provided in Appendix A through to E.

Table 4: summary table of proposed EA amendments

EA reference	Technical area	Proposed change	Magnitude of change proposed	Level of environmental harm assessed	Where addressed in supporting documentation
CONDITION CHANGES PROPOSED					
Schedule C: Surface Water					
Table C2	Mine affected water release limits	Compliance with condition (footnote) to insert release limits for turbidity and suspended solids.	Release limits provided by DES (21/01/23) are accepted by Millennium Mine	The proposed release limits are achievable to facilitate controlled releases of mine-affected water. The conservative nature of the proposed release limits ensures that any releases would not cause impacts to the downstream environmental values.	Section 3.2 Appendix B, Table 1
Table C7		Replace suspended solids Trigger Level of 258 with 1404 mg/L from Table C7 based on the technical study report submitted.	Release limits provided by DES (21/01/23) are accepted by Millennium Mine	The proposed release limits are achievable to facilitate controlled releases of mine-affected water. The conservative nature of the proposed release limits ensures that any releases would not cause impacts to the downstream environmental values.	Section 3.2 Appendix B, Table 2
Schedule D: Groundwater					
Table D1	Mavis UG compliance	Proposed addition of two new monitoring bores to the groundwater monitoring program in Table D1, as a result of the assessment undertaken in accordance with condition D6 and the requirement in condition D7 to update Table D1.	Groundwater monitoring program proposed: Section 3 Table 7 and repeated in Appendix C, Table 4.	Current monitoring network is suitable with proposed two additional bores. In order to avoid any unnecessary disturbance to the groundwater system, the two bores to be included in the network were selected from existing bores of a neighbouring mine. No impacts to the groundwater system are predicted. It is recommended to undertake downhole camera investigation, check or iron bacterial and to re-develop the existing groundwater monitoring bores	Section 3.3 Appendix C. S3.2.3

EA reference	Technical area	Proposed change	Magnitude of change proposed	Level of environmental harm assessed	Where addressed in supporting documentation
				to improve the connection to the screened aquifer section. None of these actions are predicted to have an impact on the groundwater system.	
Table D2	Mavis UG compliance	Proposed amendment of some groundwater contaminant trigger values in Table D2, as a result of the assessment undertaken by SLR in accordance with condition D6 and the requirement in condition D7 to update Table D2.	New trigger limits proposed: Table 8 and repeated in Appendix C, Table 17.	The groundwater contamination trigger levels were developed based on the DES, 2021 Guideline. Using monitoring data to assess groundwater quality and potential environmental impacts. There are no predicted impacts to groundwater from this change of trigger limits. Rather, they will be more suitable to pick up any impact should they occur.	Section 3.3 Appendix C. S3.5
ADMINISTRATIVE CHANGES PROPOSED					
Table C4 Table C8	Table C4: Mine affected water release during flow events. Table C8: Receiving Water Upstream Background Sites and Down Stream Monitoring Points	Remove reference to RP1. This release point no longer exists as there is no release source water Dam.	No discernable impact, as replaced, as covered with current authorisation to release water from the Mavis ROM Dam through to release point RP2 in the EA	No impact due to change. If RP1 and Southern void (which no longer exist) are removed from the EA, dewatered water from the Mavis underground E pit which is currently sent to either B pit water storage Dam or Mavis ROM water storage dam will make it possible to release the water from the Mavis ROM Dam through release point RP2 to New Chum Creek. The change will not cause any additional environmental harm as a result of removing RP1 and Southern void from the EA.	Section 3.3

EA reference	Technical area	Proposed change	Magnitude of change proposed	Level of environmental harm assessed	Where addressed in supporting documentation
		Request removal of Goonyella Gauging Station #130414A (Department of Resources). Gauging station is outside of Millennium Mine ML boundary and site does not have access to it.	Referencing has removed from the Department of Regional Development system and no longer accessible.	No impact due to change. This because the same purpose monitoring is conducted at the Railway Culvert (GS1) as in EA Table C4 and therefore same purpose will be achieved to get the receiving water quality results	Not discussed further in supporting documentation
Table C5	Table C5: Water Storage Monitoring	Request to remove Southern Void reference. The water storage no longer exists and is now an active mining pit	As above for RP1. Mine affected water dam Southern Void is now an active E pit Mavis underground Mining area and no longer exists in our current operations as a mine affected water dam. Also remove Southern void from Table C5 for the same reason	No impact due to change	Not discussed further in supporting documentation
		Request to change Mavis Northern ROM Dam to Carborough ROM Dam.	Naming reference is incorrect as the two are the same.	No impact	Not discussed further in supporting documentation
Condition C22	REMP design document	This obligation has now been fulfilled	REMP design document was submitted to the DES compliance unit on 02/08/2022.	No impact	Not discussed further in supporting documentation
Condition F5	Rehabilitation Management Plan	Remove date (31/12/2020) reference as this obligation has now been fulfilled	No impact as obligation complete	No impact	Not discussed further in supporting documentation
Condition F7	Landform design criteria	Remove date reference (31/12/2020) as this obligation has now been	No impact as obligation complete	No impact	Not discussed further in supporting documentation

EA reference	Technical area	Proposed change	Magnitude of change proposed	Level of environmental harm assessed	Where addressed in supporting documentation
		fulfilled			
Condition F11	Post Closure Management Plan	Remove date reference (31/12/2020) as this obligation has now been fulfilled	No impact as obligation complete	No impact	Not discussed further in supporting documentation

Surface Water assessment

Hydrology

Millennium Mine is located in the Isaac River drainage basin sub-area of the wider Fitzroy Drainage Basin. The Isaac River, to the south-west of Millennium, is the major drainage feature of the region and flows in a southeasterly direction. New Chum Creek runs parallel to Millennium Mine, between the existing Millennium and Mavis open cut pits, and is a tributary of the Isaac River. New Chum Creek and Isaac River are classified as third order and sixth order streams respectively, and both are ephemeral, experiencing short periods of flow following high rainfall events over the summer months.

The catchment area of New Chum Creek is approximately 51 km2, with Millennium Mine, as well as Poitrel and Daunia Mines, located within the catchment. The main channel of New Chum Creek typically has a base width of approximately 3 m and a depth of up to 2 m. Although minor waterholes can persist in the channel for several weeks following high rainfall events, there is little to no aquatic vegetation due to the stream being ephemeral, with streamflow expected to occur less than 30% of the time (Peabody, 2020). New Chum Creek has been diverted downstream as part of a neighbouring mining operation at Poitrel Mine.

The south-western part of Millennium Mine drains south to West Creek, another tributary of Isaac River. The West Creek confluence with the Isaac River is approximately 9 km upstream of that of New Chum Creek. West Creek has a catchment area of approximately 22 km2. West Creek acts as an ephemeral minor watercourse.

Surface water in the area is ephemeral and does not have a groundwater baseflow component (SLR, 2021).

The receiving environment of Millennium Mine includes the New Chum Creek, West Creek and North Creek and connected waterways 10 km downstream of release points which will include the Isaac River. The New Chum Creek is the closest area where water flows during heavy rainfall. The New Chum Creek begins east of the Peak Downs Highway and continues through to the site, bisecting the space between the Millennium and Mavis areas of the site. Flows are generally in the south-east direction through the mine site. The West and North Creeks are tributaries that connect the main New Chum Creek that feed into the Isaac River. There are no Wetlands located within 10 km radius of the Millennium Mine operations.

Proposed EA condition changes

Propose site-specific WQOs for turbidity and suspended solids

In order to meet the requirements with respect to EA conditions described in **Section 1.1** of this report, MetRes contracted C and R Consulting (C&R) to undertake a technical assessment in relation to the proposed new contaminant release limits for turbidity and suspended solids. This assessment informed the updates to EA table C2 and C7 for Mine affected water release limits and receiving waters contaminant trigger levels respectively. Results are presented below and in detail in **Appendix B**.

Based on the specialist technical assessment (**Appendix B**), and consideration of values as provided by the Department (20/01/23), the following calculated release limits and trigger values have been proposed.

The changes affect EA Tables C2 (Mine affected water release limits) and C7 (Receiving water contaminant trigger levels) and is duplicated in Tables 5 and 6 below respectively.

Table 5: Proposed Release limits for mine affected water EA Table C2

EA Table C2 – Mine affected water release limits	
Total Suspended solids (TSS) mg/L	265
Turbidity (NTU)	500

Table 6: Proposed contaminants trigger levels for receiving environment EA Table C7

EA Table C7 – Receiving water contaminant trigger levels	
Total suspended solids (TSS) mg/L	400
Turbidity (NTU)	750

The Mine affected water proposed release limits and REMP trigger values in this amendment as described in section 3 and full details attached in C and R Consulting report (Appendix B) if adopted will not cause any additional environmental harm to the downstream environmental values of the receiving environment. This outcome is further reinforced by the background data for the Isaac River that C&R reviewed in the November 2022 letter (Appendix A) to M Mining.

C&R calculated 50th percentiles for turbidity (933 NTU) and SS (601 mg/L) above the proposed guideline values, suggesting that the levels within the upstream receiving environment are generally above the proposed release limits and therefore any releases in accordance with the limits will not adversely influence the levels of these quality characteristics within the receiving environment. These new proposed values are consistent with the surrounding Companies EA's as also calculated by the Department (DES) (refer to Appendix A and B). Also, generally our current water storage quality levels are consistent with new proposed release limits and trigger values and no additional environmental harm to waters is anticipated in times of water release.

The only exception dam on Millennium Mine site is the Build pad dam which has slightly elevated water quality values. However, this water is circulated to other water dams on site as seen in our water management system flow chart in Figure 1. Therefore, time and dilution factor reduces the elevated water quality numbers to be consistent with the general water quality on site and will not have any special concern.

Impact of proposed changes to the surface water system

As outlined in the sections below, removal of the RP1, Southern Void, change of name from Mavis Northern ROM Dam to Carborough ROM Dam, removal of EA condition 22 will have no bearing with groundwater pollution and no additional environmental impact for groundwater is anticipated.

Removal of RPI, Southern Void

RP1 has its mine affected water release source as the Southern Void which is now the active Mavis underground mining area. Currently there is no permanent mine affected water storage dam at the Mavis E pit as it is currently an active underground mining area. From time to time there is dewatering from this Mavis Underground area and water is sent through to either B pit water storage dam or the Mavis ROM Dam in the water management system. This is presented in Figure 1 below.

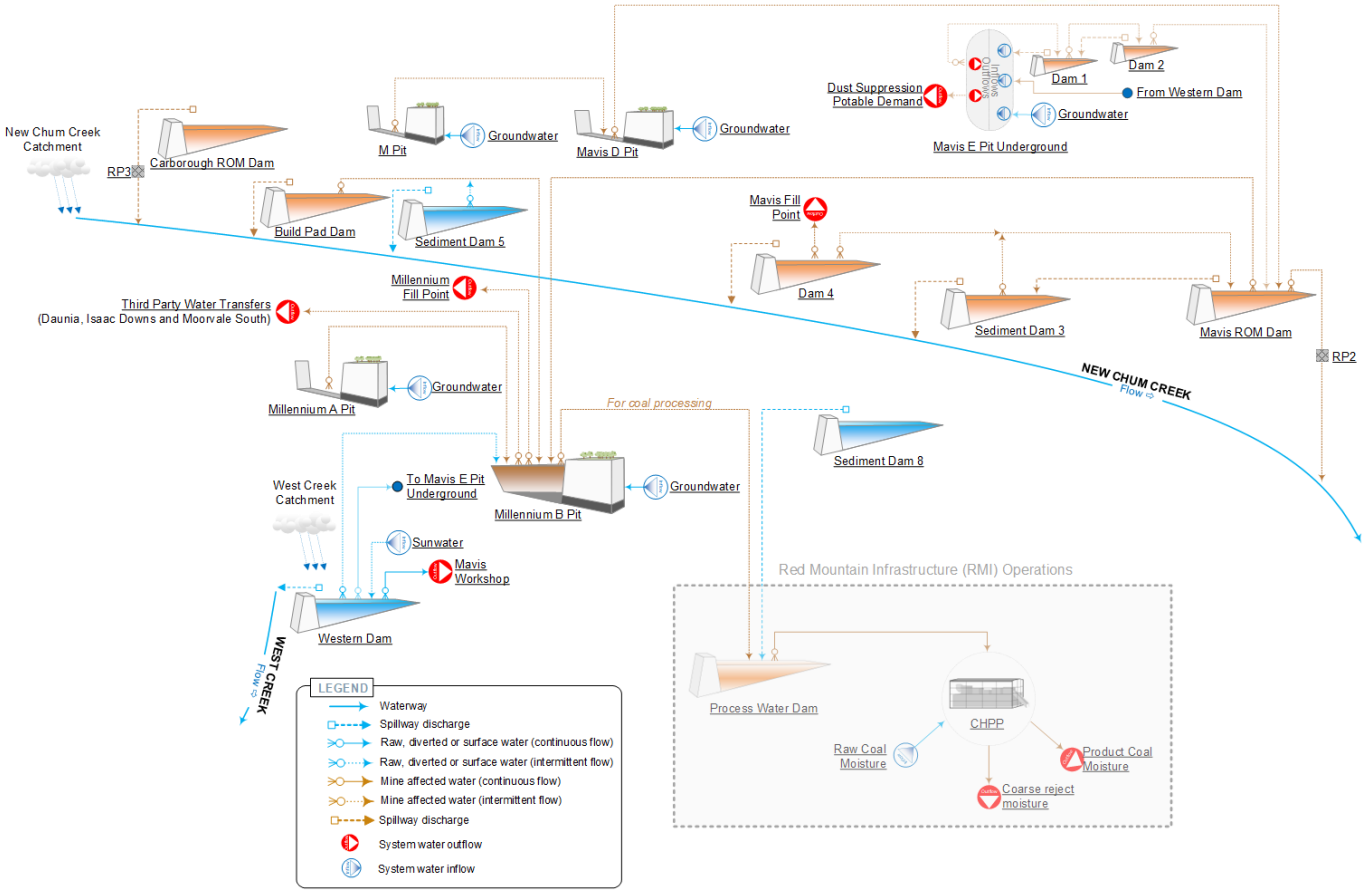

Figure 1: Millennium Mine Water Management System Schematic.

Millennium Mine currently has an authorisation to release water from the Mavis ROM Dam through to release point RP2 in the EA. Therefore, if RP1 and Southern void (which no longer exist) is removed from the EA, dewatered water from the Mavis underground E pit (which is currently sent to either B pit water storage Dam or Mavis ROM water storage dam), will make it possible to release the water from the Mavis ROM Dam through release point RP2 to New Chum Creek. This will not cause any additional environmental harm as a result of removing RP1 and Southern void from the EA.

In addition, dewatered water quality from the Mavis underground E pit area is not different from the Mavis ROM Dam water quality and is not likely to affect the mine affected water release limits in EA Table C2. See Appendix E updated water quality results spreadsheet.

Removal of Goonyella Gauging Station #130414A in EA Table C4

Request for removal of Goonyella Gauging Station #130414A in EA Table C4 as this has been removed from the Department of Regional Development system and no longer accessible and will not cause any additional environmental harm to waters. The receiving environment monitoring is also conducted at the Railway Culvert (GS1) as in EA Table C4 and therefore same purpose will be achieved to get the receiving water quality results.

Request for change of Mavis Northern ROM Dam from EA Table C5 to Carborough ROM Dam Request

Request for change of Mavis Northern ROM Dam from EA Table C5 to Carborough ROM Dam in the naming convention will bring consistency in the EA as Carborough ROM Dam is already mentioned in EA Table C1 and will also match with WaTERS reporting system of the same EA. The name change request will only be an administrative correction and will not add any additional environmental harm to waters and other environmental values on the Millennium Mine site.

Compliance with EA condition 22 regarding REMP design document

EA condition 22 regarding REMP design document was submitted to DES compliance unit on 02/08/2022. This condition has now been fulfilled. REMP is already in place and monitoring is ongoing. Removing of this condition from the EA will only tidy up the EA and bring consistency. Therefore, it is not anticipated there will be any additional environmental harm to waters and other environmental values.

Groundwater assessment

SLR Consulting Australia Pty Ltd (**SLR**) has undertaken a technical review of the proposed EA amendment changes relating to groundwater. Results are presented in full in Appendix C.

The information presented in this supporting documentation is consistent with information presented to DES as part of the EA amendment application lodged 19th December 2022 but has been updated to consider the request for further information as presented in the DES Notice (dated 19/01/23).

Groundwater environment

Millennium is located within the Isaac Connors Groundwater Management Area (GMA) (Zone 34) of the Fitzroy Basin under the Water Plan (Fitzroy Basin) 2011 (DES, 2011). The management objective of the Water Plan (Fitzroy Basin) 2011 is to maintain the 20th, 50th and 80th percentiles water quality results in order to preserve or enhance groundwater quality for its recognised uses. These percentiles are available for 'shallow' bores (less than 30m deep) and 'deep' bores (more than 30m deep).

In the case of Isaac groundwaters, these values include aquatic ecosystems, irrigation, farm supply/ use, stock watering, primary recreation, drinking water as well as being of cultural and spiritual value.
The identified Environmental Values (EVs) of groundwater most applicable to Millennium are listed Appendix C, **Table 9** together with the respective water quality guideline or water quality objective (WQO) that applies to the identified EV. The guideline value for each proposed analyte is listed in Appendix C, **Table 10.**

The Millennium Expansion Project Environment Management Plan (Peabody, 2011) found that groundwater is largely associated with the coal seam aquifers and is neutral to alkaline (pH 7.2 to 8.2) and slightly to highly saline (electrical conductivity (EC) 840 to 25,500 µS/cm). There is no realistic re-use value for this groundwater, either for agricultural, domestic, or industrial purposes.

Three main aquifers exist in the MCM area, though they are not hydrologically connected due to large layers of predominantly impermeable overburden separating the seams, as described below:

- unconfined fractured rock aquifers of the Triassic and Permian coal sediments;
- confined aquifers within Permian coal measure sequences; and
- unconfined aquifers in unconsolidated Quaternary sand and gravel alluvium associated with creeks and rivers.

Groundwater monitoring program

The current groundwater monitoring network at Millennium Mine available to assess impacts from the Mavis UG mine is as per the current EA EPML00819213. It is comprised of one groundwater bore targeting the Permian Rangal Coal Measures and six groundwater bores targeting the Permian Fort Cooper Coal Measures. The locations of groundwater bores in relation to Mavis UG area are shown in **Figure 2**, together with the mapped surface geology.

Based on the technical report for the groundwater (**Appendix C**), new EA Tables D1 and D2 have been proposed and as duplicated below in Tables 7 and 8.

Note that the two new additions for the groundwater bores CS_MB2 and CS_VWP1 are located in Carborough Downs Mining Lease. However, Millennium Mine has data sharing agreement (**Appendix D**) with Carborough Downs Mines and will be able to obtain the quarterly results.

To addresses Condition D6 of EA EPML00819213, it is recommended to:

- Expand the coverage of the Mavis UG monitoring network to capture the predicted groundwater drawdown impacts in the areas where potential changes to the groundwater regime can be attributed to Mavis UG mining activities. In particular, the areas related to the low potential terrestrial GDE associated with North Creek and to the Rangal CM (Leichhardt Seam) to the east and north of Mavis Pit should be captured by the Mavis UG monitoring network:
  - Include the piezometer CS_VWP1 and bore CS_MB2 from the Carborough Downs mine groundwater network in the Mavis UG groundwater monitoring network, in order to target the areas listed above; and
  - Undertake logger downloads at CS_VWP1 and manual water level monitoring at CS_MB2 on a quarterly basis.

As part of the full water quality monitoring suite, in addition to collecting field parameters (EC and pH), water samples will be submitted to a NATA accredited laboratory for the analysis of:

- Physiochemical indicators (TDS);
- Major ions (calcium, magnesium, sodium, potassium, chloride, sulphate, bicarbonate and carbonate);
- Total and dissolved metals: aluminium, iron, copper, zinc, silver, arsenic, mercury, antimony, molybdenum and selenium; and
- Total petroleum hydrocarbons (C6-C9, C10-C14, C15-C28 and C29-C36) with silica gel clean-up.

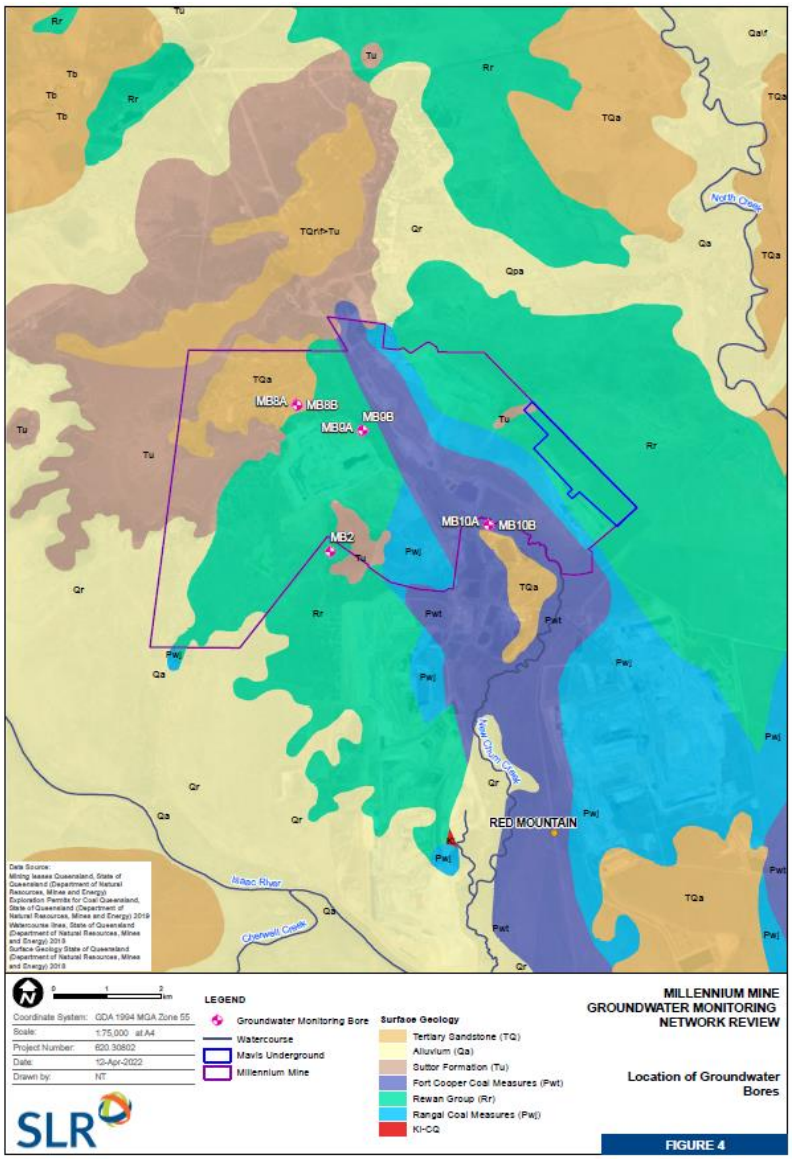

Figure 2: Existing groundwater bore network (SLR, 2023)

Proposed EA condition changes

Proposed groundwater monitoring network and ground water management plan

The proposed groundwater monitoring locations for compliance with the EA to assess impacts of the Mavis UG mine are presented in **Table 7** and **Figure 3.** The locations have been based on the assessment of potential impacts (SLR, 2021) as well as the suitability of the current network and Carborough Downs groundwater monitoring network. **Table 7** presents the groundwater monitoring names with their depth and target aquifer, and locations are shown on **Figure 3**.

For the Carborough Downs monitoring bores, CS_MB2 and CS_VWP1, the proposed monitoring frequency is quarterly. These two bores are monitoring water levels only as per their original purpose.

Justification for the proposed monitoring network is provided in **Appendix C, Sections 3.2.**

Table 7: Proposed new EA Table D1 (SLR, 2023)

Monitoring Site ID	Latitude (GDA 94)	Longitude (GDA 94)	Bore Depth (mBGL[1])	Target Aquifer	Monitoring Frequency	Status	Sampling
MB2	22° 10′ 49″ S	148° 14′ 18″ E	90	Permian Rangal	Quarterly	Existing	SWL
MB8A	22° 00′ 27″ S	148° 14′ 20″ E	30	Fort Cooper CM - Sandstone	Quarterly	Existing	SWL and Quality
MB8B	22° 00′ 27″ S	148° 14′ 20″ E	80	Fort Cooper CM - Sandstone	Quarterly	Existing	SWL and Quality
MB9A	22° 00′ 34″ S	148° 14′ 43″ E	30	Moranbah Coal Seam	Quarterly	Existing	SWL and Quality
MB9B	22° 00′ 34″ S	148° 14′ 43″ E	80	Moranbah Coal Measures Sandstone	Quarterly	Existing	SWL and Quality
MB10A	22° 10′ 33″ S	148° 16′ 00″ E	35	Fort Cooper Sandstone	Quarterly	Existing	SWL and Quality
MB10B	22° 10′ 33″ S	148° 16′ 00″ E	80	Fort Cooper Sandstone	Quarterly	Existing	SWL and Quality
CS_MB2	22° 1' 10"S	148° 17' 16"E	170	Rangal CM (Leichhardt Seam)	Quarterly	**Recommended for inclusion**	SWL only
CS_VWP1	21° 59' 55"S	148° 16' 56"E	196	Sensor 1 - Rewan group Sensor 2 - Permian overburden Sensor 3 - Rangal CM (Leichhardt Seam)	Quarterly	**Recommended for inclusion**	SWL only

1.Metres below ground level
2.MB8A/B could be either attributed to the Rewan Formation or to the overburden of the Rangal Coal measures, to be confirmed with a site geologist (SLR, 2021)
3.SWL= standing water level

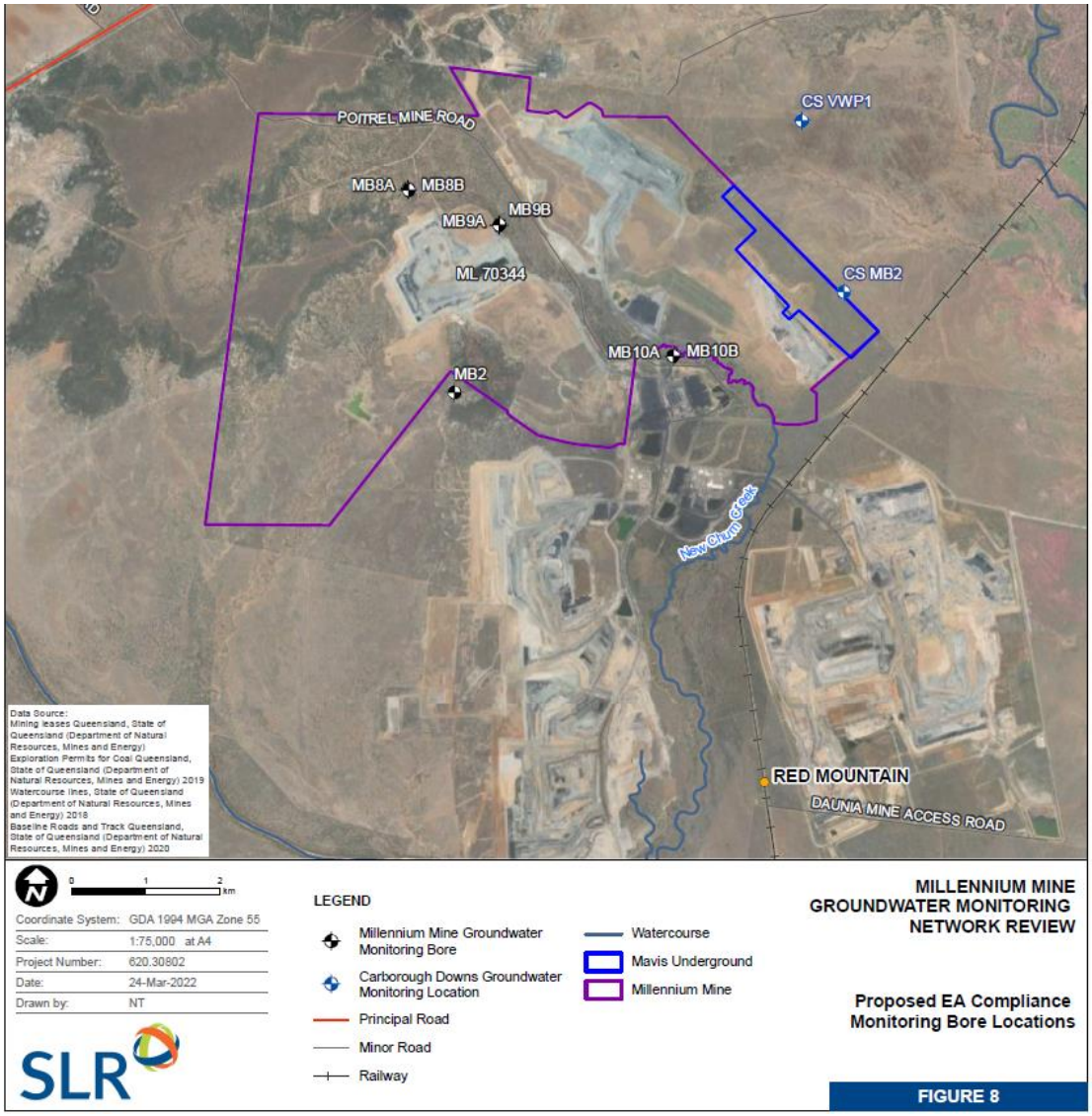

Figure 3: Proposed groundwater bore locations (SLR, 2023)

Groundwater quality parameters

A review of the data collected in the groundwater sampling network was undertaken and opportunities for improvements in data collection were identified. Review findings are presented in **Appendix C, Section 3.4**.

The current EA groundwater quality trigger limits were developed in the early 2010s. Since then, DES has published the guideline *Using monitoring data to assess groundwater quality and potential environmental impacts* (DES, 2021), which describes a more modern approach to derive trigger limits based on monitoring data.

The analytes with their current trigger limit and limit type are listed in **Table 8.** In the last column, a comment has been included on the applicability of the trigger and analytes, in the context of DES (2021). It is proposed to remove trigger limits for major ions (except chloride and sulfate), TDS, total suspended solids (TSS) and chlorine.

It is further proposed to add copper and zinc to the analytes list. The trigger limits for the metals will be derived for the dissolved concentrations.

The final proposed water quality trigger limits are presented in Table 8 with justification provided in Appendix C, Section 4.3. As per the chosen approach (Appendix C, **Section 4.4.2**), three consecutive exceedances would result in a non-compliance and trigger an investigation.

Impact of proposed changes to the groundwater

All items addressed in this supporting documentation were stipulated by the current EA Condition D6:

For the Mavis underground operations, an assessment by an appropriately qualified person must be undertaken to determine the following: a) Number and location of groundwater monitoring sites; b) Suitability of the monitoring network; and c) Groundwater contaminant trigger levels.

Table 9 summarises the predicted impacts of the proposed changes to the network and the trigger limits.

No impacts to the groundwater system are predicted as a result of the proposed EA amendment changes.

Table 9: Detailed environmental impact assessment for groundwater in the proposed amendment.

Condition D6	Impact
Number and location of groundwater monitoring sites	The number of bores was increased by two. In order to avoid any unnecessary disturbance to the groundwater system, the two bores to be included in the network were selected from existing bores of a neighbouring mine. No impacts to the groundwater system are predicted. Millennium Mine has a data sharing agreement in place to receive the data at a regular frequency.
Suitability of the monitoring network	The network was reviewed for suitability. Some bores showed signs of the potential presence of iron bacteria and potential sedimentation (turbid samples). SLR Consulting has recommended to undertake downhole camera investigation, check or iron bacterial and to re-develop the existing groundwater monitoring bores to improve the connection to the screened aquifer section. None of these actions are predicted to have an impact on the groundwater system. The airlifting will produce some groundwater to the surface. The water quality in all bores is unimpacted and as such, no impact to the surface environment is predicted. An exception is the salinity, but given this naturally occurring and they are no sensitive receptors near the bores, no impact is predicted. If the airlift water is a concern, it could alternatively be captured.

Condition D6	Impact
Groundwater contaminant trigger levels.	The groundwater contamination trigger levels were developed based on the DES, 2021 Guideline. Using monitoring data to assess groundwater quality and potential environmental impacts. The methodology allows to set triggers either site based or based on guideline values. This approach results in suitable triggers limits that will pick up any changes in groundwater quality. There are no predicted impacts to groundwater from this change of trigger limits. Rather, they will be more suitable to pick up any impact should they occur.

Table 8: Proposed Trigger Limits for EA Table D2

Water Quality Guideline	Field pH	Field EC	Sulfate as SO4	Cl[1]	Al[1]	Sb[1]	As[1]	Cu[1]	Hg[1]	Mo[1]	Se[1]	Ag[1]	Zn[1]	C6 - C10 Fraction	C10 - C40 Fraction
	pH Unit	(µS/cm)	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	(µg/L)	(µg/L)
MB08B	6.0-7.5	24240	483	8520	0.055	0.009	0.013	0.0014	0.0006	0.034	0.011	below LOR	0.317	20	100
MB09A	6.0-7.5	20329	109	6785	0.055	0.009	0.013	0.030	0.0006	0.034	0.011	below LOR	0.060	20	100
MB09B	6.0-7.5	16000	79	5905	0.055	0.009	0.013	0.0014	0.0006	0.034	0.011	below LOR	0.008	20*	100
MB10A	6.0-7.5	3998	75	789	0.055	0.009	0.013	0.0014	0.0006	0.034	0.011	below LOR	0.060	20	100
MB10B	6.0-7.5	10265	174	5905	0.055	0.009	0.013	0.0014	0.0006	0.034	0.011	below LOR	0.008	20*	100

4 Other considerations

Land

All amendments seeking change (as listed in section 3, Table 4) do not involve any clearing of vegetation or excavation of land. Therefore, no land will be affected as a result of this EA amendment.

Land use

The area surrounding Millennium Mine is classified as "grazing native vegetation" in Queensland Globe (2023). The closest sensitive receptors are shown in Table 7.
This amendment such as the new water quality parameters proposed will not cause any potential environmental harm to the current land uses.

Air and Acoustics

Sensitive receptors in the vicinity of Millennium Mine include individual residences or homesteads as well as the Towns of Moranbah and Coppabella. This is shown in Table 10 below;

Table 10: Nearest sensitive receptors to the Millennium Mine

Sensitive Receptor	Description	Distance and direction from Millennium Mine
Most affected receptors in Millennium's Project EIS		
Annandale	Homestead	6.8 km north-northeast
Moorvale	Homestead	6.3 km north-northeast
Winchester Downs	Homestead	9 km south-southwest
Watonga	Homestead	4.8 km West
Broadlea	Homestead	7.7 km northwest
Other Receptors		
Moranbah	Town	13.8 km west
Coppabella	Town	13.8 km northeast
Wanella	Homestead	15.3 km northeast
Mavis Downs	Homestead	5.7 km east
Daunia	Homestead	8.0 km southeast
Olive Downs	Homestead	9.1 km south-southeast
Coolibah	Homestead	12.0 km southwest
Kurrali Park	Homestead	14.8 km west-southwest
Grosvenor Downs	Homestead	12.8 km west
Moranbah	Homestead	11.1 km west

There are eight main sensitive receptors within 10 km of Millennium Mine. The closest is the Watonga Homestead which is 4.8 km West of the Mine.

All amendments (as listed in Section 3, Table 4) do not involve changes to currently approved activities relating to air and noise values. Therefore, no additional potential environmental harm to air and noise environmental values will be affected as a result of this EA amendment.

Waste

The proposed amendment described in section 3 above is not associated with additional waste generation.

All amendments seeking change (as listed in Section 3, Table 4) do not involve change to currently approved activities relating to waste. Therefore, no change is required to approved waste management practices for Millennium Mine.

Risk and Impact

This amendment as described in section 3 will not be associated with any additional risks and impacts to surface water, groundwater, land, waste and others. Rather groundwater monitoring network will be optimised and in general the EA will be improved.

Management and Mitigation Practices

In general, this amendment is not expected to introduce any additional environmental impact to surface water, groundwater, land, waste, etc. to be managed differently other than the current environmental management practices on site. Therefore, current Environmental management plans and systems will still be relevant and same will be used such as waste management plan, water management plan, Erosion, and sediment control management plan, etc.

Rehabilitation

This requested amendment will not bring any changes to the rehabilitation objectives of the site. Therefore, the existing Rehabilitation Management Plan will still be relevant and remain unchanged as an outcome of the proposed amendments (Section 3, Table 4).

Reef Discharge Standards

The Reef Discharge Standards are described in section 41AA of the Environmental Protection Regulation 2019 and apply to EA applications where there are proposed impacts to the Great Barrier Reef (GBR) catchment waters or other coastal waters from the release of fine sediment and dissolved inorganic nitrogen. The guideline *Reef discharge standards for industrial activities* (ESR/2021/5627) (the Reef Discharge Guideline) describes how the standards will be applied and assessed.

This EA amendment has no impacts to the Great Barrier Reef and therefore Reef discharge standards does not apply to this amendment.

5 Regulatory Requirements

5.1 EA amendment assessment level decision

Under s.228 of the EP Act, the Department as the administering authority, must decide whether the proposed amendment to the EA is a minor or a major amendment.

Reference has been made to the DES Guideline 'Major and minor amendments' (ESR/2015/1684, version 10.01) (DES, 2022). The threshold criteria for a minor EA amendment and their relevance for the proposed EA amendment are described in Table 9.

Based on this analysis, MetRes is of the view that the proposed EA amendment is a 'minor' EA amendment.

Table 9: Minor Amendment Criteria

Minor amendment (threshold) criteria	Proposed Amendment
Is not a change to a condition identified in the authority as a standard condition.	NO There are no standard conditions as the Millennium EA was approved under a site-specific application.
Does not significantly increase the level of environmental harm caused by the relevant activity.	NO As confirmed in Section 3, the proposed amendments will not result in any additional contamination to receiving surface waters, will not result in any additional releases or emissions to groundwater or land, and will not result in any additional environmental harm to air and noise environmental values. This EA amendment will not increase the level of environmental harm caused by the activity. The existing disturbance will not increase by the 10% threshold. Also, as per the SLR report no other significant environmental harm is expected in terms of the groundwater network changes.
Does not change any rehabilitation objectives stated in the authority in a way likely to result in significantly different impacts on environmental values than the impacts previously permitted under the authority.	NO This EA amendment will not change the existing rehabilitation objectives of the Millennium Mine site.
Does not significantly increase the scale or intensity of the relevant activity.	NO The proposed amendment will not introduce any additional disturbance or undermine the monitoring regime of the environmental management requirements.

Minor amendment (threshold) criteria	Proposed Amendment
Does not relate to a new relevant resource tenure for the authority that is- a) a new mining lease; b) a new petroleum lease; c) a new geothermal lease under the Geothermal Energy Act; or d) a new GHG injection and storage lease under the GHG storage Act.	NO This EA Amendment does not relate to a new resource tenure.
Involves an addition to the surface area for the relevant activity of no more than 10 % of the existing area.	NO The proposed amendment will not introduce any additional disturbance of the surface area.
For an environmental authority for a petroleum activity- a) involves constructing a new pipeline that does not exceed 150 km b) involves extending an existing pipeline so that the extension does not exceed 10 % of the existing length of the pipeline.	NO The EA does not relate to a petroleum activity.
If the amendment relates to a new relevant resource tenure for the authority that is an exploration permit or GHG permit – seeks, in the amendment application under section 224, an amended environmental authority that is subject to the standard conditions for the relevant activity or authority, to the extent it relates to the permit.	NO The amendment does not relate to a new resource tenure.

From this self-assessment, the activities relating to the proposed EA amendment (both the amendments to the conditions for compliance under the EA, and minor administrative amendments) are in accordance with a minor amendment application. In addition, consideration of what defines a significant impact has been considered in this supporting documentation to further support this self-assessment for a minor amendment decision level.

Additional consideration is provided below in relation to considerations for a major amendment application as set out in the Department's Guideline 'Major and minor amendments' (ESR/2015/1684 Version 10.01, May 2022). Table 9 demonstrates that the proposed EA amendment does not trigger a major amendment.

Table 10: Major Amendment considerations (DES, 2022)

The following matters will usually be significant, and therefore be assessed as major amendments	Relevance to proposed Amendment
Increasing impacts to Category A or B environmentally sensitive areas	No
Increasing impacts to waters with limited assimilative capacity measured against environmental values and management objectives as prescribed in the Environmental Protection (Water) Policy 2019 (e.g. a discharge to a river which is already not meeting the required water quality objectives prescribed in the Environmental Protection (Water and Wetland Biodiversity) Policy 2019)	No
Increasing impacts to air quality such that the air quality objectives in the Environmental Protection (Air) Policy 2019 may not, or will not be achieved.	No
Increasing noise emissions such that the acoustic quality objectives in the Environmental Protection (Noise) Policy 2019 may not, or will not be achieved	No

The following matters will usually be significant, and therefore be assessed as major amendments	**Relevance to** proposed Amendment
Increasing scale and nature of disturbances by a prescribed activity that will, or are likely to, result in a significant residual impact on a prescribed environmental matter (Note - these changes may trigger a requirement for an offset under the *Environmental Offsets Act 2014*)	No
Diverting a natural watercourse	No
Changing fuel type being used (i.e. from gas to coal or coal to waste)	No
Discharging contaminants directly to groundwater	No
Deeper extraction that intersects groundwater or where the depth of groundwater is not known	No
Increasing the height or area of a mine tailings dam by more than 10% of the existing height or area of that dam	No
Constructing and/or operating a new coal seam gas brine dam	N/A
Using emerging technologies (e.g. a new type of mining)	No
Changes to the final landform design that compromise landform stability and increase erosion potential (e.g. increasing the gradient of final slopes)	No
Changes which are part of staged development	No
A 5% volume increase of waste production with potentially acid forming or neutral mine drainage properties	No
A change in the type of minerals being mined	No
A change of a post-mining land use for an area	No
The addition of a mining lease to an EA, due to the increase in the risk of environmental harm	No
Discharging contaminants which differ to those authorised in the existing EA	No
Increasing emissions to the environment either by substantial volume or concentration or load	No
Changing the final rehabilitation acceptance criteria for an activity to a lower standard such that proposed rehabilitated land has a lower environmental value than that originally authorised in the existing EA	No
Moving a contaminant release location to a place with different environmental values	No
Using different industrial processes which will result in different emissions and impacts which are not authorised by the EA	No
Changing the design of an engineered capping layer to be installed over a waste rock dump	No
Increasing annual throughput for the relevant activity beyond that authorised in the existing EA	No
Increasing the quantity of chemicals, hazardous materials or wastes stored on the site beyond that authorised in the existing EA	No
Increasing operating hours into evening hours and Sundays where not previously authorised in the existing EA and the site of the activity(ies) is within close proximity to sensitive receptors.	No

5.2 Public Notification

Section 230 of the EP Act states the circumstances for when public notification may apply to major EA amendments. Given that this EA amendment is likely to be a minor amendment it is anticipated that no public notification will be required.

References

Application requirements for activities with impacts to air (ESR2015/1840, version 4.04) (DES, 2021a);

Application requirements for activities with impacts to land (ESR/2015/1839, version 4.03) (DES, 2021b);

Application requirements for activities with impacts to water (ESR2015/1837, version 4.04) (DES, 2021c);

Application requirements for activities with noise impacts (ESR2015/1838, version 3.06) (DES, 2022a);

Application requirements for activities with waste impacts (ESR2015/1836, version 5.02) (DES,2021d); and

Requirements for site-specific and amendment applications – underground water rights (ESR/2016/3275, version 1.03) (DES, 2021).

Groundwater Network and Trigger Review Report for Millennium Mine, (SLR, 2023).

Appendix A: C&R Consulting Background review

Appendix B: C&R Consulting. Environmental Authority Table C2 and Table C7 Amendment. Memo. 31 January 2023.

Appendix C: SLR Consulting Australia Pty Ltd. Groundwater Network Review and Trigger Assessment. February 2023. Reference: SLR Ref No: 620.30802.00000-R02-v3.0-20230202

Appendix D: Data sharing agreement with Carborough Downs Mines