

GEMINI PROJECT
EA Application: Information Request

PREPARED FOR
MAGNETIC SOUTH PTY LTD

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BRISBANE OFFICE
Suite 5, 1 Swann Road
Taringa, QLD 4068
P +61 7 3217 8772

CAIRNS OFFICE
PO Box 4887
Cairns, QLD 4879
P +61 7 4057 9402

E info@aacrc.net.au
AARC.NET.AU
ACN. 620 818 920
ABN. 71 620 818 920

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Author:	Ellie Furlong
Project Manager:	Heath Carney
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LIST OF ABBREVIATIONS

AARC	AARC Environmental Solutions Pty Ltd
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
AQMP	Air Quality Management Plan
BoM	Bureau of Meteorology
Cd	Cadmium
CEC	Cation Exchange Capacity
CHPP	Coal Handling and Preparation Plant
CO ₂	Carbon Dioxide
Cr	Chromium
Cu	Copper
Cwlth	Commonwealth
DES	Department of Environment and Science
EP	Equivalent Person
ESP	Exchangeable Sodium Percentage
EVNT	Endangered, Vulnerable and Near Threatened
GDE	Groundwater Dependent Ecosystem
GHG	Greenhouse Gas
GIS	Geographical Information System
LOR	Limit of Reporting
MEDLI	Model for Effluent Disposal through Land Irrigation
MIA	Mining Infrastructure Area
MLA	Mining Lease Application
PMLU	Post-mine Land Use
PPE	Personal Protection Equipment

QLD	Queensland
REMP	Receiving Environmental Monitoring Program
ROM	Run-of-Mine
Se	Selenium
SILO	Scientific Information for Land Owners
SMU	Soil Management Unit
STP	Sewage Treatment Plant
TARP	Trigger Action Response Plan
TLO	Train Load Out
TPH	Total Petroleum Hydrocarbons
TRH	Total Recoverable Hydrocarbons
TSP	Total Suspended Particles
WQO	Water Quality Objectives
Zn	Zinc

1.0 RESPONSE TO INFORMATION REQUEST

The Gemini Project is a greenfield, open-cut metallurgical coal mine project, which will produce pulverised coal injection (PCI) coal and coking coal for export to the international steel making industry. The Project will be developed and managed by Magnetic South Pty Ltd, a private Australian based company which was founded in 2006. The executive team of Magnetic South has some 60 years' experience in the development and operation of metallurgical coal assets and agribusiness in central Queensland.

The Project is located in the Bowen Basin, approximately 110 km east of Emerald and 125 km southwest of Rockhampton, in central Queensland. Blackwater, a larger town serving mines in the region, is located approximately 34 km to the west.

An application for a site-specific environmental authority was submitted by Magnetic South on 23 October 2019. The application reference number is APP0043095. The administering authority considered the EA application, and issued Magnetic South with an information request on 31 January 2020.

In response to the information request, additional environmental assessments have been undertaken, and the EA Application Supporting Document has been revised, along with several of the specialist environmental assessments that form the Appendices to the Supporting Document.

The purpose of this document is to provide a summary of the revisions to the environmental assessments, specifically addressing each of the issues raised in the information request, and directing the administering authority to where these issues have been addressed in the *EA Application: Revised Supporting Information* document.

Table 1 Gemini Project Response to Information Request

Issue No.	EA Application Chapter /Section	Regulator Comment	Information Requirement	Magnetic South Response
Infrastructure				
1	Supporting information Section 3.3 Construction	It has been stated that site preparation will include the clearance of vegetation. Address the requirement for protected plant clearing permits under the <i>Nature Conservation Act 1992</i> .	Provide further detail regarding vegetation clearing and the potential additional requirements under the <i>Nature Conservation Act 1992</i> .	<p>Under the <i>Nature Conservation Act 1992</i>, it is an offence to clear protected plants that are ‘in the wild’ unless the clearing is authorised or ‘exempt’ (Section 89 of the <i>Nature Conservation Act 1992</i>). Areas shown on the map as high risk are subject to particular requirements under Queensland legislation (DES 2019a).</p> <p>A protected plants flora survey trigger map identifies high risk areas where Endangered, Vulnerable, and Near Threatened (EVNT) plants are known to exist or are likely to exist.</p> <p>Areas that fall within the high-risk area but not within 100m of EVNT plants can be cleared under exemptions. An Exempt clearing notification (Protected plants) will need to be lodged to notify the Department of Environmental and Science (DES) of clearing which is exempt from the requirement of a permit under Section 261ZA of the <i>Nature Conservation (Wildlife Management) Regulation 2006</i>.</p> <p>Any clearing of a species listed as EVNT under the <i>Nature Conservation Act 1992</i>, or within 100m of EVNT species, will require approval under the Queensland protected plants legislative framework. A protected plant clearing permit is required under Section 283 of the <i>Nature Conservation (Wildlife Management) Regulation 2006</i> for any vegetation clearing of an area containing EVNT species.</p> <p>It should be noted that to obtain a clearing permit or an exemption, a specific flora survey in accordance with the flora survey guidelines (DES 2020a), has to be conducted by a suitably qualified person. A suitably qualified person is typically an ecologist or botanist who meets the qualifications, experience and skills set out in the flora survey guideline (DES 2020a). A flora survey report needs to be submitted to the DES within a year of the completion of the survey and not earlier than 2 year before the clearing takes place.</p> <p>The protected plants flora survey trigger map is reviewed and subsequently updated (when necessary), at least every 12 months to reflect the most up to date data available (DES 2019b). A flora survey trigger map will be consulted before fieldwork to reflect the recent update undertaken by the DES.</p>
2	Supporting information Section 3.3.1 Mine Access Road – Figure	Within Figure 9, it has been stated that there is an “area to be cleared to ensure SISD (Safe Intersection Sights Distance) is achieved.” It has also been stated that the existing culvert is to be extended.	Provide further information as to the vegetation type and potential impact as a result of the proposed clearing works to allow for	The vegetation within Section 3.3.1, Figure 9 of the <i>EA Application: Revised Supporting Information</i> document) representing the Mine Access Road has been assessed as a combination of non-remnant and Vegetation Community 1. This vegetation community is associated with Regional Ecosystem 11.5.2, <i>Eucalyptus crebra</i> , <i>Corymbia</i> spp., with <i>E. moluccana</i> woodland on lower slopes of Cainozoic sand plains and/or remnant surfaces. Regional Ecosystem 11.5.2 is listed as Least Concern under the

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	9 Conceptual design - Mine access road intersection	There is no detail regarding the vegetation type proposed to be cleared in this area. The potential impacts of extending the existing culvert have not been addressed.	SISD and extending the culvert.	<p><i>Vegetation Management Act 1999</i> and no EVNT species have been found during field surveys in this area. No prescribed matters and therefore no potential significant residual impact have been identified as a result of the proposed clearing works.</p> <p>Further, the area does not fall within a protected plants flora survey trigger map. A protected plants flora survey trigger map identifies high risk areas where EVNT plants are known to exist or are likely to exist. For areas outside of high-risk areas identified on the protected plants flora survey trigger map, clearing can be undertaken without a prior flora survey, protected plant clearing permit, or notification to the department (DES 2019a).</p>
3	Supporting information Section 3.3.3 CHPP, Stockpiles and overland Conveyor and Figure 13 Conceptual design - Conveyor crossing (Capricorn Highway)	It has been stated that “The conveyor will be constructed to pass over both the Capricorn Highway and the Blackwater Railway.” The impacts of the conveyor over the highway (specifically visual amenity) have not been addressed. Visual amenity impacts of the conveyor on a nearby residential dwelling have been marginally addressed.	Address the potential impacts of the overland conveyor crossing over the Capricorn Highway and the impacts on sensitive receptors.	<p>A <i>Visual Amenity Assessment</i> was undertaken by AARC Environmental Solutions Pty Ltd (AARC) and has assessed the potential impacts of the overland conveyor (AARC 2020a). Based on this assessment, it was concluded that the conceptual design details (i.e., minimum height elevation of 7 m and 10 m in length across the Capricorn Highway) would result in a visual impact similar to that of the existing conveyor across the Capricorn Highway at Boonal, approximately 28 km west.</p> <p>Visual simulations of the overhead conveyor were not considered necessary from the selected vantage points as the conveyor is not expected to be visible from nearby local residences, or sensitive receptors. The closest residential dwelling is located 800 m east of the Train Load Out (TLO) facility and 2.9 km east of the overhead conveyor on the Ellesmere property. This property is owned by the proponent and will be vacated prior to the commencement of operations. A nearby accommodation facility is also located 2.9 km to the west and would be occupied during operations. Local topography, along with the retention of existing vegetation, outside the disturbance footprint, would provide natural screening to obscure any visual modification in either direction the conveyor might potentially impose.</p> <p>As a result, the visual impact from the overhead conveyor would be limited to a short-term exposure of road users passing through the landscape periodically. Due to the close proximity of the visual modification across the transport line, the visual sensitivity of a main road was therefore considered to be moderate. Visual exposure would comprise industrial framing, an enclosed belt crossing and light pollution during night hours. In this instance, the expected visual modification is considered moderate and consequently, the overall visual impact of the overhead conveyor would therefore be moderate.</p> <p>Further mitigation measures to reduce impacts on visual amenity are provided in Section 5.4.2 of the <i>EA Application: Revised Supporting Information</i> document).</p>
4	Supporting information Section	In Section 3.4.3.1 it has been stated that the temporary levee will be constructed to provide protection from a 0.1% AEP	Provide further information as to the levee design and function in accordance	The levees will be ‘regulated structures’ and will be designed, constructed and decommissioned in accordance with the ‘Manual for assessing consequence categories and hydraulic performance of structures (ESR/2016/1933)’ and ‘Structures which are dams or levees constructed as part of

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	<p>3.4.3.1 Temporary Flood Protection Levee</p> <p>Section 4.3.4 Final voids</p>	<p>flood event, and that the levee will be from 1.21 to 2.37 metres high.</p> <p>Section 4.3.4 has stated that “Perimeter drainage will be provided to limit the volume of surface water runoff, including modelled 1:1000 storm events, from entering the (final) voids”.</p> <p>It is not clear from Sections 3.4.3.1 and 4.3.4 of the whether the 1:000 AEP Flood Protection Levee around Pit AB is only a temporary structure or is also part of the perimeter drainage plan for final closure, providing flood immunity for the final void up to the level of a 1:1000 AEP flood.</p> <p>Regulated structures (including diversions) are required to be designed, constructed and decommissioned in accordance with the Departmental Guidelines, ‘Manual for assessing consequence categories and hydraulic performance of structures (ESR/2016/1933)’ and ‘Structures which are dams or levees constructed as part of environmentally relevant activities (ESR/2016/1934)’.</p>	<p>with Departmental Guidelines, including the structure requirements at closure and after relinquishment. Ensure sufficient details are provided for mass (slope) stability, erosional potential, scouring potential, settlement, safety and future land use suitability once decommissioned.</p>	<p>environmentally relevant activities (ESR/2016/1934)’. The design height of the levee ranges from 1.21 m to 2.37 m, determined by the modelled flood height, plus 0.5 m freeboard.</p> <p>The levee will be reinforced by in-pit rock dumps as mining progresses. The levee structure would be temporary, required only until the final overburden profile is achieved and the associated permanent drainage systems commissioned. The final voids are located and designed such that they are not inundated by flooding in the probable maximum flood. Accordingly, no flood levee will be required to prevent inundation of the final void. The levee constructed to protect the operational pit would not be required post-mining, and would therefore be decommissioned or form part of the rehabilitated dump</p> <p>Section 3.4.3.1 of the <i>EA Application: Revised Supporting Information</i> document has been updated with this additional information, along with a plan and longitudinal section of the levee (Figure 16), and a typical cross-section (Figure 21).</p>
5	Supporting information Section 3.4.3.2 Clean water drains	The engineered ‘drainage features’ do not meet the definition of a drainage feature under the <i>Water Act 2000</i> . How will mine affected water (MAW) or contaminated water be prevented from entering into the unaffected water	<p>Provide further information and a conceptual design of any proposed drainage feature diversions.</p> <p>Provide further information as to the design and</p>	<p>Additional preliminary design details have been included in Section 3.4.3.2 of the <i>EA Application: Revised Supporting Information</i> document, and Section 7 of the <i>Surface Water Impact Assessment</i> (Appendix B of the <i>EA Application: Revised Supporting Information</i> document).</p> <p>The engineered drainage features will be required throughout operations at each mine pit and will become permanent features at mine closure. The permanent channels will be designed to be self-sustaining features of the local surface water environment. It is therefore proposed that the design of</p>

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		<p>system? Are the proposed structures temporary or permanent?</p> <p>Regulated structures (including diversions) are required to be designed, constructed and decommissioned in accordance with the Departmental Guidelines, 'Manual for assessing consequence categories and hydraulic performance of structures (ESR/2016/1933)' and 'Structures which are dams or levees constructed as part of environmentally relevant activities (ESR/2016/1934)'.</p>	<p>function of the 'drainage features' in accordance with Departmental Guidelines, including the structure requirements at closure and after relinquishment.</p> <p>Provide further information on whether the proposed infrastructure is temporary or permanent. If permanent discuss residual risks and relinquishment upon surrender.</p>	<p>the drains will take into account key design principles and requirements for the functionality of permanent diversions, including for operations, maintenance, monitoring and revegetation.</p>
6	Supporting information Section 3.4.3.3 Water storages	Risk of water storages (regulated structures) overtopping or failing, as well as the potential impacts and mitigation have not been discussed.	Provide information regarding the risk of regulated structures failing or having inadequate freeboard to contain site waters, MAW and the potential impacts on environmental values.	<p>A Preliminary Consequence Category Assessment has been included in Section 3.4.4 of the <i>EA Application: Revised Supporting Information</i> document with more detailed discussion of the assessment protocols and criteria provided in Section 5.5 of the <i>Surface Water Impact Assessment</i> (Appendix B of the <i>EA Application: Revised Supporting Information</i> document).</p> <p>The coal handling and processing plant (CHPP), mining infrastructure (MIA), Dams, Raw Water Dam and Sediment Dams are all considered to be of 'Low' consequence, with the main Mine Water Dam and Levee assessed as 'Significant' category.</p>
7	Supporting information Section 3.5.3 Sewerage	In relation to the release of treated effluent to land, the application states that the design of the system will ensure no runoff from the disposal area occurs.	<p>Further information is to be provided on the following:</p> <ul style="list-style-type: none"> Any predicted overflows to the environment from any storage needs to be justified in terms of environmental impact. 	<p><i>A Model for Effluent Disposal through Land Irrigation</i> (MEDLI) was used to assess the suitability of dispersal in the surrounding area (Appendix N of the <i>EA Application: Revised Supporting Information</i> document). The MEDLI modelling exercise confirmed that by applying a scheduled 2 mm/day over 3.8 ha in mine construction phase and 1.9 ha in mine operation phase, no overflow events would occur.</p> <p>Although the model indicated that effluent irrigation could occur every day, in day to day operations there are times when irrigation should not occur. Such events would include during substantial rain events when the ground is showing signs of saturation (such as surface water pooling).</p> <p>In order to account for such events, 3 days of wet weather storage (in tanks) were accounted for in the model as is recommended in the <i>QLD Government Technical Guideline For Disposal of Effluent via Irrigation</i>. As a result, at least 168 m³ tank capacity will be available.</p>

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			<ul style="list-style-type: none"> The assessments should be carried out for the proposed and future effluent disposal rates. 	Assessments have been based on a construction phase (accommodating up to 280 persons) and the operational phase (accommodating up to 140 persons).
			<ul style="list-style-type: none"> Description of management measures to be implemented to ensure the irrigation of effluent does not exceed water holding capacity of the soil or the uptake capacity of the crop (that may, as a consequence, result in water logging, surface runoff or excessive deep drainage). 	<p>In the absence of site-specific soil sample data, the assessment was informed by the <i>Soil and Land Suitability Assessment</i> (Appendix I of the <i>EA Application: Revised Supporting Information</i> document) to analyse the response based on modelling of extremely conservative soil types. One being an extremely permeable sand, and the other being an extremely impermeable clay.</p> <p>The design irrigation rate and area and chosen pasture were sufficient to prevent waterlogging, surface runoff or excessive deep drainage in either extreme soil type. This has been validated through the MEDLI model as shown in Appendix N of the <i>EA Application: Revised Supporting Information</i> document.</p>
			<ul style="list-style-type: none"> Description of the capacity of the vegetation and soils in the irrigation area(s) to assimilate these salts on a long-term sustainable basis. 	Rhodes grass was assumed to be the pasture which will be irrigated on site. Modelling using Rhodes Grass (moderately salt-tolerant) indicates the resulting salinity would be too low to impact upon the health of the grass. The proportion of years that crop yields would be expected to fall below 90% of potential due to salinity (fraction) was 0% for both construction and operations.
			<ul style="list-style-type: none"> Description of irrigation application method and scheduling (triggered). 	<p>Application will be undertaken in accordance with '<i>AS/NZS 1547:2012 On-Site Domestic Wastewater Management</i>' through a spray irrigation system method. The pump system and pipeline will contain a separate effluent chamber with storage volume to match the electrical starting requirements of the irrigation pump motor. Additionally, a discharge capability of at least 50% more than the maximum 30-minute flow rate and capacity to withstand at least 150% of the shut-off head of the pump. The selected spray-irrigation system will evenly distribute effluent and control the droplet size, throw, and plume through the use of coarse spray heads suitable for effluent application.</p> <p>Given the designated irrigation site is isolated and significant in size, management would only warrant a secondary treatment quality to contain negligible risk of human exposure, aerosol drift and odour nuisance to offsite locations. The following management measures will be implemented to ensure the</p>

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				<p>limits identified in the <i>National Guidelines for Water Recycling</i> of Appendix N (Table 9-1) in the <i>EA Application: Revised Supporting Information</i> document are achieved:</p> <ul style="list-style-type: none"> • no access during and after irrigation, until dry (1-4 hours); • spray drift control (low-throw sprinklers - 180° inward throw); • restricted irrigation when wind direction is not favourable, or temperature inversions present; and • irrigation timing during the day when residents are not localised.
			<ul style="list-style-type: none"> • Description of risks of human exposure from irrigation of effluent or aerosol drift. 	<p>The adopted irrigation application regime described in issue number 7 combined with the achieved setback distances as recommended by the <i>QLD Government Technical Guideline For Disposal of Effluent via Irrigation</i> finds the risk of aerosol drift negligible.</p> <p>Section 9.1 of Appendix N of the <i>EA Application: Revised Supporting Information</i> document has been updated to provide further details on the risk of aerosol drift.</p>
			<ul style="list-style-type: none"> • Description of risks aerosol drift to off-site locations and cause odour nuisance. 	<p>The adopted irrigation application regime described in issue number 7 combined with the achieved setback distances as recommended by the <i>Qld Government Technical Guideline For Disposal of Effluent via Irrigation</i> finds the risk of odour negligible.</p> <p>Section 9.2 of Appendix N of the <i>EA Application: Revised Supporting Information</i> document has been updated to provide further details on the risk of odour.</p>
			<ul style="list-style-type: none"> • Description of buffer zones from all sensitive receptors to the irrigation area and sewage treatment plant. 	<p>The irrigation management area is close to the primary source of domestic wastewater (accommodation facilities) and domestic wastewater from the MIA can be practically pumped to this location.</p> <p>The following buffer zones will be adopted in accordance with the <i>Qld Government Technical Guideline For Disposal of Effluent via Irrigation</i> to ensure environmental care and exposure to all sensitive receptors is negligible:</p> <ul style="list-style-type: none"> • natural waterways >100 m; • residential facility or public amenities >50 m; • domestic water bore > 250 m; • drinking water catchment and aquatic ecosystems with high ecological value > 250 m; • town water supply bore > 1000 m; • groundwater bore used for potable water supply >250 m; and • groundwater table at a depth >3 m. <p>How these buffer distances will be achieved is shown in Figure 12-1 of Appendix N of the <i>EA Application: Revised Supporting Information</i> document.</p>

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8		<p>It has been stated that the proponent will operate a sewage treatment plant (STP) located at the accommodation facility. This STP will have a maximum capacity of 140 equivalent person (EP). The expected workforce at the site accommodation is about 140 persons in “normal” conditions, the accommodation facility will be constructed to accommodate up to 280 persons (see page 54 of the Supporting Information report).</p>	<p>Justify the proposed capacity of 140 EP given the accommodation capacity. Consideration to contingencies following a STP failure event and maintenance issues in line with risks noted in the above requirement should be provided.</p>	<p>The sewage treatment plant (STP) has been assessed to cater for the accommodation facilities under two conservative scenarios (i.e., maximum equivalent persons (EP) capacity during construction of 280 EP = 56,000 L/day and during operations of 140 EP = 28,000 L/day.</p> <p>It is however unlikely that all 280 workers will all be on site on a given day and generate their entire volume of wastewater, as many may utilise off site accommodation facilities. Therefore, estimates are conservative and cater for a greater risk.</p> <p>Section 4.1 of Appendix N of the <i>EA Application: Revised Supporting Information</i> document has been updated to provide further details.</p>
9	<p>Additional information - Requirements for effluent release to land</p>	<p>As the proposed activity involves the release of treated effluent to land, the following should be submitted in relation to effluent sources and type:</p> <ul style="list-style-type: none"> • Type of treatment applied – include description of treatment process, design details including size/volumes, peak design capacity of the sewage treatment system. • Quantity, description of average and maximum wastewater flows. Also include dry versus wet weather period over time. • Quality (key contaminants of concern), describe and quantify the concentrations of key contaminants including total nitrogen, total phosphorous, electrical conductivity/total dissolved salts and sodium/sodium absorption ratio. • Include average and maximum concentrations of treated effluent generated at the site. • Quality (other contaminants) – provide a risk assessment of other 	<p>Address the effluent sources and type in relation to the releases of treated effluent releases.</p>	<p>During both construction and operation phases, workers will generate domestic wastewater from accommodation, offices, and facilities. The wastewater will include material which is generated from the following:</p> <ul style="list-style-type: none"> • toilets (often classed as black water); and • showers, kitchen facilities and laundry (often classed as grey water). <p>In accordance with the Environmental Protection Regulation 2019, wastewater has been estimated using each worker as an EP with each EP generating 200 L/day. During construction, a total of 280 workers (280 EP) will be onsite and generate their total maximum volume of 56, 000 L/day. During operations, only 140 workers (140 EP) will be present onsite and will generate their total maximum volume of 28, 000 L/day.</p> <p>All domestic wastewater will be channelled to a single treatment plant and disposal area. The sewage treatment plant has been designed for a 280 EP maximum capacity with a closed wet weather storage tank designed for a three-day maximum capacity (168m³) before any overflow events would occur. The proposed method e.g., daily irrigation rate (2mm/day) will maintain a consistent wastewater flow rate determined based on local weather patterns (wet and dry periods) and soil conditions.</p> <p>Conservative assumptions on the treated wastewater quality have been provided in Section 4.2 of Appendix N of the <i>EA Application: Revised Supporting Information</i> document and are anticipated to achieve the target objectives set out in the <i>National Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 1) 2006</i>. The quality is reflective of a standard secondary treated effluent. Once further detailed designs are available for the irrigation regime, more specific treated effluent quality data can be estimated.</p>

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		contaminants including Heavy metals, Pharmaceuticals, Toxins, Pathogens including E.coli and quantify of treated effluent generated at the site.		The risks associated with contaminants such as pathogens, odour, toxicants have been discussed in Section 9 of Appendix N of the <i>EA Application: Revised Supporting Information</i> document. Majority of risk management measures are based upon exposure reduction measures (i.e., lessening aerosol production via spray method, irrigation timing and use of buffer zones). These risks are considered negligible and easily managed using the irrigation application regime described in issue number 7.
10		<p>No standard conditions apply to STPs of more than 100 EP.</p> <p>As the proposed activity involves the release of treated effluent to land, identify the location of effluent discharge (irrigation scheme) and include a layout plan showing:</p> <ul style="list-style-type: none"> property boundaries; proposed irrigation area boundary, location of any wet weather storage infrastructure, sampling and discharge points including GPS Co-ordinates (Latitude, Longitude) and Elevation; topography including drainage lines, water courses or any 'waters'; any sensitive receiving environments such as sensitive / high ecological value areas in close vicinity of the irrigation scheme; and any buffer distances to any sensitive receivers. <p>As the proposed activity involves the release of treated effluent to land, the following should be submitted in relation to historic climate data for area used for designing the scheme:</p> <ul style="list-style-type: none"> Provide a description of most locally relevant climate data, weather 	<p>Additional information such as disposal area and size, wet weather storage capacity is required along with an appropriate risk assessment of the potential impact of this activity to the relevant environmental values. The STP capacity, disposal area location and size as well as the wet weather storage capacity should be included in the proposed conditions.</p> <p>Address historic climate data to support the proposed irrigation scheme.</p>	<p>A layout plan of the proposed irrigation scheme is illustrated in Appendix F attached to, Appendix N of the <i>EA Application: Revised Supporting Information</i> document.</p> <p>The proposed irrigation management area boundary (approximately 195m x 195m) is located at the following GPS points:</p> <ul style="list-style-type: none"> northwest (E 726480.51, N 7384618.95); northeast (E 726678.87, N 7384618.95); southwest (E 726480.51, N 7384427.74); and southeast (E 726678.87, N 7384427.74). <p>The irrigation management area is positioned within the north-western portion of the mining lease and south of the Capricorn Highway and rail line. This area is close to the primary source of domestic wastewater (accommodation facilities) and accessible from the proposed camp access road. The wet weather storage capacity will be located at the sewage treatment plant, anticipated to hold 3 days storage capacity (168m³). Sampling and discharge points will be determined during the detailed design phase.</p> <p>The reasonably flat nature of the designated area and distance from significant watercourses is ideal for irrigation. The topography falls in a north to south direction. The irrigation area lacks any significant drainage lines / watercourses and sits on the divide between the catchment of Stanley Creek towards the north and the catchment of Charlevue Creek to the south. Two minor drainage lines off Charlevue Creek are present to the east and west of the irrigation management area. Stanley Creek and Charlevue Creek are highly ephemeral flowing only after substantial rainfall events. The area has already been cleared and therefore contains limited ecological value.</p> <p>Sufficient buffers from sensitive receivers such as waterways, ecosystems, and the residents/mining camp listed in Section 3.5.3.1 of the <i>EA Application: Revised Supporting Information</i> document are maintained.</p> <p>Climate data was obtained from the Queensland Government Scientific Information for Landowners (SILO) for the closest grid point (-24.55, 149.25). The site has a relatively dry climate, with evaporation</p>

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		<p>patterns which can be obtained from Silo DataDrill (web link) data.</p> <ul style="list-style-type: none"> Provide a description of the frequency of inundation in the area and assess if this is a risk. The location of the sewage treatment plant and any other high-risk areas of the activity should be located above the Q100 floodplain. 		<p>rates exceeding rainfall throughout the year. A distinctive dry/wet season pattern is observed, whereby the winter period from April to September is traditionally dry, with higher rainfall (typically from storms) received over the summer months from September to January. Even during the wet season, the evaporation rates still exceed rainfall rates. Detailed illustrations of SILO data is provided in the Section 2.2 of the <i>EA Application: Revised Supporting Information</i> document.</p> <p>A review of the Central Highlands Regional Council Flood Hazard Overlay indicates that the area and the greater proposed mine are located a substantial distance away from Q100 floodplain based on the 1% Annual Exceedance Probability (AEP) + climate change allowance.</p>
11		<p>As the proposed activity involves the release of treated effluent to land, the following should be submitted in relation to the soil characteristics of the proposed effluent irrigation area and the site suitability. Based on site investigation and available data, provide the following:</p> <ul style="list-style-type: none"> description of soil profile including erodibility, texture, structure, impermeable layers and any evidence of rising water table: <ul style="list-style-type: none"> hydraulic properties: <ul style="list-style-type: none"> moisture content at field capacity, permanent wilting point and saturation saturated hydraulic conductivity chemical properties: <ul style="list-style-type: none"> nitrogen content, especially organic nitrogen; phosphorus content; phosphorus sorption capacity; exchange sodium percentage; background concentration of any contaminants; proposed vegetation for effluent irrigation area: 	<p>Describe the soil characteristics of the proposed effluent irrigation area.</p>	<p>In the absence of site-specific soil sample data, soil characteristics have been informed by the <i>Soil and Land Suitability Assessment</i> (Appendix I of the <i>EA Application: Revised Supporting Information</i> document) to analyse the response to extremely conservative soils. One being an extremely permeable sand, and the other being an extremely impermeable clay.</p> <p>As a result, interpolation of the assessment indicates the irrigation area is within the Soil Management Unit (SMU) defined as the Geoffrey SMU which covers approximately two thirds of the mining lease. The Geoffrey SMU consists of texture contrast soils (loamy sands to sandy light clays) with soft surface conditions, associated with undulating plains and rises. Where these soils are exposed, extensive washouts and large erosion gullies occur. Overland flow has removed coarse sandy material, leaving the easily eroded clays exposed to surface runoff. The permeability of the soil profile is very slow, with a moisture content percentage of 0.8 % - 9 %.</p> <p>The chemical and physical properties of the soil profile pH are described as moderately acidic in the upper loamy profile (5.8-6), with a sudden shift to weakly alkaline in the underlying clay profile (8.1). An increased cation exchange capacity (CEC) was observed at greater depths (0.4 – 8.8 meq / 100g) and also a general increase in salts, as is evident in the higher EC (0.004 – 0.137), chloride and sodicity in the bottom clay layer. Exchange sodium percentage ranges from non-sodic in the upper profile (1 – 1.8%) to strongly sodic in the lower profile (22.1%).</p> <p>Topsoil nutrients are generally quite limited with nitrate (3 mg/kg), phosphorous (8 mg/kg) and potassium (<200 mg/kg) below desirable levels. Boron (0.2 mg/kg) and sulphate (<10 mg/kg) are also lower than guideline recommendations for suitable plant growth medium. For extractable metals, manganese (16.0 mg/kg) and zinc (2.16 mg/kg) are within the desirable range, though iron (166 mg/kg) is elevated, and copper (<1.0 mg/kg) is below reportable levels. The nature of the soil is generally supportive of spray irrigation, though the sodicity in the lower soil profile will need to be managed to ensure the soil does not become dispersive.</p>

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		<ul style="list-style-type: none"> ○ species of plant cover; and • Management of plant biomass. It is department's expectation the plant biomass be cut and removed from the irrigation/ disposal area. 		<p>The proposed vegetation for the effluent irrigation area has been modelled using Rhodes Grass. The MEDLI model indicates that mowing (with removal of clippings) would only be required approximately 3 times per year to maintain sufficient growth and subsequent nutrient uptake. Modelling indicates that plant biomass is unlikely to be impacted by the irrigation of effluent and sufficient setbacks would be appropriate to manage any impacts.</p>
12		<p>As the proposed activity involves the release of treated effluent to land, the following should be submitted in relation to groundwater:</p> <ul style="list-style-type: none"> • Presence of groundwater or temporary perched water tables, levels over time and background water quality. • Any risk of effluent reaching groundwater. 	<p>Describe the impacts to groundwater of the proposed treated effluent release.</p>	<p>The closest registered bore (RN122470) indicates that the regional groundwater table may be present at approximately ~ 46 m below ground level. Estimated depth is within the suitability selection criteria of greater than 1.2m recommended by the <i>AS/NZS 1547:2012 On-Site Domestic Wastewater Management</i>. QLD Government groundwater dependent ecosystem (GDE) mapping indicates a potential (low level confidence) GDE may be present in the riparian zone around Stanley Creek. Detailed groundwater quality and background levels are provided in Section 8.2 of the <i>EA Application: Revised Supporting Information</i> document.</p> <p>Elevated levels of nitrogen can be leached into the groundwater table when more nitrogen is added than removed to the soil (i.e., heavy rain periods). Modelling of the designed irrigation rate, area and chosen pasture resulted in negligible concentrations of nutrient leaching in either extreme soil type. Results for construction and operational scenarios indicate the average nitrate is predicted to leach 0.17 kg/ha/year via deep drainage during extremely impermeable conditions and during extremely permeable conditions an average of 1.29 kg/ha/year. These findings are well within the accepted limit of 5 kg/ha/year.</p> <p>The irrigation scheme will still need to be managed via use of an appropriate irrigation rate and set back distances to minimise any impact on groundwater and any potential GDEs. These are detailed in Section 3 and Section 12 of the <i>EA Application: Revised Supporting Information</i> document.</p>
13		<p>As the proposed activity involves the release of treated effluent to land, the following should be submitted in relation to the irrigation management area:</p> <ul style="list-style-type: none"> • irrigation regime proposed (how irrigation is triggered and applied); • irrigation method and infrastructure required; and 	<p>Describe the proposed irrigation management area.</p>	<p>In accordance with <i>AS/NZS 1547:2012 On-Site Domestic Wastewater Management</i>, the irrigation regime comprises a set daily irrigation rate and does not require trigger limits. The infrastructure required will include a sewage treatment plant, a wet weather storage tank, closed pond, pump system, pump chamber, pipeline, flush and release valve, supply header and secondary treatment unit. The STP will operate a membrane bioreactor with an appropriately sized pump station to minimise the retention of raw sewage to less than eight hours to mitigation potential odour and volatile organic compounds.</p> <p>The irrigation layout is shown in Appendix F attached to Appendix N of the <i>EA Application: Revised Supporting Information</i> document.</p>

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		<ul style="list-style-type: none"> management of any potential aerosol drift generated from above ground irrigation. 		<p>When combined with the setback distances discussed above in issue number 7, the risk of aerosol exposure is negligible.</p>
14		<p>As the proposed activity involves the release of treated effluent to land, the following should be submitted in relation to wet weather storage management:</p> <ul style="list-style-type: none"> type and volume; how any overflows will be managed; algae management if proposing open lagoon or pond; if open storage, design of the wet weather storage including lining to ensure any potential of effluent leaching to groundwater is prevented; and contingency plans. 	<p>Describe wet weather storage management.</p>	<p>The MEDLI modelling confirmed that by applying a scheduled 2mm/day over 3.8 ha in mine construction phase and 1.9 ha in mine operation phase, no overflow events would occur. However, in accordance with the <i>QLD Government Technical Guideline For Disposal of Effluent via Irrigation</i>, during substantial rain events when the ground is showing signs of saturation (such as surface water pooling) wet weather storage for 3 days must be accounted for. This equates to a maximum tank capacity of at least 168 m³ – length 19.5m, width 19.5m, overflow outlet depth 3m.</p> <p>As closed tanks will be used instead of ponds, there are negligible risks with algae blooms or leaching into the groundwater.</p> <p>Once detailed design information is available, a site-specific contingency plan will be developed to manage the wet weather storage tanks, sewage treatment plant shutdowns and maintenance periods when >3 days storage may be required.</p>
15		<p>As the proposed activity involves the release of treated effluent to land, address the predicted environmental impacts of the proposed effluent irrigation scheme. The preferred model is MEDLI. This model assesses the hydraulic load applied to the irrigation areas, the fate of nitrogen, phosphorus and salts, and required wet weather storage volume. The results of the MEDLI assessment is to be provided and include the following:</p> <ul style="list-style-type: none"> the proposed size of the irrigation area(s); the proposed wet weather storage volumes; irrigation rates; frequency of overtopping ; irrigation rates; 	<p>The department requires a “water balance method” (typically “MEDLI”) to determine the suitable wet weather storage volume and size and locations of effluent irrigation areas based on the volume of wastewater generated at a facility, taking into account climatic conditions, vegetation being irrigated, effluent quality with regard to TN, TP, TDS, EC and soil properties to ensure no runoff from the effluent irrigation disposal area(s) and wet weather storage,</p>	<p>MEDLI modelling was undertaken by Cardno (2020a) and is provided in Appendix N of the <i>EA Application: Revised Supporting Information</i> document.</p> <p>Four (4) MEDLI model scenario input and output files can be provided to DES upon request.</p>

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		<ul style="list-style-type: none"> • soil water balance; • soil nutrients balance; • any risk of contamination to groundwater and measures to be implemented to protect groundwater • crop performances; • predicted irrigation-induced annual deep drainage rate (mm/year); • predicted average deep drainage Nitrate and Phosphorus annual concentrations (mg/L); and • interpretation of output details. <p>For assessments using MEDLI model <u>Version 1.3</u>, the following model input and output files are to be provided:</p> <ul style="list-style-type: none"> • those files that end with “IPT.SUM” (Input Summary); and • those files that end with “SUMM.STA” (Summary Output). <p>Each file name begins with a 4-digit reference number and neither file contents nor the format is to be altered or changed.</p> <p>For assessments using MEDLI model <u>Version 2.0</u>, the following model input and output files are to be provided:</p> <ul style="list-style-type: none"> • *.medr (Output file) • *.med (Scenario file) 	<p>with minimal “irrigation-induced deep drainage”.</p> <p>Where MEDLI is not used, a justification for the validity and calibration for the model is required.</p>	
16	Supporting information Section 3.6.2 Mine schedule Figure 19	The temporary levee is proposed to be positioned along the south-eastern side of Pit AB. The diverted drain is located at the southern end of Pit AB. As the pit is proposed to progress toward the mining	Demonstrate that the active mining pit will not be impacted during flood events given that this area	Flood modelling in Appendix B of the <i>EA Application: Revised Supporting Information</i> document has concluded the active mining of Pit AB will not be subject to flooding inundation during a 1% AEP flood event and instead flood impacts from Springton Creek would extend off the lease area onto land owned by Magnetic South.

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	Mine stage plan - Year 06	lease area (MLA) boundary, the applicant has proposed that the levee would extend the length of the drain to prevent possible in-pit flooding from the drain.	has a high probability of flooding.	<p>Although as shown in Figure 7.7, Appendix B of the <i>EA Application: Revised Supporting Information</i> document, there is potential for flood waters to come into contact with overburden dumps on the southern side of Pit AB due to water overflowing from the unnamed tributary of Springton Creek upstream of the inlet to the engineered drainage feature. The temporary levee is expected to protect this section of the dump during operations and avoid any inflow into Pit AB, limiting impacts to overburden run-off.</p> <p>In events up to the 0.1% AEP design flood, modelled flow velocities are less than 1 m/s along most of the length of the proposed levee. Such flows would be non-erosive and especially given the relatively short flow durations in this small catchment, the risk of migration of sediment in floodwaters would be minimal. A <i>Site Water Management Plan</i> described in Section 7.4.1 of the <i>EA Application: Revised Supporting Information</i> document will be developed for the Project to address flooding mitigation and surface water runoff from overburden dumps.</p>
17	Supporting information Section 3.6.2 Mine schedule Figure 20 Mine stage plan - Year 08	Figure 20 shows that the active spoil dumps extend to be in close proximity to the diverted drainage feature. Risk of the dump slopes failing and impacting the drain has not been discussed.	Provide further information on the proximity of dumps to the drain and the potential impacts to environmental values.	<p>Figure 20 is now Figure 26 of <i>EA Application: Revised Supporting Information</i> document and shows the progressively rehabilitated outer extent of the waste rock dump already reshaped, sloped to a 1V:10H ratio (where maximum slopes adhere to 6°), topsoiled, seeded, and erosion controls installed. The limit for the working waste dump face would be up to 100m inside the identified boundaries of these outer extents shown in Figure 26 to allow for the spoil dump to be reshaped for the final landform and rehabilitated.</p> <p>The 100 m distance provides a suitable buffer from the drainage feature and allows Magnetic South to adjust the dumping strategy in response to any signs of instability. As shown in Figure 17 of the <i>EA Application: Revised Supporting Information</i> document, there is an approximate distance of 55m between the mining lease application (MLA) boundary and the identified outer extents of the spoil dump. As the conceptual level design of the drainage feature will be 1m deep, containing a low flow channel with 5 m base width and high flow channel with a 15 m base width (i.e., full conservative cross section width of 29 m). There is an additional 20 m buffer Magnetic South could utilise to ensure the drain is constructed at a greater distance away from the dump, inclusive of additional protective berms, as necessary. Noting the slopes proposed for spoil dumps are at the lower end of typical design practice in the Bowen Basin and are already considered conservative.</p>
18	Supporting information Section 3.6.2 Mine schedule Figure 22 Mine stage plan - Year 12	Figure 22 shows that Pit AB is in close proximity to the MLA eastern boundary. Limited information has been provided as to whether there is going to be adequate space to complete rehabilitation works. If the pit is on the MLA boundary, how will pushing or	Provide further information regarding the rehabilitation of land surrounding Pit AB.	<p>Figure 35 of the <i>EA Application: Revised Supporting Information</i> document has identified where Pit AB abuts the MLA boundary as corresponding to rehabilitation area 4 (a residual void high wall), which will be rehabilitated to native vegetation supporting fauna habitat.</p> <p>The technical parameters for Pit AB high wall slopes are provided in Table 19 of the <i>EA Application: Revised Supporting Information</i> document and are considered suitable to ensure the stability of the final landform. Monitoring of rehabilitated highwalls, including the surrounding landform, will be</p>

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		<p>fencing occur? Figure 26 Mine stage plan - Final landform shows no established vegetation at the location where the pit abuts the MLA boundary.</p> <p>There could be a risk of pit or dump failure, which may result in environmental impacts off-lease.</p>		<p>undertaken as detailed in Section 4.8 of the <i>EA Application: Revised Supporting Information</i> document to ensure risks of rehabilitation failure, erosion and landform instability are addressed. In addition, safety assessments of the final void highwalls, including the surrounding landform, will be undertaken by a suitably qualified person prior to relinquishment of the EA to ensure geotechnical stability of the post-mine land use (PMLU) has been achieved.</p> <p>It is further noted Magnetic South currently owns the properties east of the MLA on Lot 2 Plan HT138 and Lot 47 on Plan H406 where this concern has been pointed out. As a result, Magnetic South will ensure no off-lease environmental impacts, with respect to rehabilitation of the highwall to Pit AB, occur.</p>
19	Supporting information Section 3.8 Road Transport	<p>It has been stated that “These local roads and tracks will be temporarily closed to the public for the Project...to maintain the connection of Cooinda Road to the Capricorn Highway (via Sanders Road and Namoi Road), the access track extending from Sanders Road is proposed to be diverted. This diversion will be approximately 2km in length and will connect onto Cooinda Road approximately 1.0-1.2km south of its current connection. The diversion works are located outside of the MLA and will be subject to a separate approval from the Central Highlands Regional Council (CHRC) (i.e., approval is not being sought by this EA application).”</p> <p>Information has not been provided regarding the road diversion construction timing and how this coincides with the temporary closure. Will the diversion be constructed in advance of the road closure, so the public are minimally affected?</p>	<p>Provide further information regarding the timing of the road closure and diversion construction.</p> <p>Provide alternatives if the road diversion is not approved.</p>	<p>Mine construction activities are scheduled to commence in July 2021, subject to the granting of the Project ML and EA. Approvals through council for the road diversion would be sought prior to any construction activities taking place and the granting of relevant approvals. The closure of Cooinda Road would only occur following the construction of the road diversion via Sanders Road and Namoi Road to ensure the public are not affected.</p> <p>Preliminary conceptual designs for the proposed road diversion entail a 3546m long rural road, with 150mm thick pavement and 1 culvert crossing. Construction of the road diversion is anticipated to take 33 days. The <i>Traffic Impact Assessment</i> undertaken by Cardno (2020b) provided in Appendix A of the <i>EA Application: Revised Supporting Information</i> document identified that the road diversion would have minimal disturbance to local road users.</p> <p>It is also noted that Magnetic South has purchased the property Lot 2 on Plan HT138 whereby the road diversion would be constructed and therefore minimising impacts on immediate local road users.</p> <p>An alternative road diversion was also considered further south on Namoi road past Sanders Road, and partially uses an existing road reserve boundary, then ties into Cooinda Road. However, this option would require an extension of the existing road reserve through Lot 2 on Plan HT138 also owned by Magnetic South.</p> <p>The current proposed road alignment described in the <i>EA Application: Revised Supporting Information</i> was considered the most appropriate to minimise impacts such as driving times and distance to local road users. In addition, road users would not be exposed to any impact on visual amenity for either road diversion options.</p>

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		If approval of the diversion (off-lease) is subject to council approvals, it is assumed that the diversion and road closure will not go ahead if approvals are not received. Alternatives will need to be considered.		
Rehabilitation				
20	Supporting Information 4.2.4 Topsoil Resources Table 12 Estimated topsoil volumes available for rehabilitation	The table states that the Normanby soil management unit (SMU) will not be disturbed, but there will be a stripping depth of 0.9m. Topsoil stripping is considered surface disturbance. Are topsoil seedbank and topsoil subsoils calculated separately?	Ensure Table 12 values are accurate. Identify depth of topsoil seedbank and topsoil sub-soil and volumes	Section 4.2.4 of the <i>EA Application: Revised Supporting Information</i> document has been amended to differentiate the depth and volumes of topsoil (seedbank) and subsoil. The top 30cm of recoverable soil has been distinguished as the primary source of dormant seed contributing to revegetation success. The deeper subsoils, while still suitable for use in rehabilitation, are unlikely to contain a viable source of seed. Updates have been made to the topsoil balance, handling, stockpiling and placement practices described in Sections 4.2.4 and 4.4.2. Appendix I (Soil and Land Suitability) of the <i>EA Application: Revised Supporting Information</i> document has also been updated to reflect this differentiation of subsoils and topsoils. The Project will not result in any disturbance of the Normanby SMU. The stripping depth of 0.9 m indicated a possible stripping depth. Table 14 has been updated to reflect stripping depths from areas of planned disturbance, available for use in rehabilitation.
21	Supporting Information Section 4.3.1 Post-Mining Land Use	It has been stated that the rehabilitated low wall slopes will be capable of supporting a grazing land use. However, in Table 14 – Nominated post-mining land use (PMLUs) show that residual low walls are planned for native vegetation supporting fauna habitat – this is inconsistent information. The void low wall will be rehabilitated to a final gradual slope for safe access and grazing by cattle. What is the gradient/degree of the low wall in voids? This should also be included in Table 18 as a performance criterion.	Provide clarification on the rehabilitation outcome for the low walls as there is conflicting information throughout the rehabilitation section. Demonstrate that the low walls can sustain the PMLU of native vegetation and identify what additional stabilisation methods are required.	Section 4 of the <i>EA Application: Revised Supporting Information</i> document has been updated to provide clarification on the low wall PMLU and correct any inconsistencies in the original application. The low walls have been designed to achieve a PMLU of grazing. Void low wall slopes will be reshaped to a maximum of 6°. This design criterion has been incorporated into the proposed rehabilitation completion criteria for the Project.

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22	Supporting information Section 4.3.2 Waste rock emplacements	It has been stated that it is preferable to internally drain the upper surfaces of waste rock emplacements rather than increase flows down rehabilitated slopes. What structures are required for this? Are these going to remain post-mining? Is there a risk of failure?	Provide further information on the internally draining infrastructure required to reduce flows down rehabilitated slopes	<p>Section 4.4.6 (formerly 4.3.2) has been updated to provide further information regarding the use of internal drainage systems on the upper surfaces of waste rock emplacements.</p> <p>The upper surfaces of waste rock emplacements will be reshaped, using earthworks, with natural depressions that follow the contours of the surrounding landscape. During rainfall event, these depressions will act as an internal drainage system that promote water retention on the top surfaces of waste rock emplacements without damming or ponding. The addition of vegetative cover will further aid the absorption of rainfall. Improving the internal drainage of surface water on waste rock emplacements, decreases surface run-off on the outer slopes and resulting in improved landform stability.</p> <p>Internal drainage landforms are permanent features in the landscape which are designed to blend into the landscape over time. There are no artificial structures specifically associated with the internal drainage design. The minimal slopes of the depressions and vegetative cover increases stability of the land. If rehabilitation monitoring indicates reparation is required, reparation activities will be carried out and documented.</p> <p>Internal drainage landforms have a low risk of failure due to the site-specific and design characteristics including minimal slope, vegetative cover, relatively low surface area, low geochemical risk and the presence of soils with self-sealing properties. Internal drainage design is common practice in nearby mines such as Jellinbah Mine, where the additional retained water provides a notable improvement in revegetation success and landform stability.</p>
23	Supporting Information Section 4.3.2 Figure 29 Conceptual Layout – Nominated PMLUs	<p>Figure 29 identifies the PMLUs. The map demonstrates that there is grazing adjacent to the native vegetation. Has consideration been given to a corridor or link for fauna?</p> <p>Is there a barrier between the grazing land and the native vegetation to ensure cattle don't impact the native vegetation growth?</p> <p>Consider the spread of exotic pasture species into native vegetation habitats.</p>	<p>Address the connectivity between varying PMLUs and undisturbed areas.</p> <p>Discuss how the PMLUs will function as an integrated ecosystem in the long-term.</p>	<p>Grazing by cattle on rehabilitated areas will only commence once the completion criteria for the area has been met. Fencing requirements around grazing areas / native ecosystems will be undertaken in a manner to enable standard grazing management practices. Where fencing is required, standard management practices will identify potential wildlife corridors and where possible, ensure these protected from cattle grazing through the installation of stock fencing. Generally, a <i>Grazing and Agriculture Management Plan</i> is developed by the landowner / leaseholder as a part of standard management practices. Further description of the proposed <i>Grazing and Agriculture Management Plan</i> has been updated in Section 4.7.5 of the <i>EA Application: Revised Supporting Information</i> document.</p> <p>PMLUs for the mine were developed based on the pre-mining land suitability, landholder/stakeholder preferences, technical studies and the existing land use and environmental values of the surrounding landscape. The existing Project site does not represent a fauna corridor. The majority of the site has represents cleared or impacted cattle grazing land. Magnetic South proposes to develop a corridor of</p>

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				native vegetation along the rehabilitated clean diversion water channels dissecting the site. These corridors aim to improve on the existing connectivity values to the extent that is practical.
24	Supporting Information 4.3.4 Final Voids	<p>It has been stated that “A key rehabilitation objective for this domain is to reduce the rate of predicted water salinity present in the void primarily to allow the ecology of the residual void waterbody sufficient time to adapt to salinity changes.” No method of how this will be achieved has been elaborated on. Are there other contaminants of concern that flora and fauna will have to ‘adapt’ to?</p> <p>Page 97 of the supporting document states that, “...the void will contain a fresh to brackish pit lake that is expected to provide suitable habitat for fauna species, particularly migratory and marine bird species.” No evidence has been provided to support this statement. How are flora and fauna species expected to transition from freshwater to a brackish water ecosystem?</p>	<p>Provide additional information regarding how the rate of predicted water salinity in the void is proposed to be reduced.</p> <p>Demonstrate how the ecological ecosystems will adapt to changes in salinity. Demonstrate that there are no other contaminants of concern that may impact the success of flora and fauna to function within the proposed ecosystem.</p> <p>Provide justification as to how the pit lake at both the freshwater and brackish timelines will be considered suitable habitat for specified fauna species.</p>	<p>Section 4.3.2.1 of the <i>EA Application: Revised Supporting Information</i> documents the alternative mine closure options considered. The preferred option proposed in this application requires the rehandling of significant waste to backfill voids to a minimum of 80 m below the natural topography. The option was determined on the basis of recommendations included in the Groundwater Report (Appendix C). Backfilling to this level will significantly reduce the contribution of saline water from Permian coal seam aquifers that might otherwise remain exposed in the lower portion of the pit. As a result, the timeframe over which modelled salinity accumulates in the void is significantly extended. Furthermore, the design of the residual voids has ensured there is no predicted overtopping and no predicted groundwater contamination, as voids will remain as groundwater sinks indefinitely (due to evaporation from the pit lake).</p> <p>Section 4.4.7.1 of the <i>EA Application: Revised Supporting Information</i> document provides a research summary and evidence to support the use of final void waterbody, the airspace above the waterbody, and the highwalls as a suitable habitat for native species found within the Project region. The section provides literature and practical experience to justify the value of brackish pit lakes for native fauna species, particularly macroinvertebrates, fish, avian species including migratory birds, bats and other mammals and reptiles.</p> <p>For the reasons described above and explained in the revised supporting information document, the proposed final landform design is considered the most appropriate rehabilitation outcome for the Project.</p>
25	Supporting Information Section 4.3.7 Progressive rehabilitation	Refer to Table 17 Indicative progressive rehabilitation schedule.	<p>Provide a clear explanation of the rehabilitation plans and methods for each of the domains.</p> <p>Provide justification as to why the area of land available for rehabilitation isn't being fully</p>	<p>Section 4 of <i>EA Application: Revised Supporting Information</i> document has been amended to address the rehabilitation scheduling requirements of the PRCP, which will ultimately be required for the Project. The sub-sections within Section 4 provide details on the rehabilitation strategy, rehabilitation areas, dates land becomes available for rehabilitation, rehabilitation milestones, indicators and completion criteria.</p> <p>Land will become progressively available for rehabilitation throughout the life of the Project. Land is considered available for rehabilitation when:</p> <ul style="list-style-type: none"> the land is no longer required for operating infrastructure or machinery for mining, including, for example, a dam or water storage facility;

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			<p>rehabilitated in Year 8 and Year 12.</p> <p>Clarify where the values in column 5 for 'Total area rehabilitated (ha)' have been derived from.</p> <p>After mining activities have ceased, identify the expected timeframes to complete rehabilitation.</p> <p>For Pit C, provide further information on the areas available for rehabilitation and the total area reshaped and topsoiled.</p> <p>Identify proposed methods for failed rehabilitation and the impacts and management of this beyond Year 20.</p>	<ul style="list-style-type: none"> the land is no longer being mined and there is no plan to return to mining within 10 years after the land would otherwise have become available for rehabilitation (assuming a probable or proven ore reserve remains); and the land does not contain permanent infrastructure remaining on the land for a PMLU. <p>Detailed descriptions of mine development and progressive rehabilitation have been provided in the supporting information. Year 37 has been nominated as the expected date by which all rehabilitation areas will achieve the intended PMLU. It is noted for coal mining operations, it is not uncommon for changes to mine plans to occur as a result of factors including; increased resource knowledge, changed market conditions, geological factors, extreme weather or other external factors. For this reason, the rehabilitation schedule should be treated as indicative. Mine planning changes are expected to result in regular updates to the schedule over the mine life. Additional contingency may be required to achieve ultimate rehabilitation success.</p> <p>Monitoring and reparation requirements have been described in the relevant parts of Section 4. It is expected that monitoring and maintenance will continue post mining, until such time that rehabilitation criteria area achieved, and certification and relinquishment can occur.</p>
26	Supporting Information Section 4.4.2 Reshaping/ landform development	<p>It was stated that there is a 'master waste rock emplacement surface drainage plan'.</p> <p>Graded banks and rock-protected spine drains are proposed to be installed to allow drainage from long rehabilitated slopes to be conveyed to natural ground level. All surface runoff from newly rehabilitated slopes will be directed into sediment dams until revegetation uptake is stable and adequate to control soil erosion.</p>	<p>Provide the aforementioned plan.</p> <p>Provide further information about structures to address the concerns raised.</p>	<p>Reshaping and landform development of waste rock emplacements is detailed in Section 4.4.6 of the <i>EA Application: Revised Supporting Information</i> document.</p> <p>The <i>Master Waste Rock Emplacement Surface Drainage Plan</i> will be developed on approval of the EA and prior to the commencement of mining operations, during the detailed design phase of the Project. The plan is expected to describe:</p> <ul style="list-style-type: none"> Where required, graded banks will be designed in accordance with industry recommendations (Witheridge et al. 1996), they will achieve a minimum width of 5 m and height of 500mm high. Larger contour drains are generally more stable and longer lasting. Rock-lined spine drains will utilise rock of between 300 – 450 mm in diameter. Graded banks and rock-protected spine drains will be designed to blend into the landscape over time, with a relative minimal cross section to minimise the risk of failure. If necessary, these structures will be removed, and reparation activities will be undertaken.

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		<p>Is this temporary infrastructure? If it is permanent, what is the long-term management? How is this proposed to function? Will the drainage structures be removed?</p> <p>What capacity or design will sediment basins take and how were they calculated? How will sediment basins feed into the wider MAW Management?</p>		<ul style="list-style-type: none"> Given the overburden and topsoil materials available, the rehabilitation design parameters proposed, and the mitigation measures and actions nominated, no significant risks associated with the rehabilitation of waste rock emplacements have been identified. <p>Sediment dams have been designed in accordance with the <i>'Best Practice Erosion and Sediment Control'</i> (IECA Australasia 2008) and the guideline for <i>'Stormwater and environmentally relevant activities'</i> (DES 2017a) detailed in Section 3.4.3.3 of the <i>EA Application: Revised Supporting Information</i> document. The integration of sediment dams into the Project's Water Management Infrastructure is described in Section 3.4 and Appendix B of the <i>EA Application: Revised Supporting Information</i> document.</p>
27	Supporting Information Section 4.4.4 Revegetation	It has been stated that "Initial revegetation efforts will be aimed at stabilising and establishing the building blocks for a self-sustaining system, in accordance with the defined land use". Unsure how this will be achieved as it is not explained further. How will self-sustaining be defined? What analogue / representative vegetation type will be adopted?	Provide further information into "building blocks" and their correlation to the defined land use.	<p>Section 4 of the <i>EA Application: Revised Supporting Information</i> document has been updated to reflect the specific requirements of the PRCP schedule. Rehabilitation indicators and criteria have been included and will form the basis for determining rehabilitation success for all Rehabilitation Areas.</p> <p>In the context of the expected future PRCP, land is required to achieve Stable Condition. The building blocks of the stable condition include by definition:</p> <ul style="list-style-type: none"> safety and structural stability; no environmental harm; and the land can sustain a post-mining land use. <p>Section 4.5.2 of the <i>EA Application: Revised Supporting Information</i> document, has nominated specific completion criteria that must be achieved for the rehabilitated land to meet the definition of Stable Condition. All of the building blocks described above have been addressed.</p>
28	Supporting Information Section 4.4.7 Water Management Infrastructure	Included revegetation activities are: weed and pest management, ensuring revegetated areas are protected from the impacts of livestock grazing, monitoring diversion stability and revegetation success until a trajectory of achieving completion criteria can be demonstrated. The methods for achieving this have not been demonstrated.	Provide information in relation to planned strategies and the demonstration of achieving rehabilitation completion criteria.	<p>Rehabilitation activities will be subject to adaptive management where the rehabilitation methods and controls are continually improved and updated based on the results of site-specific rehabilitation trials, further land assessment (where applicable) and revisions of legislative requirements. Section 4.4 of the <i>EA Application: Revised Supporting Information</i> document details of rehabilitation methods and controls including maintenance and reparation.</p> <p>Section 4.7.4 of the <i>EA Application: Revised Supporting Information</i> document details the methods for weed and pest management. A <i>Weed and Pest Management Plan</i> for the Project will be developed to address the site-specific requirements for weed and pest management across the Project site.</p> <p>Section 4.8 of the <i>EA Application: Revised Supporting Information</i> document addresses the monitoring methods adopted for the Project. Regular monitoring and review of analogue and rehabilitated sites will</p>

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				<p>provide feedback to the success of rehabilitation efforts and the requirement for reparation efforts including weed and pest management and erosion and sediment control. Where appropriate, rehabilitation monitoring methods documents the progress of performance indicators and will be used to assist the achievement of completion criteria described in the <i>EA Application: Revised Supporting Information</i> document, Table 21.</p> <p>Section 4.5.2 of the <i>EA Application: Revised Supporting Information</i> document contains further information regarding rehabilitation indicators and completion criteria.</p>
29	Supporting Information Section 4.5.2 Erosion and Sediment Control	Erosion and Sediment Control has been proposed to be developed to address the construction, operational and rehabilitation/ closure phase of the Project.	Provide further information on erosion and sediment control methods, and management process' such as adopting ESC Plans developed by a CPESC or suitably qualified person during the life of mine operation and the relevant locations if known.	<p>Section 4.7.2 of the <i>EA Application: Revised Supporting Information</i> document has been updated. An <i>Erosion and Sediment Control Plan</i> has been developed for the Project by a suitably qualified person to address the construction, operational and rehabilitation/closure phases of the Project and is provided in Appendix P of the <i>EA Application: Revised Supporting Information</i> document.</p> <p>Four sediment dams associated with Pit AB will be installed in mining year 1 and five sediment dams associated with Pit C will be installed in mining year 13. Sediment dam design and location is discussed further in Section 3.4. of the <i>EA Application: Revised Supporting Information</i> document.</p>
30	Supporting Information Section 4.5.2 Erosion and Sediment Control	It has been stated that erosion and sediment control structures would not be removed until disturbed areas have been stabilised and the risk of erosion of sedimentation impacts have reached pre-disturbance levels. What are the criteria for pre-disturbance levels? Will these structures remain post surrender or will rehabilitation not be achieved until erosion and sedimentation has stabilised?	<p>Provide further information on how this will be achieved.</p> <p>Demonstrate that it is possible to achieve pre-disturbance levels of erosion and sedimentation.</p>	<p>Section 4.7.2 of the <i>EA Application: Revised Supporting Information</i> document has been updated.</p> <p>Section 4.5.2 provides revised completion criteria for habitation areas, in line with PRCP schedule requirements.</p>

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31	Supporting Information Section 4.5.3 Contaminated Land	<p>It has been stated that the risk of land contamination will be similar to existing mining operations and is likely to be confined to instances of small diesel spills, and/or spills of chemicals likely to be onsite.</p> <p>What are the relevant potential spill incidences and impacts of spills on the relevant environmental values at the proposed site. What are the proposed remediation methods prior to disturbance or ongoing management strategies?</p>	Address the relevant impacts from contaminated land on site-specific environmental values.	<p>Section 4.7.3 of the <i>EA Application: Revised Supporting Information</i> document has been updated to address the predicted impacts to land and preventative management measures associated with land contamination.</p> <p>The Project is not predicted to have any significant impacts on the environmental value of land within the Project or the receiving environment. Predictive analysis of erosion rates will be undertaken to demonstrate that successful rehabilitation areas achieve soil loss rates that are acceptable and require land management inputs not significantly greater than the surrounding equivalent land use.</p>
32	Supporting Information Section 4.6 Rehabilitation indicators and completion criteria Table 18 Rehabilitation objective, performance indicators and completion criteria by domain	<p>Table 18 identifies rehabilitation goals, objectives, performance indicators and completion criteria for mine domains. For the rehabilitation goals column performance indicators need to be specific. Performance indicators (something that can be measured i.e., water pH) and the subsequent rehabilitation criteria (quantifiable target i.e. water in Miners Creek must measure between 6 and 8 pH) are the benchmarks that would allow the proposed post-mining land use to occur without unacceptable ongoing management costs. Include, but not limited to the following examples; percentage of vegetation cover, vegetation dynamics, rates of erosion, volume of sediment loss, geotechnical stability factor.</p> <p>Baseline data is essential for evaluating rehabilitation performance as it</p>	<p>Include a comprehensive suite of SMART performance indicators and rehabilitation/ completion criteria.</p> <p>In deriving the performance indicators (as mentioned above), demonstrate/ justify where the indicators were derived from as supported by baseline data.</p> <p>To support the future PRC plan requirement, considering including a timeframe in the rehabilitation criteria to demonstrate progression of rehabilitation. (Note that this can be changed when a PRC plan is submitted</p>	<p>Table 18 is now Table 21 of the <i>EA Application: Revised Supporting Information</i> document. The table has been updated to reflect SMART performance indicators and completion criteria for rehabilitation areas, consistent with the requirements of a PRCP schedule.</p> <p>Baseline data is summarised throughout the application and has formed the foundation of the proposed rehabilitation performance indicators and completion criteria.</p> <p>Rehabilitation milestones have been developed and discussed in detail (Section 4.5) alongside a preliminary rehabilitation milestone schedule (Section 4.6).</p>

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		<p>describes the mine site’s biophysical properties prior to disturbance. It is critical in setting performance targets for site rehabilitation, for understanding the long-term properties/ performance of the sites and to inform rehabilitation planning (especially with the PRC plan). This should be collected and decided prior to disturbance by mining to ensure that closure objectives have been fully considered and rehabilitation planning is an accurate representation of the site’s characteristics. Baseline data is a requirement for a PRC plan.</p>	<p>but will be used to support it.)</p> <p>Address the steps the site will need to take in order to achieve the objectives and criteria. Address risk avoidance steps.</p> <p>Identify and describe the post mining land use for each domain in Table 18 – link to criteria and objectives.</p> <p>This information requirement is also applicable to the respective Sections 4.3 – 4.3.7 for each domain.</p>	
33	<p>Supporting Information Section 4.7 Rehabilitation monitoring and measurement</p>	<p>It has been stated that “The assessment recommended additional testing of materials and field trials to assist in determining the most appropriate management options to ensure effective rehabilitation.”</p> <p>How have transects been determined to be the best site-specific option for monitoring rehabilitation? What other methods have been assessed as options?</p> <p>Have these field trials commenced? If not, is there a tentative timeframe as to when these might commence? The results of the trials will influence the</p>	<p>Identify and describe the monitoring regimes which would be undertaken in order to assess the trajectory of success of mine rehabilitation.</p> <p>Describe what field-based assessments and application of remote sensing, GIS and other relevant emerging technologies where appropriate might be applied.</p>	<p>Rehabilitation monitoring has outlined in Section 4.8 of the <i>EA Application: Revised Supporting Information</i> document.</p> <p>Rehabilitation monitoring will involve an assessment of rehabilitated sites against appropriate analogue sites. Monitoring will investigate the following site characteristics at a minimum:</p> <ul style="list-style-type: none"> • aspect and slope; • tree, shrub and herb/grass density • groundcover (%); • species (flora and fauna) composition; • chemical and physical indicators of soil; • erosion indicators (depth of rills or erosion lines, surface crusting, slopes); and • groundwater levels and quality; • surface water quality; and • stream sediment quality. <p>The monitoring program will be designed in accordance with the performance indicators and completion criteria that are ultimately approved for the Project.</p>

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		<p>rehabilitation methods on site (closure). Identify other studies that address options for rehabilitation that have been undertaken for similar land areas.</p> <p>The rehabilitation monitoring program should be designed in accordance with the performance indicators that can be compared against the rehabilitation criteria for the relevant domains.</p> <p>What rehabilitation trials are planned for the life of mine and after closure? The trials may focus on a single aspect of rehabilitation such as erosion control, oxidation rates, seed germination, plant growth rates or uptake of metals, faunal recolonisation or resilience to climatic variation. They may also address the overall success of the developing ecosystem through studies of nutrient recycling, microbial bio indicators, self-seeding or other measures of sustainability. The trials may be directed at filling gaps in the knowledge of local ecological processes and enable refinement of rehabilitation objectives and rehabilitation criteria that have been proposed for the milestones. Monitoring data from baseline studies may assist in designing the trials and monitoring programs, especially if analogue sites have been proposed to allow more realistic consideration of local conditions and the climatic effects on rehabilitation. Monitoring data from the trials can be useful in progressive certification or final surrender applications.</p>	<p>Identify plans for rehabilitation trials that can improve the success of the site's rehabilitation strategies.</p>	<p>Revegetation techniques will continually be developed and refined over the life of the Project through a continual process of research, trialling, monitoring and improvement. In accordance with standard mine practice site – specific rehabilitation trials to inform rehabilitation efforts and practices will be undertaken. Where required but not limited to, rehabilitation trials may investigate soil preparation, seed mixes, seed application, surface cover treatment, watering requirements, monitoring methods and to assist directing reparation efforts. As such, rehabilitation trials will be used as part of adaptive management of rehabilitation trials and will commence as identified during mining operations. At the pre-approval stage of project development, it is not practical to progress the design of rehabilitation trials any further.</p> <p>Magnetic South may engage with external research programs such as those undertaken by ACARP and research institutions in development of trials.</p>

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34	Additional information – Relinquishment	With respect to the rehabilitation objectives, what are the anticipated ongoing vegetation management requirements and restrictions that may be imposed on future landholders after relinquishment?	Address final land use for landholders and the management requirements.	<p>Section 4.9.2 of the <i>EA Application: Revised Supporting Information</i> document has been updated to provide further information on the management requirements for landholders for the final land use.</p> <p>Successful rehabilitation should achieve a post mining land use where land management inputs are not significantly greater than equivalent land uses in the surrounding region. Upon relinquishment of the land, the ongoing vegetation management requirements should be similar to the surrounding land and include weed control, management of grazing intensity, bushfire controls, etc.</p> <p>The final or progressive rehabilitation report will contain an environmental risk assessment which will identify any residual risks. Where relinquishment requires the transfer of ownership or management of infrastructure and/or land to other parties, written legal agreement will be sought to identify acceptance of the mining legacy and any outstanding costs of remediation, monitoring and reporting. Legal agreements will be undertaken in accordance with the relevant legislative requirements at the time of relinquishment.</p>
35	Additional information – Community consultation	Community consultation gives weight to the selection of the proposed final landforms. Consideration of the public interest is also a 'standard criteria' for a decision relating to an application and must be addressed. Demonstrate community consultation has been undertaken and that the community are supportive of the proposed final land uses.	<p>Address what community consultation has been undertaken to address the proposed final landforms and what were the results of the consultation.</p> <p>As a standard criteria consideration, demonstrate that 'public interest' has been sufficiently considered.</p>	<p>PMLUs for the mine were developed based on pre-mining land suitability, landholder/stakeholder preferences, technical studies and the existing land use and environmental values of the surrounding landscape. Magnetic South is an active member in the local community and is responsible for managing an extensive area of local cattle grazing land. Community consultation has been undertaken by Magnetic South over the past two years and has covered all relevant aspects of mine operations and closure. This Consultation included, but was no limited to:</p> <ul style="list-style-type: none"> • underlying landholders; • surrounding community members with an interest in the Project; • the Gaangalu Nation People; • Local Council representatives; and • State Government representative. <p>Further consultation will be undertaken as part of the operational consultation strategy for the Project. Local knowledge of graziers is highly valued by Magnetic South in all aspects of land management and is seen as essential for ensuring successful and sustainable rehabilitation of the Gemini Project.</p>
Soil and Land Suitability				
36	Supporting information Section 5.2.5	The table has several references to 'Cassia spinarum'. This is a potential	Confirm whether 'Cassia spinarum' is correct or not.	A typographical error has been identified, 'Cassia spinarum' is not correct and it should be 'Carissa spinarum'. Table 21 (formerly Table 19) of the <i>EA Application: Revised Supporting Information</i> document has been updated.

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	Soils Table 19 SMUs within the study area	typographical error. Might be meant to read ' <i>Carissa spinarum</i> '.		
37	Supporting information Section 5.2.5 Soils Figure 32 Distribution of SMUs	Figure 32, supported by information provided in Table 19, suggests that the project site is dominated by strongly sodic soils. Impacts of strongly sodic soils can include surface crusting, reduced seedling emergence, reduced soil aeration, waterlogging, increased run-off and erosion risk, less groundcover and organic matter, less microbial activity. The aforementioned impacts have not been discussed in the supporting document or Appendix F Soil and Land Suitability.	Provide further information regarding the impact of strongly sodic soils on site, which may impact rehabilitation outcomes and proposed mitigation measures.	<p>Soils within the Project area are discussed in Appendix I (<i>Soil and Land Suitability Assessment</i>) of the <i>EA Application: Revised Supporting Information</i> document, and Section 5 of the <i>EA Application: Revised Supporting Information</i> document.</p> <p>Figure 49 (formerly Figure 32) of the <i>EA Application: Revised Supporting Information</i> document demonstrates that the Project Area is dominated by the Geoffrey and Kosh SMU. These SMUs are, therefore, reflective of the predominant soil characteristics of the Project area. The subsoils of the Geoffrey and Kosh SMUs are considered strongly sodic (exchangeable sodium percentage (ESP) > 14%). This indicates subsoil may become dispersive if exposed to surface water run-off for prolonged periods of time post topsoil stripping.</p> <p>While these SMUs have sodic subsoils, topsoil layers used for rehabilitation are not considered sodic. Stripping depths have accounted for this and have been determined to exclude any sodic subsoil material from the topsoil resource. This topsoil resource is therefore not considered sodic and dispersive. The rehabilitated landform is thus at low risk of the beforementioned impacts associated with sodic soils. Mitigation measures that target sodic and dispersive soils is not considered necessary.</p>
38	Supporting information Section 5.3 Potential Impacts, 5.3.1 Landform	The post-mining landform is proposed to be at a maximum height of 190m. The current height of the pre-mining landscape is from 120 – 150m. Can a landform of 190m in height be considered a significant change?	Provide further information about the change in final landform.	<p>The potential impacts on visual amenity have been updated in Section 5.3.2 and included in Appendix O of the <i>EA Application: Revised Supporting Information</i> document.</p> <p>A final landform height of 190m AHD was superimposed as a visual simulation from five representative vantage points within the nearby local surrounds. The results from the <i>Visual Amenity Assessment</i> (AARC 2020a) concluded that the final landform of the waste rock emplacement to Pit AB would only be visible from vantage point VA1 (located within the MLA facing south west towards Pit AB along the eastern boundary of the Rubina property) and VA3 (located approximately 1.2 km from the boundary of the MLA facing north towards Pit AB at the end of Sanders Road along the eastern boundary of the Namoi Hills property).</p> <p>Of these two vantage points, only VA1 is expected to experience moderate impacts. However, the property of vantage point VA1 is owned by the proponent and the dwelling will be vacant during operations. On this basis, a low-level of visual sensitivity exists and visual impacts are significantly reduced even under the provision of the 190m AHD landform height proposed.</p>
39	Supporting information	Dingo township is located approximately 2.3km east of the Project, in addition to other sensitive receptors within a 10 km	Provide further information regarding the impacts of the Project on visual	The visual impacts identified in the <i>Visual Amenity Assessment</i> (AARC 2020a) are predominantly considered low. In terms of mining infrastructure visually exposed, the changes to the visual landscape are limited to the spoil crest of Pit AB and the overhead conveyor across the Capricorn Highway

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	Section 5.3.2 Visual Amenity	radius that could be potentially impacted by visual disturbances. It has been stated that “views of Project infrastructure and elevated landforms are not expected to be significant from local roads and residential dwellings due to the local topography and large separation distances between dwellings and mining activities.” Insufficient information has been provided regarding visual amenity impacts. Potential mitigation measures are not provided.	amenity and the mitigation measures.	<p>connecting the TLO facility. The remaining infrastructure associated with the Project will be obscured and not likely to cause any disruption to the visual landscape.</p> <p>Visual simulations did not identify significant impacts at four of the five representative vantage points. Only one vantage point, VA1, is expected to experience moderate impacts. However, the property of the vantage point is owned by the proponent and the dwelling will be vacant during operations. On this basis, a low-level of visual sensitivity exists and visual impacts are significantly reduced.</p> <p>Still, residual short-term and intermittent visual impacts will be unavoidable for road users exposed to the overhead conveyor across the Capricorn Highway when using the main transport route. This visual modification is anticipated have moderate visual impacts to nearby road users; however, all mining infrastructure areas, including the overhead conveyor will be subject to decommissioning and rehabilitation. Therefore, these identified residual impacts of the conveyor will be limited to the operational phases of the Project.</p> <p>A series of mitigation measures to reduce impacts on visual amenity have been updated and listed in 5.4.2 of the <i>EA Application: Revised Supporting Information</i> document).</p>
40	Supporting information Section 5.4 Mitigation measures, management and monitoring - Landform	It has been stated that “Waste rock emplacement will be constructed to a maximum slope of 1V:10H (approximately 5.7%) and a maximum height of 190mAHD.” Based on percentage and degree conversions it is assumed that ‘5.7%’ should read ‘5.7°’ (i.e., 10% or 1/10). Other sections of the supporting information document (refer to section 4.3.2) have stated that the maximum slope is 6 degrees.	Confirm the maximum slope.	All references to a 5.7% waste rock emplacement slope have been updated to state a slope design of 6° will be adhered to.
41	Supporting information Section 5.4 Mitigation measures, management	It has been stated that “Mitigation strategies for soil include carrying out routine testing of soil properties prior to use in rehabilitation. If required, fertilizers, soil ameliorants, and application of a seed mix will be used to	Provide further information regarding routine testing of soil and possible mitigation and management measures.	<p>Section 5.4.4 of the <i>EA Application: Revised Supporting Information</i> document has been updated with detailed information relating to soil monitoring and subsequent management actions.</p> <p>In summary, if topsoil resources are to be stockpiled for a period in excess of six months, testing of soil properties (including physiochemical analysis) will occur prior to use in rehabilitation. This monitoring information is only required prior to topsoil application to assess changes in topsoil quality (changes to soil chemistry and biological activity as a result of being stockpiled). Key parameters would include pH,</p>

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	and monitoring – Soils	<p>increase the likelihood of rehabilitation success.”</p> <p>The use of the phrase 'routine testing' suggests the testing will be carried out at regular intervals in advance of rehabilitation activities. No further detail has been provided to confirm this.</p> <p>If the results of routine testing determine that the soil is not suitable for use in rehabilitation and that ameliorants etc. will not be adequate in improving soil properties, what is the next step in mitigation?</p>		<p>ESP %, cation exchange capacity (CEC) (major cations), organic matter content and other essential nutrients such as nitrate, phosphorous and sulphate.</p> <p>The most significant risk to topsoils is deterioration as a result of stockpiling for extended periods of time. Topsoils across the disturbance area will be stripped to a depth that excludes any constraining layer/properties. That is, stripping is to occur above a sodic/highly saline soil horizon. The topsoil resource is, therefore, considered to be of good quality.</p> <p>Should the physiochemical analysis indicate significant deterioration of topsoil has occurred, the subsequent action will be amelioration in the form of fertiliser and the application of a seed mix to increase the likelihood of rehabilitation success. However, topsoil is not anticipated to deteriorate to the point of becoming unsuitable for use in rehabilitation works.</p>
42	Supporting information Section 5.4 Mitigation measures, management and monitoring – Erosion Protection Measures	<p>It has been stated that topsoil stockpiles will be seeded to prevent unnecessary erosion of soil.</p> <p>No further detail has been provided about which seed mixes would be used on topsoil stockpiles. An appropriate seed mix is required to be used to ensure that if seeds remain in the seed bank when topsoil is spread for rehabilitation that there is growth of appropriate species for that area/post-mining land use.</p>	Provide further information regarding the proposed seed mix for use in rehabilitation.	<p>To prevent unnecessary erosion of stockpiled topsoil, it is recommended that stockpiles be ripped and seeded to limit erosion and maintain a viable seed bank. The seed mix used on stockpiles should be quick establishing and include pasture species to agree with the post-mining land use of grazing. Pasture species that are appropriate and will be applied include:</p> <ul style="list-style-type: none"> • Single generation Sorghum (Annual forage sorghum) – cover crop; • Rhodes grass (<i>Chloris gayana</i>) – Grass pasture species; • Creeping bluegrass (<i>Bothriochloa insculpta</i>) - Grass pasture species; and • Desmanthus (<i>Desmanthus virgatus</i>) – Leguminous pasture species. <p>Spreading the seeds will easily be achieved using a bucket with the seed mix and a filler (such as sand or fertiliser pellets). Section 4.4.2.4 of the <i>EA Application: Revised Supporting Information</i> document details the full list of species to be used in topsoil application.</p>
43	Supporting information Section 5.4 Mitigation measures, management and monitoring – Table 22	Table 22 states that the Normanby SMU has a topsoil stripping depth of 0.9m. The table note relating to the Anderson, Charlevue, Ellesmere, Nigel and Normanby SMUs states “topsoil stripping not recommended.” Normanby SMU is the only SMU out of the aforementioned	Further justification is required as to why the Normanby SMU has a topsoil stripping depth of 0.9m when topsoil stripping is not recommended.	<p>Appendix F is now Appendix I. Section 6 of Appendix I of the <i>EA Application: Revised Supporting Information</i> document describes topsoil stripping recommendations for each SMU. The use of the asterisk in Table 24 of the <i>EA Application: Revised Supporting Information</i> document identifies all SMUs unsuitable for use in revegetation activities due to soil properties that limit plant growth as stipulated in Section 6 of Appendix I of the <i>EA Application: Revised Supporting Information</i> document.</p> <p>All text and tabulated data suggests topsoil of the Normanby SMU is suitable for stripping to a depth of 0.9 m under the provision of nutrient supplements or soil ameliorants. It is therefore considered the</p>

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	Potential topsoil volume within disturbance footprint Appendix F Soil and Land Suitability – Table 62 Maximum Topsoil Stripping Depths for all Soil Management Units	SMUs that has a proposed topsoil stripping depth above 0m. Table 62 on page 76 of Appendix F states that the stripping depths with an asterisk (*) may require nutrient supplements or soil ameliorants for successful use in rehabilitation.	The note in Table 62 of Appendix F has not been reflected in the note of Table 22 in the supporting document. Account for any required ameliorants necessary for successful rehabilitation.	demarcation of the Normanby SMU with an asterisk (*) in Table 24 of the <i>EA Application: Revised Supporting Information</i> document is a typographical error and has been removed. The proposed topsoil volume of 0 m ³ for the Normanby SMU can be explained by its location outside of the disturbance footprint. The topsoil resources available for rehabilitation do not include any SMUs outside of the disturbance footprint. Table 24 of the <i>EA Application: Revised Supporting Information</i> document has been updated and now denotes any areas outside the disturbance footprint with a dash to identify topsoil resources that will remain intact and not used in rehabilitation activities. The use of the asterisk in Table 24 of the <i>EA Application: Revised Supporting Information</i> document and Table 63 of Appendix I is unrelated and is not meant to communicate the same information.
44	Supporting information Section 5.4 Mitigation measures, management and monitoring – Topsoil Handling Procedures	It has been stated that “If available, subsoils that have been identified as having a high clay content with low erosivity risk will be returned first at a depth of up to 0.5m, prior to the addition of sandier topsoil.” Is the expectation that subsoils with high clay content will be readily available? It has not been discussed about what would occur to ensure the sandier soils can provide a suitable growth medium if the high clay subsoils are not available.	Provide further information in regard to availability of high clay content soils and measures to be taken if they are not available.	The Geoffrey and Kosh SMU dominate the Project area. Majority of the topsoil resource will, therefore, be sourced from these SMUs. These SMUs have been characterised to be sandy throughout (Kosh SMU) or have sandy topsoil overlying a dispersive clay-rich subsoil (Geoffrey SMU). Although it is preferred that a clay-rich subsoil be placed below topsoil, the Geoffrey and Kosh SMU alone will not provide suitable subsoil material. Topsoil will therefore need to be placed directly over spoil or alternatively, clay-rich subsoil sourced from other SMUs within the proposed disturbance area could be nominated for use in rehabilitation works where possible/practicable. The SMU descriptions detailed in Section 5.2.5 of the <i>EA Application: Revised Supporting Information</i> document indicates suitable, non-dispersive clay-rich subsoil material can be sourced from SMUs James and Barry (estimate volumes for these SMUs are detailed in Table 15 of the <i>EA Application: Revised Supporting Information</i> document). Placement of suitable subsoil material below the topsoil will create both a thicker growing medium as well as a more natural soil profile with greater water holding capacity. This will help achieve a better rehabilitation outcome.
45	Appendix F Figure 3, 4 and 6	Figures 3, 4 and 6 of Appendix F Soil and Land Suitability identify that the study area does not align with the MLA boundary. An explanation for the	Clarify the reasoning for the variation of the study area.	At the time of the <i>Soil and Land Suitability Assessment</i> (AARC 2018) survey, the Project MLA was subject to frequent changes, therefore, the study area was based of the EPC 881 boundary. Other reasons for variations included not having consent from landowners to access land for surveying (west

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		variation of the study area has not been provided in Appendix F.		and north of the MLA). In addition, the survey design included a 5-kilometre buffer area around the boundary of the Walton State Forest.
46	Appendix F Section 6.2 Topsoil stockpiling Table 63 Estimated Soil Volumes	<p>Table 63 indicates that 25,283,553m³ of topsoil will be stripped during the life of mine.</p> <p>Appendix F does not identify the volume of topsoil required to undertake rehabilitation to achieve the proposed final land use and rehabilitation outcomes.</p>	<p>Provide detail of the approximate volume required to achieve the proposed final land use and rehabilitation outcomes.</p> <p>Should a topsoil deficit be identified, provide detail of alternative methods to mitigate any deficit over the Life of Mine.</p>	<p>Table 15 of the <i>EA Application: Revised Supporting Information</i> document indicates that the maximum recommended volume of topsoil that can be stripped across the entire Project area is 25,283,553 m³. However, the proposed disturbance footprint has been determined to be 19,530,240.0 m². Based on this disturbance, approximately 4,953,748 m³ of topsoil will be stripped whilst a further 3,832,237 m³ of subsoil can be reclaimed from this area during the life of mine. The recommended minimum topsoil respreading depth is 0.3 m, therefore, approximately 5,231,820 m³ of topsoil will be required for rehabilitation efforts over the life of the Project. The soil balance indicates the reclaimed topsoil material will need to be supplemented with subsoil material in rehabilitation efforts. Additional material will, therefore, need to be sourced from the reclaimed subsoil.</p> <p>A <i>Topsoil Management Plan</i> will be developed and implemented to allow the appropriate management of topsoil resources across the Project area. Topsoil mass balance will inform availability of topsoil and provide an indication of topsoil shortage. The estimated topsoil volume suggests a topsoil deficit is not likely.</p>
47	Appendix F Section 7.1 Land suitability	<p>It has been stated that “Other areas, such as steeper outer slopes of spoil (e.g., slopes of greater than 10%) may be subject to erosion and as such may be less suited to cattle grazing than the pre-mining landscape. A reduced land suitability score is expected on these landforms”.</p> <p>It was stated in Section 4.3.2 Waste rock emplacements (in the supporting information) that the maximum slope for the proposed final landform is 6 degrees (with 10% = 5.7 degrees). How much greater than 10% are the slopes proposed to be?</p> <p>Section 4 of Appendix F indicated that many of the soils, from which topsoil will be sourced, are moderately to highly dispersive. No further information has</p>	<p>Demonstrate how topsoil will be applied and maintained on steep slopes (slopes >10%).</p> <p>Demonstrate how slopes >10% are appropriate for a post-mining land use of grazing.</p>	<p>Typical slopes across the rehabilitated landform will be 10%. However, no post-mining landform has been designed to have a slope greater than 10.51% (equivalent to a maximum slope of 6°).</p> <p>The application of topsoil is detailed in Section 4.4.2.4 of the <i>EA Application: Revised Supporting Information</i> document and details how these sloped landforms will be capable of supporting the post-mining land use of grazing. Stripping depths have accounted for the dispersive nature of the SMUs sodic subsoils (topsoil estimates exclude any sodic subsoil material from the topsoil resource). This topsoil resource is therefore not considered sodic and dispersive. The rehabilitated landform is thus at low risk of the dispersive impacts associated with sodic soils and mitigation measures that target sodic and dispersive soils is not considered necessary.</p>

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		been provided to describe how such topsoils will be applied to prevent erosion on steep slopes within the final landform.		
48	Appendix F Section 7.4 Soil degradation	Section 7.4 recommends that saline or sodic soils will be segregated, and stockpiles will be clearly demarcated to ensure appropriate use of the resource. No further information has been provided relating to the management of saline or sodic soils.	Provide further detail relating to the management of saline and/or sodic soils.	<p>Section 4 of Appendix I (<i>Soil and Land Suitability Assessment</i>) of the <i>EA Application: Revised Supporting Information</i> document describes the characteristics of the SMUs within the Project area.</p> <p>Chemical data for each suitable SMU that will be used as a topsoil resource reveals that no SMU has topsoil with a sodic and/or saline nature. Specialised segregation and demarcation of topsoil is therefore not considered necessary for any topsoil stockpile within the Project area. Although, it is recommended that stockpiles should be monitored monthly for evidence of erosion/structural instability.</p>
Biodiversity				
49	Additional information	<p>In reference to Section 7 Environmental offsets in the EA application form, you must detail the magnitude and duration of the likely significant residual impact on each prescribed environmental matter for each activity and demonstrate that all reasonable measures to avoid and minimise impacts on each of the matters will be undertaken.</p> <p>In reference to Section 7.2 Staged environmental offsets of the EA application form, you must include supporting information that details how the activities are proposed to be staged.</p> <p>Include any relevant biodiversity offset requirements including:</p> <ul style="list-style-type: none"> • Details of whether suitable offsets exist for impacts to prescribed environmental matters; 	Ensure the application requirements are sufficiently addressed.	<p>The timing and duration of the Project activities affect the magnitude of the overall impacts of the Project on the prescribed environmental matters within the study area. Vegetation clearance and land disturbance during the construction and operation of the mine are the primary direct impacts on the environmental values of the study area. An overview of the Project's timeline is provided in Section 3.6.2 of the <i>EA Application: Revised Supporting Information</i> document.</p> <p>The Project will require progressive disturbance as the mine development advances. Rehabilitation activities will follow a progressive rehabilitation schedule whereby land is rehabilitated as soon as practicable after areas become available.</p> <p>Environmental offsets have been outlined in Section 6.5 of the <i>EA Application: Revised Supporting Information</i> document. Additionally, an <i>Environmental Offset Strategy</i> has been provided in further detail in Appendix R of the abovementioned document.</p> <p>Magnetic South will deliver the offset for the significant residual impacts of the Project prior to the commencement of the impacts. Offsets are expected to be delivered as a combination of proponent-driven / land-based offset and financial settlement. Ample supply options for land-based offsets have been included in the <i>Environmental Offset Strategy</i>, as well as the expected staging of offsets over the life of the Project.</p>

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		<ul style="list-style-type: none"> • If already determined, the proposed offset delivery mechanism i.e. land-based, financial payment or a combination of both for impacts to prescribed environmental matters. Where financial payment is proposed, the values to which the financial payment relates and the quantity (as determined by the offset financial calculator). Where land-based offsets are proposed, provide an assessment of 'habitat quality' of the impact and offset area; • Details of whether the proposed offsets/ impacts will be undertaken in full prior to the impacts occurring, or whether they will be staged over the life of the project. If staged impacts/ offsets are proposed, identify what those stages are, which impacts are proposed for each stage and the anticipated timeframe for each stage. 		
50	Supporting information Section 6.2 Description of environmental values and Section 6.3 Potential impacts	The magnitude of terrestrial flora and fauna environmental values and potential and actual impacts are not clearly identified and discussed. Ecological values are not limited to the tenure area. In addition, address the environmental values and impacts on surrounding flora and fauna, not limited to but including Taunton National Park, Walton State Forrest, Blackdown Tablelands and Arthurs Bluff State Forest.	Provide further information on the site-specific environmental values and potential and actual impacts on terrestrial ecology.	<p>Sections 1.3, 5.1, 6.1 and 7.1.1 of Appendix J attached to the <i>EA Application: Revised Supporting Information</i> document have been updated to describe in more detail the environmental values identified within and surrounding the study area, as well as potential impacts posed by the proposed disturbance. This information has been summarised in Sections 6.2 and 6.3 of the <i>EA Application: Revised Supporting Information</i> document.</p> <p>There are several protected areas and state forest surrounding the study area (Section 1.3 and Figure 3 of Appendix J attached to <i>EA Application: Revised Supporting Information</i> document). While State Forests in Queensland have been traditionally used as a source of timber supplies, the presence of large areas of remnant vegetation has been utilised to establish ecological corridors that connect isolated habitats. The Project is located south of Taunton National Park (Scientific), (Taunton National Park), a scientific reserve under the <i>Land Act 1994</i> (Queensland), with the aim of protecting a population of Bridled nail-tail wallabies. Taunton National Park connects to the Walton State Forest via Wallaby Late Nature Refuge, which contains suitable remnant and regrowth remnant areas used by the Bridle nail-tail wallaby for feeding and shelter. Walton State Forest connects to the sandstone</p>

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				<p>ridges and plateau located at the west and south of the Project on which is located Arthur's Bluff State Forest, Blackdown Tableland National Park and Dawson Range State Forest. Lastly, Dawson Range Forest connects to Duaringa State Forest, which, like Walton State Forest, is not located in the sandstone plateau. All the above-mentioned areas are connected to one another by state ecological corridors.</p> <p>While the study area is located in the vicinity of several protected areas in the form of two national parks, one nature refuge and several state forests, none of them are connected to the study area. The study area is unlikely to provide suitable dispersal habitat for the EVNT fauna species between the national parks, as the majority of the study area consists of cleared agricultural areas fragmented remnant vegetation and narrow riparian corridors, not always formed by remnant vegetation. This fragmentation is result of farming activities, including historical vegetation clearing to facilitate grazing as well as infrastructure development such as the Capricorn highway and the Blackwater rail network.</p> <p>Further, the national parks surrounding the Project are mostly in sandstone escarpments while Taunton National Park, home of the Bridle Nail-tail Wallaby, is characterised by Brigalow vegetation, the preferred habitat of the species. The state forests in the area provide the connection between these environmental values in form of continuous remnant vegetation. The study area not only does not contain the particular vegetation present within the national parks but does not provide the connectivity between them.</p> <p>The potential impacts identified as a result of the proposed development will not affect the surrounding protected areas neither directly or indirectly as none of the proposed disturbance is adjacent to the protected areas nor will it create natural or artificial barriers to known biodiversity corridors.</p>
51	Appendix G Section 3.5.1 Groundwater Dependent Ecosystems	An explanation on what Figures 7, 8 and 9 identify in terms of GDEs was not provided.	Provide information on the figures and what the information presented in these figures identify about the site and the possible impacts on these areas that will be impacted by the mine.	<p>Appendix G is now Appendix J. Section 3.5.1 of Appendix J attached to the <i>EA Application: Revised Supporting Information</i> document has been updated to provide clarification on the information presented in Figures 7, 8 and 9.</p> <p>The Bureau of Meteorology (BoM) GDE Atlas 'National assessment' mapping was produced by conducting a national-scale assessment which involved a nationally consistent methodology using remote sensing and GIS rules-based analysis (BoM 2019). This mapping shows the potential for groundwater/ecosystem interaction and it is presented in:</p> <p>Figure 7: Potential terrestrial GDEs to occur within the study area. A terrestrial GDE is a GDE that accesses subsurface groundwater to meet all or some of its water requirements (BoM 2019).</p>

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				<p>Figure 8: Potential aquatic GDEs to occur within the study area. An aquatic GDE is a GDE which uses groundwater after it has been discharged to the surface. This includes all groundwater-fed surface water bodies, such as rivers, wetlands, lakes and springs. This definition refers only to the aquatic (inundated) component of a system, and therefore excludes any vegetation which may fringe a surface water body (BoM 2019).</p> <p>The GDE classification includes (BoM 2019):</p> <ul style="list-style-type: none"> • high potential for groundwater interaction: GDE Atlas terminology used to classify ecosystems as likely to be interacting with groundwater. It indicates that groundwater is likely to be present, and the ecosystem is likely to be using it. This categorisation means that the majority of data analysed indicated a high potential for groundwater interaction, or that the most reliable (and most heavily weighted) datasets indicated high potential; • moderate potential for groundwater interaction: GDE Atlas terminology used to classify ecosystems that may interact with groundwater. It indicates that groundwater is possibly present, and the ecosystem may use it. Where data is conflicting (some data suggests that groundwater interaction is occurring, while other data suggests it is not), and it is weighted equally (both datasets are considered equally good indicators of groundwater interaction), this will be the resulting categorisation; and • low potential for groundwater interaction: GDE Atlas terminology used to classify ecosystems as unlikely to be interacting with groundwater. It indicates that groundwater is unlikely to be present, or if it is present, the ecosystem is unlikely to use it. This categorisation means that all datasets suggest groundwater interaction is unlikely, or that the most reliable (and most heavily weighted) datasets suggest that groundwater interaction is unlikely. <p>Figure 9 shows graphical representation of potential terrestrial GDEs in Queensland. This figure was produced based on data from the DES. An incorrect reference has been identified in Section 3.5.1, although the report cites the data as sourced from the Department of Natural Resources and Mine and Energy (DNRME), the metadata has been provided from the Department of Environment and Science (DES 2019c). This dataset provides information about the location and extent of known and potential GDEs as sourced from expert knowledge, literature and existing datasets.</p> <p>This mapping identified GDEs that are attributed as 'derived GDE – low confidence'. These are GDE's that have not been field sampled, but according to expert knowledge, there is a low confidence in the mapping rule set and therefore in the prediction that the mapped ecosystem has some degree of groundwater dependence (Queensland Government 2012).</p>

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52	Appendix G Section 4.0 Methodology Figure 11 Fauna Survey Figure 10 Flora Survey	Surveys have not been conducted on sites located around the mine (predominately conducted in areas that the mines themselves/pits are not located), instead of doing survey sites in the habitat that currently sits in the areas being planned for coal extraction. Why have studies not been conducted in the relevant areas? This is also applicable for the flora surveys (Figure 10).	Provide further justification on sites that were chosen for surveying and the importance of the site's locations.	<p>Section 4 of Appendix J to the <i>EA Application: Revised Supporting Information</i> document has been updated to provide clarification on the Methodology followed during the Flora and Fauna surveys as well as the survey site selection considerations.</p> <p>Section 1.1 of Appendix J to the <i>EA Application: Revised Supporting Information</i> document identifies the scope of the flora and fauna field surveys was 'to develop an inventory of terrestrial flora and fauna species inhabiting the study area, particularly species of conservation significance', as such field surveys were designed using the stratified sampling methods as detailed within the <i>Terrestrial Vertebrate Fauna Survey Guidelines of Queensland</i> (Eyre et al 2018) and <i>Queensland Herbarium Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland Version 4.0</i> (Neldner et al 2017). The objective of the study was not to evaluate the impact of a development (before and after) as such survey sites were not delineated in 'impact' and 'control' sites. Survey effort was focused upon identifying all potential fauna and flora environmental values within the study area.</p> <p>Flora survey sites, in particular secondary sites, were selected to be representative of the regional ecosystems within the study area, allowing for several secondary sites within each vegetation community. Where possible, sites were aligned with the proposed disturbance footprint, however, preference was given to representative vegetation of higher condition. This methodology meets the recommendations from the <i>Methodology for surveying and mapping regional ecosystems and vegetation communities in Queensland (V5.0)</i> (Neldner et al 2019), which states that a minimum of three secondary sites within a regional ecosystem is desirable. Flora was sampled in Autumn, Spring and Winter seasons to best account for both annual and perennial species assemblages. Sampling was undertaken at a minimum density of 25 observations per 100 ha to complete mapping at the 1:10,000 scale (Neldner et.al 2019). Survey density was higher in areas with remnant vegetation or where vegetation types were changing, to accurately reflect the vegetation boundaries in the vegetation map. Subsequently, the flora sites were projected on a Geographical Information System (GIS), and used in conjunction with satellite images, aerial photographs, topographical and geological maps to effectively produce a ground verified vegetation map.</p> <p>As cited in Section 4.5.1 of Appendix J to the <i>EA Application: Revised Supporting Information</i> document, the survey was planned according to <i>Terrestrial Vertebrate Fauna Survey Guidelines for Queensland V2.0</i> (Eyre et al 2014) (which was the current version at the time of all surveys). As per these Guidelines, it is a recommendation that each assessment unit (habitat type) has a minimum of three fauna sites across different seasons. As indicated in Section 4.5.2 of Appendix J, four main habitat types were identified within the study area. Trapping sites were selected to be representative of these habitat types. Where possible, sites were aligned with the proposed disturbance footprint, however, preference was given to representative habitat of higher condition.</p>

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				<p>Access limitations influenced fauna site selection to a minor extent. Regular repeat safe access is essential to all fauna trapping sites and forms a requirement of the animal ethics permits under which surveys are completed. However, multiple surveys were conducted by AARC ecologists over a period of three years to ensure that a comprehensive and representative survey effort was completed for the site.</p> <p>While conducting the flora surveys across remnant and non-remnant areas, habitat conditions that met required conditions for targeted flora or fauna species were searched, and species recorded opportunistically (e.g., rocky areas for <i>Cerbera dumicola</i>).</p> <p>Following the surveys' results and the assessment of the habitat types recorded within the study area, AARC understands that the survey met the requirements of the flora and fauna guidelines and the study area has been comprehensively surveyed.</p>
53	Appendix G Section 4.5.4 Fauna Survey Effort - Table 9	An inconsistent method of trapping/monitoring/recording has been utilised for the different seasons. For mammal trapping, 4 sites in Autumn, 6 sites in spring and 5 sites in Autumn have been selected. Why was a survey not completed in Spring 2018? The results that have been formulated do not identify animal correlation between seasons and species in the MLA as they cannot be appropriately comparable.	Justification on the amount of surveying conducted in the two different seasons over the course of the surveying period.	<p>Sections 1.1 and 4.5.4 of Appendix J to the <i>EA Application: Revised Supporting Information</i> document has been updated to provide clarification on the survey effort undertaken during the Flora and Fauna surveys. Section 1.1 of the Appendix J identifies the scope of the flora and fauna field surveys was 'to develop an inventory of terrestrial flora and fauna species inhabiting the study area, particularly species of conservation significance'. As such, field surveys were designed using the stratified sampling methods as detailed within the <i>Terrestrial Vertebrate Fauna Survey Guidelines of Queensland</i> (Eyre et al 2018) and <i>Queensland Herbarium Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland Version 4.0</i> (Neldner et al 2017).</p> <p>It is considered that the fauna survey effort comprehensively the addresses the objective of the field surveys described in Section 1.1 of Appendix J. This objective is to identify terrestrial fauna inhabiting the study area, particularly species of conservation significance.</p> <p>The fauna survey was planned according to the <i>Terrestrial Vertebrate Fauna Survey Guidelines for Queensland V2.0</i> (Eyre et al 2014), the current version at the time of all surveys. These guidelines state that trapping should target each habitat unit identified within the study area at least three times across the identified survey seasons. The Project is located within the Brigalow Belt bioregion, which the fauna survey guideline recommends surveying during Spring and Autumn (Eyre et al 2014). Due to access restrictions, the fauna trapping and recording took place in Autumn 2017, Spring 2017 and Autumn 2018. The <i>Terrestrial Vertebrate Fauna Survey Guidelines for Queensland V2.0</i> (Eyre et al 2014) states that '<i>...at least two surveys undertake in different seasons will be a minimum requirement...</i>'. As such, it is understood that the fauna survey guidelines requirements have been met with the three surveys, and no further survey effort was considered necessary in Spring 2018.</p>

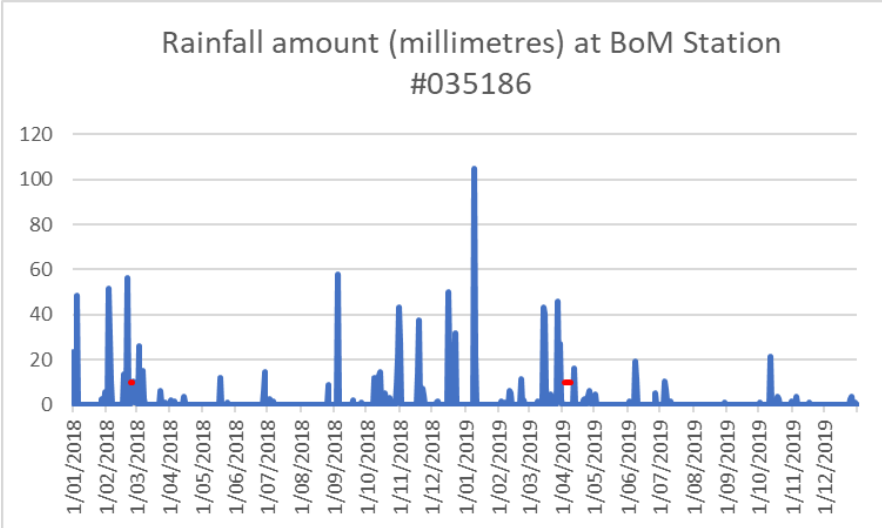
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				<p>AARC does not consider the correlation of animal presence between seasons and species to be a primary objective of the survey. Rather the goal of the survey was to identify presence and habitat for fauna species at any time during the year. The requirement to trap for fauna at specific seasons maximises the potential for positive identification of all inhabiting fauna species.</p>
54	Appendix G Section 5.4.1 Groundwater Dependent Ecosystems Figure 13	Figure 13 is not explained. Riverine wetlands are identified in the study areas including in areas where the pits are proposed to be.	Discuss the impact of mining on these groundwater dependent wetlands, and the impact from the proposed final land use.	<p>Following GDE field assessments in June 2020 (Appendix F to the <i>EA Application: Revised Supporting Information</i> document), Section 5.4.1 of Appendix J to the <i>EA Application: Revised Supporting Information</i> document has been modified, removing Figure 13 and summarising the findings of the comprehensive GDE study, included in the <i>EA Application: Revised Supporting Information</i> document.</p> <p>Two areas within the riverine wetlands have been identified as GDEs within the study area. One of these GDEs is located within the mine footprint (Springton tributary) whilst the other one is located upstream of the proposed impact, within the riparian vegetation of the Charlevue Creek. Drawdown (during and post-mining) will not have an impact on the riparian habitat identified as GDE within Charlevue Creek based on the limited hydraulic connectivity between the regional groundwater table and the perched aquifer that supports the GDE (3D Environmental 2020).</p>
55	Appendix G Section 7.2.1 Fauna Species of Conservation Significance and Habitat	<p>In this section there are three identified fauna species of conservation significance. This does not correlate with information in other sections which state there are five fauna species of conservation significance with only four listed.</p> <p>The 3 fauna species that have been discussed in Section 7.2.1 are the Squatter pigeon, the Greater Glider and the Short-beaked Echidna. In Section 6.3.1 it is stated there are five species with only four listed – southern Squatter Pigeon, Greater Glider, Short-beaked Echidna and Rufous Fantail.</p>	Ensure all information between sections are correct and correlating. All species of conservation significance need to be discussed in terms of their potential impacts from mining activities.	<p>DES has correctly identified an administrative error in Section 6.3.1 of Appendix J to the <i>EA Application: Revised Supporting Information</i> document where there is a reference to 'five fauna species'. This has been corrected to read 'four fauna species'. Three of these species are listed under the <i>Nature Conservation Act 1992</i> (southern Squatter pigeon, Greater glider, and Short-beaked echidna), while the Rufous fantail is listed as a Migratory species under the <i>Environment Protection and Biodiversity Conservation Act 1999</i>.</p> <p>Section 7.2.1 of Appendix J to the <i>EA Application: Revised Supporting Information</i> document has been updated to address the Rufous fantail. The Project is unlikely to impact the species. Appendix J has also been updated to reflect the changes above.</p>
56	Appendix G Table 25 Summary of	Table 26 identifies that an offset is required for 106.65 ha of essential habitat. This is not included in the	Ensure all information correlates between tables and is correct.	The Project is not a prescribed activity mentioned in schedule 1, item 7(e) of the Environmental Offsets Regulation (2014) and as such essential habitat of Near Threatened species does not constitute a prescribed matter. Section 9 and 9.1.2 of Appendix J to the <i>EA Application: Revised Supporting</i>

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57	Assessment of Prescribed Matters	<p>supporting information and conflicts with Table 25 (page 99).</p> <p>Table 25 identifies the summary of assessment of prescribed environmental matters. Provide further detail and workings of how the impact assessment conclusions were reached and assessed against the Queensland Environmental Offsets Policy Significant residual impact guideline (December 2014).</p>	Provide further information.	<p><i>Information</i> document have been updated to only address the prescribed matters applicable to the Project.</p> <p>Appendix J to the <i>EA Application: Revised Supporting Information</i> document has been updated to better describe the Project offset requirements.</p> <p>Table 25 in Section 9.2 of Appendix J to the <i>EA Application: Revised Supporting Information</i> document summarised the assessment of the prescribed matters identified within the Project area and potentially impacted by the proposed disturbance. Section 9.1 of Appendix J includes the assessments of each of the prescribed matters against its correspondent significant residual impact criteria included in the <i>Queensland Environmental Offsets Policy Significant Residual Impact Guideline</i> (EHP 2014).</p>
58	Appendix H Section 5.0 Methodology	Two sampling events were completed at different times of the year of February in 2018 and April in 2019, which means data cannot be accurately correlated without externalities considered which has not been discussed.	Justification into why the two sampling projects (2018 and 2019) are enough to provide critical information in relation to the aquatic biodiversity in the site area.	<p>Appendix H is now Appendix K. Four sampling events were undertaken in different times of the year due to weather conditions present during the field surveys. The systems present within the study area are ephemeral and, as such, field work was dependant on rain events sufficiently large enough to result in water flow occurring in the study area.</p> <p>All sites were assessed for creek ecology values (See Section 5.5, Appendix K of the <i>EA Application: Revised Supporting Information</i> document). These assessments provide critical information regarding the aquatic ecological values of the systems present within the study area (See Section 6.3, Appendix K of the <i>EA Application: Revised Supporting Information</i> document).</p> <p>Additional field survey for aquatic trapping was undertaken to supplement the previous surveys. Three new sites were added to the study area to improve robustness of the data collected focusing the aquatic methodologies.</p>
59	Appendix H Section 5.2 Sampling Sites Table 5	Many of the assessments and surveys were completed at different times and not all at the different survey sites identified in Figure 6.	Discussion on why specific sites were chosen for the assessments completed compared to the sites that did not have assessments. Justification is needed on the sample sites survey patterns.	<p>Priority was given to aquatic fauna sampling along the major watercourses; specifically, Charlevue Creek and Springton Creek. Charlevue Creek and Springton Creek were identified to be of higher ecological value than the other surrounding waterways. For this reason, additional fauna survey methods were completed at the chosen sites along Charlevue Creek and Springton Creek in order to identify any riparian fauna species that are reliant on the existing aquatic values within the study area.</p> <p>In addition to this, three new sites were added during the 2020 aquatic ecological survey to expand the study area further upstream and downstream of the Project. These include:</p> <ul style="list-style-type: none"> • DAR2: upstream of the Project on Springton Creek; • DA17: downstream of the Project on Charlevue Creek; and • DA18: downstream of the Project on Duckworth Creek. <p>Site scoping identified the potential for aquatic trapping to be undertaken along Stanley Creek. However, due to the aquatic environment of the study area being highly ephemeral, Stanley Creek did</p>

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				<p>not contain enough water to have aquatic fauna trapping undertaken or to allow for macroinvertebrate sampling to occur.</p> <p>The survey patterns and effort are therefore highly dependent on rainfall events sufficient enough to cause creek-flow, which is typically short-lived occurring irregularly during the wet season and occasionally during the early post-wet season. The low stream order creeks such as, Stanley Creek, are particularly less likely to be sampled for this reason.</p>
60	Appendix H Section 5.2 Location of Survey Sites Figure 6	No survey sites were located downstream of the Springton Creek, only on its tributaries within the site area.	Provide justification as to why a survey site was not located for downstream Springton Creek and why the information that could have been provided from this survey site would not have been valuable.	Site DWI6 is located downstream of the proposed disturbance for the Project along Springton Creek. This site was assessed for surface water, stream sediment, creek ecology values, macroinvertebrates, riparian vegetation and riparian zone fauna (See Table 5 and Figure 5 of Appendix K of the <i>EA Application: Revised Supporting Information</i> document). To add an additional site further downstream would not add significant value to the assessment. However, site DAR2 was introduced further upstream of the Project on Springton Creek during the 2020 survey to provide additional background data upstream.
61	Appendix H Section 6.7 Aquatic values	Stated that many of the biodiversity aspects of ecology have been found to be "low".	Provide further justification of this determination based on the surveying completed (why the amount of surveying completed in 2019 justifies the determination).	<p>The ecological biodiversity values identified for the study area were identified as of low value due to the variety of assessments undertaken. An additional aquatic ecological survey was completed during 2020 to provide a more rigorous support of these previous findings.</p> <p>While seasonal variations and conditions may contribute to this low value; sampling was undertaken during optimal conditions for these systems (sampling was undertaken following high rainfall events). The systems within the study area are ephemeral and are only able to provide habitat to aquatic life for short periods of time. Throughout the rest of the year, the systems are dry and provide no specific aquatic biodiversity values. While aquatic fauna trapping and macroinvertebrate sampling was restricted to sites that contained suitable levels of water, other assessments such as erosion assessments, habitat bioassessment, condition assessments and riparian vegetation assessments were undertaken at all sites. These assessments take into consideration long term impacts and assess the overall condition of the survey sites. Erosion was recorded at all sites, with some sites exhibiting extensive erosion levels (DWI8, DA11). Further to this, most sites had a moderate to major impact from localised influences such as clearing practices disturbing or removing the riparian zone, erosion from cattle access and increased run-off (due to clearing practices), and ephemeral waterways being vulnerable to frequent instream and geomorphological changes.</p> <p>Macroinvertebrates are a strong bio-indicator of a systems health and its biodiversity value (ANZECC and ARMCANZ 2000). When reviewing the results of the macroinvertebrate sampling, the systems within the study area are found to be significantly impaired. As well the sampling identified a high</p>

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				<p>presence of tolerant macroinvertebrate taxa across sites. These results indicate the systems are of poor health.</p> <p>Aquatic fauna trapping and riparian zone vertebrate fauna surveys resulted in minimal species being detected. This is likely due to the lack of aquatic habitat values present within the study area.</p> <p>Water quality sampling was further undertaken across multiple locations across the Project site and identified frequent exceedances of physico-chemical parameters outside of the Water Quality Objectives (WQO) along Springton Creek, Stanley and Duckworth Creek and Charlevue Creek.</p> <p>A combined review of all these assessments indicates that the systems within the study area are in poor condition and are only able to provide limited aquatic values.</p>
62	Appendix H Section 7.0 Potential Impacts	Provide a discussion about the impact of the proposed mining activity on the aquatic ecology environment in times of flood and drought.	Provide further information.	<p>Flooding Information</p> <p>Flood impact assessments were undertaken by WRM Water and Environment Pty Ltd, and are included in Appendix B of the <i>EA Application: Revised Supporting Information</i> document. This flood impact assessment concluded that flooding impacts will be contained within the mining lease area (1% AEP flood), and no impacts would occur downstream of the Project. As such any impacts during flood events to the aquatic ecological values identified would be limited to the mining lease area.</p> <p>The study further indicated that water runoff would not result in contaminants entering the system during peak flooding events. The clean water drains along Springton creek tributary (C Pit and AB Pit) would further not result in a significant increase to flooding depths or velocities; whilst clean water drains will suitably contain flood waters from extending out into unaffected areas. The development of the haul road crossing over Charlevue Creek will result in increased flood water levels downstream; these impacts will be contained within the mine lease area. Additionally, minimal loss of stream catchments would occur following the decommissioning phase of the mine.</p> <p>Overall flood impacts resulting from the presence of the Project are not likely to negatively impact the aquatic ecology values within or downstream of the study area. The clean water drain design is detailed in Appendix B Section 7. The proposed design would mimic the existing aquatic values of the diverted waterway and therefore will not lower the quality of the water in the systems, nor will it cause significant changes during flood events. The Project is short lived and following the decommissioning of the mine the final voids will not affect the water quality, habitat availability or flow of the waterways within the study area.</p>

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				<p>Drought Information</p> <p>In drought conditions the proposed mining activity is unlikely to impact on the existing aquatic ecological values as the Project will not result in the release of mine affected water to the waterways. The systems within the study area are all ephemeral and already experience prolonged dry periods. As well, the mine site water requirements of the Project can largely be sourced from water collected within the site water management system, as such the Project is not expected to exacerbate impacts resulting from drought.</p>
Surface water				
63	Supporting information Section 7.2.3 Surface water quality	Background water quality does not meet the Water Quality Objective (WQO) guideline values for the protection of aquatic ecosystems at many sites including pH (lower pH in 2019), dissolved oxygen (low DO), turbidity, suspended solids, ammonia, and sulphate (as SO42-) on a few occasions. Petroleum hydrocarbons were also found to exceed WQO guideline values at several sites, considered by the applicant likely due to the highway and agricultural practices.	Considering the absence of a specific industrial source, it is recommended that these hydrocarbon results are reviewed and confirmed.	<p>An oversight has been identified in regard to the petroleum hydrocarbon results. The analysis from ALS undertaken was specifically targeting 'TRH'; which refers to total recoverable hydrocarbons which analyses for more than just petroleum hydrocarbons. The results were interpreted as if the analysis was for 'TPH' which stands for total petroleum hydrocarbons. As such the exceedances of hydrocarbons cannot be attributed to only an anthropological source as total recoverable hydrocarbons also includes biogenic sources of hydrocarbons.</p> <p><i>A Receiving Environment Monitoring Program (REMP) has been developed as a part of the Project. This REMP will assess baseline water quality of the receiving environments, including the aquatic ecology health; the details of this monitoring program have been provided in the REMP Design Document (Appendix Q of the EA Application: Revised Supporting Information document).</i></p>

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64		It has been stated that samples were taken following two flow events. However, there is no indication of the flow characteristics at the time of sampling.	Provide flow data in addition to water quality data.	<p data-bbox="1149 336 2027 866">  </p> <p data-bbox="1122 898 2085 1007">The above graph depicts rainfall at the Blackdown Tablelands AL weather station (Station # 035186) located approximately 14.2 km south-west of the study area. The dates of the aquatic ecology surveys are marked in red. This indicates that the surveys occurred following rainfall events (optimal survey timing for the region).</p> <p data-bbox="1122 1038 2085 1147">Additionally, results of the site water balance model have been used to estimate the relative magnitude of the flow events occurring in the days prior to the samples being taken. This information has been presented in Section 7.2.3 and Figure 58 of the <i>EA Application: Revised Supporting Information</i> document.</p>
65		In accordance with Queensland WQOs guidelines, a minimum of 8 samples over a 12-month period are potentially sufficient to derive surface water quality trigger values (DEHP 2009). Only 2 sampling rounds data are provided within the report. This has implications	Additional data is required to establish a robust baseline and derive site-specific triggers for surface water quality. Provide all raw data for all monitoring locations in an	For the purposes of the EA, the Project will utilise the existing WQO for the Project's region. A Surface Water Monitoring Program will be put in place as part of the Project's REMP to routinely take surface water samples from the systems upstream and downstream of the study area. This monitoring program will incorporate multiple sampling events during periods of peak rainfall. This data will be utilised to derive surface water quality trigger values for the Project.

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		for the development of locally relevant WQOs and mine water release criteria.	excel format (including additional data obtained since the last sampling round presented in the report).	For further details regarding this surface water monitoring program see (Appendix Q of the <i>EA Application: Revised Supporting Information</i> document).
66	Supporting information Section 7.2.3 Surface water quality Table 28	WQOs are available for the Mackenzie River sub-basin and listed on page 129 of the Supporting Information report for the project. A mistake has been noted on the Total Nitrogen water quality objective (WQO) to be 7 µg/L (see Table 28 on page 129) instead of 775 µg/L proposed in the Environmental Protection (Water) Policy 2009 (EPP Water).	Ensure correct information is provided.	This was a typographical error and has been corrected; the water quality objective for total nitrogen is <775 µg/L.
67	Supporting information Section 7.3.3 Impacts on surface water quality	It has been stated that other runoff from disturbed areas, such as spoil dumps, will be intercepted by sediment dams designed in accordance with the SWMS. Discharge from sediment dams directly into the receiving environment (after settlement of suspended sediments) would only occur during rainfall events. The discharge is expected to have insignificant impacts on water quality, as overburden runoff quality is expected to be relatively benign. As total suspended solids have the potential to be a major issue, the erosion and sediment controls including the sizing of the sediment ponds requires consideration.	Address total suspended solids in the Erosion and Sediment Control Plan and REMP. It is recommended Suspended Solids trigger level be included in Table F5 – receiving waters contaminant trigger levels of the EA conditions proposed by the applicant, as per the <i>Model water conditions for coal mines in the Fitzroy basin</i> (2013) (ESR/2015/1561).	The Project will implement a REMP. The details of this monitoring program have been provided in the REMP Design Document (Appendix Q of the <i>EA Application: Revised Supporting Information</i> document). Baseline water quality of the receiving environments, including total suspended solids have been addressed in the REMP Design Document.
68	Supporting information Section 7.4.2 Mine affected water release	There are potential impacts of contamination of surface water caused by releases from mine water dams.	Provide further detail of the potential and actual impacts including the magnitude and duration.	Section 6.9 of the surface water assessment outlines the potential for accumulation of water in the mine water dam and the mine pits. The mine water dam would overflow to Pit AB. The results show that the risk of discharge from the Pits is negligible, and that mining operations could be sustained in the long-term by transferring excess water to Pit AB once mining there was complete. The likelihood of discharging mine affected water from the pit MAW system is minimal. As mentioned previously, at the MIA and CHPP, the MAW system has been sized to ensure the likelihood of discharge is small.

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				Water would only be discharged from the system when there are significant flows in the receiving waters in accordance with the EA conditions.
69		The design and water balance do not assume any release from the mine water dams. However, it has been stated that if any controlled releases are to occur, it would be in accordance with the EA conditions. Release limits at the mine affected water release points as well as at a downstream monitoring point proposed in Charlevue Creek are proposed in the draft EA conditions provided by the applicant. Proposed limits and indicators for such release should be carefully considered. Demonstrate sulphate is not an issue before proposing to remove it from monitoring requirements.	Justify amendments to the <i>Model water conditions for coal mines in the Fitzroy basin (2013)</i> (ESR/2015/1561) in relation to the proposed EA conditions.	<p>It is preferable not to list Sulphate as a release limit, as it is not a parameter which can be instantaneously measured during a release event. Additionally, sulphate is not considered a significant source of potential contamination from the Project. As part of the geochemical assessment undertaken for the project, the sulphate concentration in leachate from all mining waste samples tested was well below the applied ANZECC & ARMCANZ livestock water quality guideline criterion (1,000 mg/L).</p> <p>Sulphate has been included in the receiving waters contaminant trigger levels (Table F5 of the proposed EA Conditions), for monitoring at the background and downstream monitoring locations nominated in Table F6.</p>
70	Supporting information Section 7.4.4 Receiving water monitoring	It has been stated that site-specific reference/baseline values will be developed after a period of monitoring to assess future local water quality data.	Provide a detailed monitoring plan that would be used to assess the baseline water quality of the receiving environments (including locations, frequency, indicators and quality assurance/control methods). Data should be collected according the methods outlined in the Monitoring and Sampling Manual (DES, 2018). All available data should be provided in an excel format, including sampling conditions (rain, stream flow etc.).	A REMP has been developed for the Project. The details of this monitoring program have been provided in the REMP Design Document (Appendix Q of the <i>EA Application: Revised Supporting Information</i>). Baseline water quality of the receiving environments, including total suspended solids have been addressed in the REMP Design Document. Annual reporting will be required following monitoring, and detail all available data including sampling conditions (rain, stream flow, etc). The frequency of monitoring, including locations, indicators and quality assurance) has been addressed in the REMP Design Document.

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71	Appendix B Section 5.1 Site water types Table 5.1	<p>Sediment water is defined as 'surface water runoff from areas that are disturbed by mining operations (including out-of-pit waste rock emplacements)'.</p> <p>Although 'sediment water' may not come into contact with coal or other carbonaceous material, it has still come into contact with areas disturbed by mining operations and will contain an increased sediment load. On this basis, the department considers 'sediment water' to be mine affected water.</p> <p>Please note that the department considers runoff from areas which have had mine affected water applied as dust suppression to be mine affected water.</p>	<p>Amend Table 5.1 to remove the definition of 'sediment water'.</p> <p>Describe the management of runoff from haul roads.</p> <p>Update the water balance to include runoff from haul roads as mine affected water.</p>	<p>Requirement 1: The distinction has to be made between water which has mixed with pit water/tailings dam or processing plan/workshop water and overburden runoff so that this water can pass through erosion and sediment control structures and be released.</p> <p>The definition of sediment water has been retained with further clarification added as follows (refer to underlined text): Surface water runoff from areas that are disturbed by mining operations (including out-of-pit waste rock emplacements). This runoff does not come into contact with coal or other carbonaceous material and may contain high sediment loads but does not contain elevated level of other water quality parameters (e.g., electrical conductivity, pH, metals, metalloids, non-metals). Runoff must be managed to ensure adequate sediment removal prior to release to receiving waters. Note that prior to release through sediment control structures this water is considered mine affected water.</p> <p>Requirement 2: The site water management system has been modified to include:</p> <ul style="list-style-type: none"> • an additional Mine Water Drain to direct runoff from the northern part of Pit AB to the Mine Water Dam; • an additional small mine water dam between Pit AB and Pit C dedicated to containing runoff from the Pit C haul road; and • a dedicated mine water dam to collect runoff from the haul road on the western side of Charlevue Creek. <p>This is reflected in Section 5.3 of the Surface Water Assessment.</p> <p>Requirement 3: The additional captured haul road catchment is minimal compared to the total mine water system catchment and will not materially affect the water balance. Accordingly, the water balance has not been updated.</p>
72	Appendix B Section 5.3 Water management system components	"Raw water Dam" is listed under Mine affected water dams (p 42).	Ensure correct information is provided.	The information for the Raw Water Dam has been removed from the Mine Affected Water Dams Section (5.3.1) of the Surface Water Assessment and reinserted as Section 5.3.2.

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73	Appendix B Section 6.2 Groundwater inflows to mining pits Table 6.2	Insufficient detail is included explaining the marked changes to net annual inflows into AB pit. What changes during mine life years 11-14?	Provide further detail.	Section 6.6.2 of the Groundwater Impact Assessment explains that increase in the modelled and net inflow rate of the AB pit is due to groundwater from the spoil reporting to the final void area. The spoil was modelled as being placed dry (fully-drained but with a residual water content); the groundwater level in the spoil increased over time due to inflow from the floor and walls of the mined area, as this inflow rate was not subject to evaporation. In addition, the rate of recharge to the spoil occurs at a rate that is higher than the natural ground, allowing a water table to develop within the spoil. By mining year 11, the water level within the spoil had developed to a level that allowed relatively significant rates of inflow to occur.
74	Appendix B Section 6.5.2 Catchment runoff rates	It has been stated that adopted rainfall runoff parameters are summarised in Table 6.4. In the absence of site-specific parameters, parameters typical for coal mines in the Bowen Basin were adopted. No further justification has been provided to demonstrate that the adopted parameters (rainfall and runoff volumes) are appropriate for use in the surface water balance.	Demonstrate that the adopted parameters are appropriate for use in the surface water balance.	<p>The adopted rainfall runoff parameters are included as Table 6.4 in Appendix B of the <i>EA Application: Revised Supporting Information</i>. The adopted parameters are similar to those adopted through validation against observed site performance at a number of Bowen Basins mines.</p> <p>Specifically, the adopted parameters were selected so that the values of C_{avg} were less than those established for the corresponding catchments types by validation of the Isaac Plains Mine water balance model against recorded site data (including water storage volumes) over the period from January to December 2018. The validation model was configured to reflect the site operations during this period, with appropriate transfer rates, system configuration and water inflows and outflows. Site rainfall and evaporation data was used for the calibration.</p> <p>During 2018, the primary mine affected water storage at Isaac Plains Mine was S3 Pit (a mined-out pit area), therefore the validation of the water balance model was undertaken against the recorded inventory in S3 Pit between January and December 2018.</p> <p>The simulated S3 Pit storage inventory generally reproduced the observed overall mine observed water inventory fluctuations over the verification period between January and December 2018 with the exception of a few data points</p> <p>Compacted catchments (mining pit, roads/hardstand and stockpile/industrial areas) are characterised by hard surfaces which inhibit water infiltration, resulting in much higher rates of surface runoff.</p> <p>To represent compacted catchments, the depth of the model surface stores was substantially reduced and baseflow eliminated. The simulated volumetric runoff coefficient for disturbed catchments was 21%, about 4 times higher than natural catchments. This value is similar to typical values for urban catchments, which have similar characteristics.</p> <p>The adopted model parameters for “rehabilitated spoil” assume lower opportunities for evapotranspiration than natural catchments and also that a significant component of runoff will seep</p>

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				<p>through the spoil, discharging over several weeks rather than running off within a few hours of rainfall. The modelled runoff coefficient of 8.6% is around 1.5x that for natural catchments.</p> <p>The model parameters for “spoil” represents the uncompacted dumped overburden material, both in-pit and out-of-pit. It has also been applied to areas available for rehabilitation. The runoff coefficient of 9.8 % is around double that of natural catchments.</p> <p>Notwithstanding the above, an onsite water monitoring system will be used to validate system performance against the design assumptions (including adopted model parameters) in terms of water quality and water quantity, so that an adaptive management regime can be implemented to protect the surface water environment. The monitoring system would be used to ensure the performance of the water management system is not affected by any variance between adopted model parameters and actual parameters.</p>
75	Appendix B Section 6.9 Water balance model results	It was indicated that capacity of the mine water dam will be reached by Year 11, with increased potential of overtopping during wetter years. Table 6.8 summarises the overall annual site water balance, however no further explanation of the results is provided.	<p>Provide an interpretation summary of the data displayed in Table 6.8.</p> <p>Discuss the cause for the increase in site inventory over time, in consideration of the modelled decrease in rainfall and runoff.</p> <p>Provide a description of the management and mitigation measures to be implemented for erosion and sediment control and the release of mine affected waters.</p>	<p>The mine water dam receives pumped groundwater and surface runoff dewatered from AB Pit and C Pit (and potentially from the MIA and CHPP dams if required).</p> <p>The catchment of the Mine Water Dam is minimal (restricted to the dam itself and the immediate hillslopes). Water accumulating in the dam originates from incident rainfall, surface runoff and groundwater inflows from the nearby pit. Water will be transferred from the Mine Water Dam for reuse at the CHPP and for other uses as required.</p> <p>Groundwater inflows are expected to increase over time and eventually the net inflow would exceed the total site water demand. Water is therefore expected to accumulate in the mine water dam over the long term. The relatively large capacity of the mine water dam has been provided specifically for this purpose.</p> <p>As the mine water dam catchment is so small, fluctuations in water level due to rainfall and runoff are relatively small. The dam can therefore be maintained at an operating level relatively close to the spillway crest level with minimal risk of overflow. Notwithstanding, the mine water dam maximum operating level would include a freeboard to provide additional storage during rainfall events (i.e., the dam’s maximum operating level is less than the dam capacity).</p> <p>Further, the offsite discharge of mine water will be avoided completely by directing emergency overflows from the Mine Water Dam via a spillway to the mine pit. The water balance model results show that under this configuration, the risk of interruptions to mining is acceptably low, and no releases from the mine water dam are predicted.</p>

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76	Appendix B Section 6.9.5 Overall site water balance	Discuss how the inventory will be managed in terms of ESC and MAW releases etc. The Mine Water Dam is at capacity at year 7. It is not desirable to have a mine that accumulates MAW without management controls being implemented	Provide some additional information and interpretation regarding the increasing site water inventory and the numbers for predicted rainfall and runoff.	<p>As the mine water dam catchment is so small, fluctuations in water level due to rainfall and runoff are relatively small. The dam can therefore be maintained at an operating level relatively close to the spillway crest level with minimal risk of overflow. Notwithstanding, the mine water dam maximum operating level would include a freeboard to provide additional storage during rainfall events (i.e., the dam's maximum operating level is less than the dam capacity).</p> <p>Further, the offsite discharge of mine water will be avoided completely by directing emergency overflows from the Mine Water Dam via a spillway to the mine pit. The water balance model results show that under this configuration, the risk of interruptions to mining is acceptably low, and no releases from the mine water dam are predicted.</p>
77	Appendix B Section 8.2 Final void configuration Figure 8.1 and 8.2 Final landform and final void catchments	<p>The Figure "Predicted Flood Extents & Depths (Developed Condition), 0.1% AEP" shows the position of the Flood Levee as an orange-coloured line in Appendix A8. Interpolation of the flood level contours at the northern end of the levee indicates that the level of the floodwater at the northern end of the levee is 113.3 metres AHD in the 0.1% AEP flood.</p> <p>Examination of the subsequent Flood Map for the PMF, on page 129, entitled "Predicted Flood Extents & Depths (Developed Condition), PMF" indicates that the level of the floodwater at the same point near the end of the levee is 114.8 metres AHD in the PMF flood. This is 1.5 metres higher than the flood at the same point in the 0.1% (1:1000 AEP) Flood.</p> <p>The Flood Levee would have to be 1.5 metres higher to prevent the PMF flood from entering the Void. There is no indication in the text of the study, or on</p>	<p>Provide further certainty that the final void will not be in an undiverted floodplain, or a floodplain that has been redefined by a structure that is temporary or artificial.</p> <p>Provide further clarification whether the infrastructure required to prevent flooding inflows into the final void is temporary or permanent. If proposed to be permanent infrastructure, provide further information about the levee at relinquishment, including risks of failure and the required maintenance. How will the infrastructure be managed in perpetuity and by whom? If proposed to be temporary infrastructure, is the levee</p>	<p>The estimated flood levels referred to above, are approximately correct, and the modelling presented in the above section does incorporate the effect of a notional flood levee (the final landform design had not been finalised prior to the PMF modelling being undertaken).</p> <p>However, a flood levee is not required at this location to prevent inundation of the final void. This is further clarified in the figure below which overlays the proposed final landform on the results of the model of PMF flood under existing conditions (which are similar to the post-development conditions). The figure shows that the while the PMF flood encroaches onto the footprint of the Final rehabilitated Pit AB overburden dump, it does not extend to the footprint of the final void.</p> <p>The function of the levee is to protect the operational pit, especially when mining is active near the levee, around Year 5. The levee would be designed to temporarily protect the operational pit from flooding in the 1 in 1,000 AEP flood.</p> <p>As the levee is not required post-mining, it would be decommissioned or form part of the rehabilitated dump in this area. Details of the rehabilitated landform are provided in Section 4 of the <i>EA Application: Revised Supporting Information</i> document.</p> <p>The final void is not located in a floodplain.</p>

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		<p>the Flood Maps, that the Flood Study has been undertaken with a higher levee to exclude the PMF flood from the Final AB Void. The levee is not shown on the Map as an orange-coloured line, and not mentioned in the text but the PMF flood has been excluded along a neat straight line on the PMF flood Map as if there is a PMF Levee in position.</p> <p>It has been stated that “The final void will be located and designed such that it is not inundated by flooding in the probable maximum flood (refer Figure 8.2).” It is not clear what the function of the 1:100 AEP flood levee is.</p> <p>Will the structure later be raised higher than 1.21 and 2.37 metres at closure so as to definitely exclude the Probable Maximum Flood from the final void?</p> <p>Is the infrastructure proposed to be temporary or permanent?</p>	<p>going to be removed one the rehabilitation of the final void has been completed and approved? What is preventing mixing of the void water with floodwaters once the infrastructure is removed?</p> <p>Provide clarification about the height and function of the flood levee at mine closure and upon surrender and relinquishment.</p> <p>The department is unlikely to approve a void situated wholly or partially in a floodplain unless the void will be rehabilitated to a safe and stable landform that is able to sustain an approved post-mining land use that does not cause environmental harm.</p>	
78		<p>The proposed surface drain on Pit C has not been discussed in any of the information provided. What structures are required for this? Are these going to remain post-mining? Is there a risk of failure?</p>	<p>Provide further information about the proposed surface drain.</p>	<p>The surface drain is indicated on Figure 8.2 of the Surface Water Assessment (Appendix B of the <i>EA Application: Revised Supporting Information</i>).</p> <p>This drain will be incorporated into the final landform. Its purpose is to direct runoff from the southern side of the final landform north-east towards Springton Creek, so that it is prevented from entering the final void. The final void water balance model assumes that the void lake’s catchment will be limited by the presence of this channel.</p>

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				<p>The channel would be designed in detail as part of design of the final dump landform. It would have a longitudinal slope similar to the slope of the existing minor Springton Creek tributaries in the area and would be sized to ensure that it is a stable and self-sustaining component of the final landform.</p>
79	Appendix B Section 10.3 Final void lakes	<p>It has been stated that salt will accumulate within both voids over time. The void lake salinity is expected to exceed a TDS of 30,000 mg/L after approximately 500 years. Final void modelling suggests that during the first 200 years after closure, apart from short periods when inflows are very low, and salt concentrations temporarily increase rapidly due to evaporation, lake salinities will be less than 10,000 mg/L.</p> <p>No further information has been provided relating to final land use and rehabilitation outcomes for the voids. I.e., will the voids be partially backfilled above the coal seam? Will the highwall be blasted and shaped to partially backfill the pit?</p> <p>Based on the information provided, it appears that the final voids will not be able to support a post-mining land use.</p> <p>Demonstrate that the final landform re-establishes a functional hydrologic system that prevents erosion, maximises connectivity, prevents upstream and downstream surface and groundwater contamination in the short and long term and is consistent with the surrounding natural topography and landscape. Include drawings, figures and maps to illustrate the final landform.</p>	<p>Provide further detail regarding the final land use and rehabilitation outcomes for the final voids.</p> <p>Provide the results from a residual void study to support the statements made.</p>	<p>Section 4.3.3.3 of the <i>EA Application: Revised Supporting Information</i> document has been updated to provide further information on the rehabilitation and PMLU of the final void, including supporting research on the ability of the final void to support a final land use of fauna habitat.</p> <p>All areas within the boundaries of the MLA (excluding the undisturbed Capricorn Highway road reserve parcel) have been assigned a PMLU which is shown in Figure 36 of the <i>EA Application: Revised Supporting Information</i> document.</p>

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		<p>For areas that do not have a post mining land use proposed –</p> <ul style="list-style-type: none"> ○ demonstrate that these areas are limited in number and size to the extent possible by, for example, demonstrating that the land, or any part of the land, cannot be used for any post-mining land use; and ○ are located to prevent or minimise environmental harm by having regard to all reasonably practical alternatives for the location, and the nature of the environmental harm that may be caused at the proposed location, and the sensitivity of the environment surrounding the proposed location; and ○ demonstrate that these areas are capable of being managed to achieve best practice management and minimise environmental harm. 		
80	Appendix B Section 10.5 Impacts on downstream flow regime	It has been stated that after mine closure, the water management system will be decommissioned but there will be some residual impact on streamflow due to drainage to the final voids.	Discuss the impacts on environmental values and outline the residual impacts.	<p>Information on the impacts to downstream flow regimes has been provided in Section 10.5 of the Surface Water Assessment, and in Section 7.3.2 of the <i>EA Application: Revised Supporting Information</i> document.</p> <p>The impact on environmental values as a result of this catchment loss is expected to be negligible, based on an estimate of the impact of catchment loss on the frequency of low flows, as illustrated in Figure 10.1 of the Surface Water Assessment.</p>

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81	Appendix B Section 10.6.1 Seepage	It has been stated that there is some potential for seepage of water from the Mine Water Dam to Charlevue Creek.	Provide additional detail on mine water dam design to reduce seepage to Charlevue Creek.	<p>Final detailed design of the Mine Water Dam will be undertaken prior to construction.</p> <p>The Mine Water Dam will be impervious to leaking and drainage to groundwater sources to ensure contaminants remain contained. A liner of clay, 500mm thick and compacted to 97% saturated dry density, will be used as the impervious layer and clay cut off keys will also be employed to ensure compliance.</p> <p>If suitable clay material cannot be sourced, a HDPE or similar liner will be incorporated into the design.</p>															
82	Appendix B Section 11.1 Receiving water monitoring	Address the lack of gauging station for flow rates on Springton and Charlevue Creeks.	Provide further information.	<p>Two downstream gauging and water quality monitoring stations have been installed on Charlevue and Springton Creeks. These stations are initially being used to gather background flow and water quality data and will transition to downstream monitoring points once construction of the project commences.</p> <p>Prior to commencement of operations, additional stations will be installed upstream of the mine on both Springton and Charlevue Creeks.</p> <p>The location of these stations, along with the monitoring regime is outlined in the REMP Design Document (Appendix Q of the <i>EA Application: Revised Supporting Information</i>)</p>															
83	Post mining final void lakes	<p>The Supporting Information and Appendix B - Surface Water Assessment has indicated that the equilibrium water levels in the Final Voids will not seriously impact local aquifers. There are unexplained inconsistencies in the levels quoted.</p> <p>Section 4.3.4 of the Supporting Information stated an equilibrium level of 80m AHD. Section 7.3.5 of the Supporting Information states a maximum lake water level of 57.6 mAHD. In Appendix B - Surface Water Assessment, there are inconsistencies between the levels quoted in Section 8.11 and the levels shown in Figures 8.6 and 8.7.</p>	Address the inconsistencies around levels in the final pit configurations.	<p>Maximum, minimum and equilibrium water levels in the final voids have been provided in Table 8.5 of the Surface Water Assessment, and Table 37 of the <i>EA Application: Revised Supporting Information</i> document (reproduced below)</p> <table border="1" data-bbox="1128 959 1962 1137"> <thead> <tr> <th></th> <th>Pit AB (mAHD)</th> <th>Pit C (mAHD)</th> </tr> </thead> <tbody> <tr> <td>Long term equilibrium water levels</td> <td>52.9</td> <td>70.3</td> </tr> <tr> <td>Maximum long-term water levels</td> <td>57.6</td> <td>73.5</td> </tr> <tr> <td>Minimum long-term water levels</td> <td>47.4</td> <td>66.0</td> </tr> <tr> <td>Overflow level at natural surface</td> <td>112.0</td> <td>128.0</td> </tr> </tbody> </table> <p>Details of the floor and overflow levels of each final void are provided in Section 10.3 of the Surface Water Assessment, and Section 7.3.5 of the <i>EA Application: Revised Supporting Information</i> document</p>		Pit AB (mAHD)	Pit C (mAHD)	Long term equilibrium water levels	52.9	70.3	Maximum long-term water levels	57.6	73.5	Minimum long-term water levels	47.4	66.0	Overflow level at natural surface	112.0	128.0
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		<p>There is no one section in either the Information Document, or Appendix B, which is a single point of truth for:</p> <ul style="list-style-type: none"> • Maximum or proposed level of the waste rock backfill in the two voids. • Long term equilibrium water levels in the two voids (based on modelling). • Maximum and minimum long-term water levels in the two voids (modelled). • Final proposed floor level in the two voids. • Overflow level at natural surface for the two voids. <p>The problem of uncertainties about Levels is further exacerbated by the use of both mbgl (metres below ground level) and AHD (Australian Height Datum) as means of quoting different levels.</p>		
Groundwater				
84	Baseline Monitoring	<p>The department is concerned that the water quality data accumulated to date are too localised and do not provide adequate spatial representation of the site.</p> <p>The data was obtained over 9 months. The DSITI guidelines (Using monitoring data to assess groundwater quality and potential environmental impacts) (2017) recommend at least 8 to 12 groundwater samples be taken over a 12-month period to establish a robust baseline in</p>	<p>Provide the following information:</p> <p>a) Data (water level and quality) that is spatially representative of the ML area (i.e., in addition to collection of data at sites 1 to 6) should be collected for at least 12 months including end of dry and end of wet season data (i.e.,</p>	<p>a) Groundwater monitoring (water level and water quality) is undertaken at a total of 39 bores at 17 sites; of these, a total of 6 bores have been dry for all monitoring events, with 5 of these bores in the Tertiary sediments and 1 bore in the Permian coal measures. The locations of groundwater monitoring bores are shown in Figure 68 of the <i>EA Application: Revised Supporting Information</i> and summary bore details are provided in Table 4-1 of the Groundwater Impact Assessment (Appendix C of the <i>EA Application: Revised Supporting Information</i> document).</p> <p>Groundwater quality and level data has been collected from bores between December 2018 and October 20, with quality results summarised in Table 46 of the <i>EA Application: Revised Supporting Information</i> and both quality and level data presented in full in Appendix D.</p> <p>b) A baseline data set has been established that includes:</p>

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		<p>order to derive site-specific triggers or limits for groundwater quality.</p>	<p>should reflect seasonality).</p> <p>b) The water quality data collected above should then be used as baseline water quality data, for determining and assessing natural variability and to derive appropriate site-specific triggers for the EA (refer to <i>Using monitoring data to assess groundwater quality and potential environmental impacts. Version 1.</i> (DSITI, 2017)</p> <p>c) Data from the Stage 2 bore installation (bores installed May/June 2019) for which only field-testing data was provided should be updated and used in the derivation of appropriate site-specific triggers.</p> <p>d) All ground water level data for bores at sites 1 to 5 must be provided.</p> <p>e) Provide a date by which bore DW7292W1 be fitted with a data logger.</p> <p>f) Describe the streamflow gauging, including the locations of and timeframe for streamflow gauging that will take place in order</p>	<ul style="list-style-type: none"> • for sites 1 to 5, water level and water quality data is available from 19 sampling events at 2-monthly intervals between December 2018 and November 2019 and from March 2020 to October 2020; and • for sites 6 to 17, water level and water quality data is available from 14 sampling events between September 2019 and October 2020; <p>Summary statistics for the water quality data (total number of samples, minimum and maximum values, mean, median, standard deviation, 80th and 95th percentiles) are included in Table 46 and presented in full in Appendix D of the <i>EA Application: Revised Supporting Information</i>.</p> <p>The water quality data has been reviewed in accordance with the recommended guidelines, <i>Using monitoring data to assess groundwater quality and potential environmental impacts. Version 1</i> (DSITI 2017), and proposed trigger levels are provided in Table 51 of the <i>EA Application: Revised Supporting Information</i> and included in Table E4 of the Draft EA conditions.</p> <p>Rationale for the proposed trigger values are outlined in Section 8.4 of the <i>EA Application: Revised Supporting Information</i> document. Data for each of the proposed compliance bores compared to the proposed trigger levels are shown graphically in Figures 24 to 42 of Appendix D of the <i>EA Application: Revised Supporting Information</i> document.</p> <p>c) Data is available as discussed above in (b) and has informed the derivation of site-specific triggers that are proposed, as discussed in Section 8.4 of the <i>Revised Supporting Information</i> document.</p> <p>d) Groundwater data for sites 1 to 17 are included in Appendix D and are shown graphically in Figures 2 to 7 in that Appendix.</p> <p>e) For bore DW7292W1 (Springton Creek alluvium - Site 17) a data logger was fitted initially in April 2020. However, the data logger was found to be faulty and the data was unusable. A new data logger was installed in July 2020 and has been recording at 6-hourly intervals since that time. Section 8.2.4 of the <i>Revised Supporting Information</i> has been updated to reflect this.</p> <p>f) Two downstream gauging and water quality monitoring stations have been installed on Charlevue and Springton Creeks. These stations are initially being used to gather background flow and water quality data and will transition to downstream monitoring points once construction of the project commences.</p>

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			<p>to establish the relationship between creek flow and ground water levels that will take place.</p> <p>g) Provide all monitoring data from the data logger fitted to bore DW7076W and the date that it was fitted.</p> <p>h) Provide all monitoring data for bores at sites 6 to 17.</p>	<p>Prior to commencement of operations, additional stations will be installed upstream of the mine on both Springton and Charlevue Creeks.</p> <p>The location of these stations, along with the monitoring regime is outlined in the REMP Design Document.</p> <p>g) For bore DW7076W (Charlevue Creek alluvium - Site 5) a water level data logger is fitted to the bore that has been logging data at 3-hourly intervals from December 2018 to present. Available logger data for bore DW7076W and DW7292W is summarised graphically in Figures 2 – 7 of Appendix D of the <i>Revised Supporting Information</i>.</p> <p>h) Available water level and quality data has been provided in Appendix D of the <i>EA Application: Revised Supporting Information</i> document.</p>
85	Monitoring Network	<p>The groundwater monitoring network (sites 1 to 5) to establish the baseline are not considered to be representative of the project area and should be spread out across the site and strategically located to assess any potential source of contamination.</p> <p>The monitoring bores should not be located where there is a high probability to be directly impacted or destroyed by the activity, unless replaced by other bores.</p> <p>It is noted that the monitoring network was expanded to include bores at sites 6 to 17 (i.e. the network has been augmented). The monitoring network has been described in terms of the location and screening of bores within the hydrostratigraphic units but the intended purpose of each bore and proposed long term frequency of monitoring of the bores is not described.</p>	<p>Once sufficient baseline data has been obtained the following is required:</p> <p>a) A review of the groundwater model using all the data collected.</p> <p>b) Review the proposed monitoring bores and justify the consolidated bore network based on factors such as the represented aquifers, the groundwater flow directions, the environmental values and the impacting activities on site.</p> <p>c) A revised conceptual model of the hydrogeology of the mining lease including updates to the</p>	<p>a) Based on data collected to date, it is assessed that the data and conceptualisation in the model is still sound and that no update of the groundwater model is required at this stage.</p> <p>b) The groundwater monitoring bore network was designed based on the following considerations:</p> <ul style="list-style-type: none"> • bores are located within all groundwater units present at site (Quaternary alluvium of Charlevue Creek and Springton Creek, Tertiary sediments, Permian coal seams and interburden units); • the majority of bores were located in the area of the AB pit, as this pit is planned to be developed first; • the bores are broadly aligned in two transects to provide drawdown data within the mined area, immediately adjacent to the mined area, and at distance towards Charlevue Creek and Springton Creek. • bores are located within all groundwater units that exist between the AB Pit and the C Pit, to provide information on the extent of drawdown between the pits and as a way of providing drawdown data to validate the groundwater model. • additional bores are located within and immediately adjacent to the C Pit, within all groundwater units encountered in that area (to base of mining) to provide both water level and water quality data in that area. • the spatial and vertical layout of the bore monitoring network (which includes 39 bores at 17 sites) will allow:

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		<p>The selected bore locations should reflect the current understanding of the hydrogeology with an aim to get a more detailed conceptual understanding of the hydrogeology, aquifers present, standing water levels and direction of groundwater flow. While the augmented network appears to provide adequate spatial coverage, very little information is provided to demonstrate that monitoring bores have been located giving consideration to the spatial representation of hydrostratigraphic units both up and down stream of the Gemini Project or in relation to proposed infrastructure. The bore locations should be justified through an explanation of their locations, and the application should include a figure showing the location of the monitoring bores relative to the proposed infrastructure.</p> <p>The conceptual model and groundwater monitoring network provided in the submitted application is not supported by sufficient fit for purpose baseline monitoring.</p> <p>Falling head slug tests were undertaken on bores 6 to 17 to obtain site specific hydraulic conductivity data for groundwater modelling. Falling head slug tests were not undertaken on the bores at sites 1 to 6.</p> <p>An adaptive management program is anticipated however an ongoing adaptive management strategy for the</p>	<p>hydrogeology, aquifers present, standing water level and the direction of groundwater flow.</p> <p>d) The proposed operational phase monitoring network demonstrating that consideration has been given to: the revised conceptual model and groundwater flow model, the location of the mining activities, potential sources of contaminants (seepage from dams and overburden dumps).</p> <p>e) Demonstrate that there is adequate spatial coverage and representation of aquifers both up and down gradient in relation to potential contamination sources.</p> <p>f) Include a documented rationale for the spatial distribution of the sampling design / network and the monitoring frequency.</p> <p>g) Demonstrate clearly that the monitoring network is fit for purpose with bores classified as reference/control and test/compliance and the</p>	<ul style="list-style-type: none"> o assessment of the variability of water quality across the site and within vertically separated groundwater units at the same location (e.g., coal measures and overlying Tertiary sediments); o assessment of the potential for upward vs downward groundwater movement at a single location; o assessment of groundwater flow direction within the distinct groundwater units; o assessment of recharge potential of the various groundwater units, particularly the Quaternary alluvium where water level loggers have been fitted to bores DW7076W and DW7292W. <p>c) A detailed conceptual model is presented in the <i>Groundwater Impact Assessment</i> (JBT 2019). Following review of the available water level and water quality data, no major update of the conceptual model is proposed, with the exception of the following additional observations:</p> <ul style="list-style-type: none"> • Available water level data is summarised in Appendix D of the <i>EA Application: Revised Supporting Information</i> and bore hydrographs for each site are shown in Figures 2 to 7 of that Appendix. The figures all include a graph that shows monthly rainfall data as well as the rainfall residual mass curve for the period of monitoring, to allow assessment of rainfall on groundwater level trends. It is noted that both alluvial monitoring bores (DW7076W and DW7292W1) record a falling water level trend followed by a rising water level trend that is interpreted to be related to the above-average rainfall of February 2020, with the water level then starting to fall again in around July 2020. From the available data, it appears that this is a seasonal trend for the Quaternary alluvium. A recharge response is either more subdued or absent in Tertiary and Permian monitoring bores. • The groundwater flow direction within the Permian sediments is assessed to be from south-southwest to north-northeast (JBT 2019). It is noted from available water quality data that the EC of the Permian coal measures is generally lower towards the south (i.e., for bores in the area of the C Pit) and higher towards the north (i.e., for bores in the area of the AB Pit). This is consistent with a general degradation in water quality along the groundwater flow line, i.e., with increased groundwater residence time. <p>d) A revised groundwater monitoring network that comprises compliance bore sites and reference bores sites is presented in Section 8.4 of the <i>EA Application: Revised Supporting Information</i>.</p> <p>Additional monitoring bores will be installed as required around sources of potential contaminants, though it is noted that these are best installed once the facilities themselves (e.g., dams) are installed, to avoid the bores being destroyed during earthworks and to allow targeted bore placement.</p>

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		<p>collection of data, review and recalibration of the underground water model and review of the monitoring program in order to ensure that impacts on Environmental values are avoided and mitigated has not been detailed.</p> <p>In order to derive site-specific limits for all bores listed by the applicant in Section 14 of the supporting document in Table E1, additional data should be provided for all the designated bores. Sufficient data are required in order to identify natural variability within the different aquifers, as per the DSITI guidelines (2017). The proponent should provide the proposed monitoring plan to assess the groundwater quality baseline at each bore or group of bores.</p> <p>Once sufficient data are obtained, the proponent is required to nominate compliance bores and propose limits for relevant indicators.</p>	<p>target aquifer is identified.</p> <p>h) A detailed monitoring plan to assess the groundwater quality baseline at each bore or group of bores.</p> <p>i) Provide a detailed adaptive management strategy proposed for the mitigation and management of drawdown and potential water quality impacts; and</p> <p>j) Detail any proposed strategies for the review and recalibration of the underground water model and review of the monitoring program in order to ensure that impacts on environmental values are avoided and mitigated.</p>	<p>e) f) g) Refer to response (a) in issue 84.</p> <p>h) A <i>Groundwater Monitoring and Management Plan</i> has been prepared and attached to Appendix E of the <i>EA Application: Revised Supporting Information</i> document.</p> <p>i) The predictions from groundwater modelling will be reviewed on an ongoing basis once mining commences and drawdown data becomes available to validate the predictions of the groundwater model. The groundwater model will be re-calibrated as necessary and updated predictions of groundwater impacts and mitigations measures made as appropriate.</p>
86	Trigger Values	<p>The proposed groundwater monitoring program should achieve the early detection of any potential impacts to groundwater resources at Gemini, to maintain groundwater at a suitable background quality.</p> <p>Trigger values should be assessed/proposed based on the guideline <i>Using monitoring data to assess groundwater quality and potential</i></p>	<p>Demonstrate that baseline groundwater monitoring data has been collected and that proposed trigger values are determined in accordance with the DSITI Guideline (March 2017).</p>	<p>The water quality data has been reviewed in accordance with the recommended guidelines (<i>Using monitoring data to assess groundwater quality and potential environmental impacts. Version 1. DSITI, 2017</i>).</p> <p>Proposed trigger levels are provided in Table 51 of the <i>EA Application: Revised Supporting Information</i> document. The following observations and comments are made with respect to the proposed trigger levels:</p> <ul style="list-style-type: none"> • The water quality data collected to date represent background data; • The data is presented with reference to the three groundwater units that have been identified at site, being: <ul style="list-style-type: none"> ○ Quaternary alluvium associated with Charlevue Creek and Springton Creek;

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		<p><i>environmental impacts. Version 1.</i> (DSITI, 2017) guideline. The guideline details a process for data evaluation to calculate site specific trigger values for groundwater. It is recommended that this guideline is followed, both in the collection of baseline monitoring data, and ensuring that baseline monitoring ensures sufficient data for the statistical robustness of trigger values as per the guideline.</p> <p>Trigger values should be fit for purpose and conservative enough that when applied to the investigation bores they provide an early warning of emerging potential impacts to the quality of the groundwater. Applying triggers which are set too high may not be sensitive enough to identify current or emerging contamination issues.</p>		<ul style="list-style-type: none"> ○ Tertiary sediments, which are present over the entire lease area. It is noted that 5 out of 11 Tertiary monitoring bores have been dry for the full period of monitoring. These are the same bores that were noted as being dry during the preparation of the groundwater impact assessment (JBT 2019) and the conceptualisation that was presented in that report still stands; ○ Permian coal measures (coal seams and interburden/ overburden sediments) ● The three groundwater units contain groundwater with broadly distinct chemistry, therefore trigger levels are proposed based on the data for each of the groundwater units; ● Trigger levels are proposed for a subset of the bores (the compliance monitoring bores) within the groundwater monitoring network, with the proposed compliance bores identified in Table 50 of the <i>EA Application: Revised Supporting Information</i> document ● Compliance and reference bores have been selected as follows: <ul style="list-style-type: none"> ○ The compliance bores provide a spatial coverage within all groundwater units identified at site and where possible are located close to mining areas (within the zone of predicted impact) but not within the disturbance footprint of mining (i.e. within the proposed pit area); ○ Reference bores have been selected to be located within the same groundwater units but at locations that are distant from the area where mining is first proposed to commence (the AB Pit Area). As mining progresses towards the C Pit area, the existing reference bores are likely to become the compliance bores for that area. ● Because a large number of Tertiary monitoring bores are dry, the proposed compliance bore network for Tertiary bores is limited to the bores that contain water. One bore (DW7225W1) is located within the mining footprint of the C Pit, though mining of the AB Pit will occur in advance of mining in this area. The bore is included to provide spatial coverage of the Tertiary sediments, but will require replacement once mining in the C Pit area commences. ● The rationale for setting of trigger levels is as follows: <ul style="list-style-type: none"> ○ For EC and sulphate the trigger level is based on the 95th percentile of the data for each groundwater unit ○ For pH, the proposed trigger level range is based on the range of site data; ○ For metals/metalloids where the data is generally below the ANZG (2018) aquatic ecosystem protection limit for moderately disturbed system (95% protection), the proposed trigger level is based on the ANZG (2018) limits; ○ For mercury, the proposed trigger is based on the LOR of the analytical method FIMS; ○ For metals/metalloids where the site background data is generally above the ANZG (2018) freshwater protection limit, the proposed trigger level is based on the 95th percentile of the data for each groundwater unit.

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				<ul style="list-style-type: none"> For compliance assessment a control charting technique is proposed, with a trigger exceedance being 2 consecutive samples above the trigger level and a limit exceedance being 4 consecutive samples above the trigger level. This criteria is proposed as it is noted that the background data at individual compliance bore sites is close to and in some cases exceeds the proposed trigger, and that an assessment criteria of one exceedance equalling a trigger event would result in the reporting of trigger exceedances for almost every sample event, even with pre-mining background data; The trigger levels shown in Table 51 of the <i>EA Application: Revised Supporting Information</i> document are proposed as interim trigger levels and it is proposed that the levels are further reviewed after collection of an additional 2 years of data
87	Water Balance modelling	Modelling has been undertaken to assess the extent of groundwater level impacts from the proposed project and the rate of groundwater inflow to the pits.	<p>Provide an updated numerical model based on updates to the conceptual and groundwater flow direction models, incorporating groundwater monitoring data obtained to date.</p> <p>Demonstrate that the proposed water management strategies will perform adequately in terms of maintaining the capability of reducing mine affected water inventories and compliance with any proposed release criteria. The water management system performance must demonstrate that it is able to manage excess water during and after very high rainfall wet season conditions.</p>	<p>Based on data collected to date, it is assessed that the data and conceptualisation in the model is still sound and that no update of the groundwater model is required at this stage.</p> <p>Water balance modelling, and the performance of the site water management system is summarised in Section 3.4.5 of the <i>EA Application: Revised Supporting Information</i> document and provided in detail in Section 6 of the Surface Water Assessment.</p>

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88	Groundwater dependent ecosystems	<p>It cannot be conclusively ruled out that the groundwater level is beyond the depth that is accessible to the root zone of some plants (vegetation adjacent to Charlevue Creek) or that there is not continuous saturation below the potential groundwater dependent ecosystem (GDE) that has been identified. Furthermore, the seasonal range of water level within the alluvium is not known, and the 2m drawdown contour at post-mining equilibrium extends under the area where the potential GDE is located. Ongoing monitoring has therefore been recommended, including monitoring within the alluvium via water level data loggers. It is noted that a data logger is already fitted to bore DW7076W and that it is planned to install a logger in bore DW7292W1.</p> <p>The GDEs that may be impacted by the activity and the expected drawdown includes Charlevue Creek, Springton Creek and an 88 ha HES wetland located approximately 4 km east of the MLA boundary. The applicant indicates that this wetland is located within a shallow depression on an elevated ridgeline. On page 48 of the Appendix B Groundwater Impact Assessment report, it is stated that, “based on modelling, professional experience and judgement, ..., It is interpreted that the risk posed by drawdown from the mining operation to the potential GDE is very low as:</p>	<p>a) Describe a plan for the ongoing monitoring of groundwater levels within the Charlevue and Springton Creek Alluvium that is proposed to be undertaken, including the locations and frequency of monitoring.</p> <p>b) Include the derivation of indicators, thresholds and triggers relevant to the protection of GDE values.</p> <p>c) Demonstrate that the monitoring locations selected for monitoring the alluvium are adequately representative of the alluvium across the site.</p> <p>d) Provide a date by which the data logger will be installed in bore DW7292W1.</p> <p>e) Provide detail in relation to the streamflow monitoring that is or will be undertaken in order to allow the relationship between creek flow and water level to be established over time.</p> <p>f) Provide information relating to how the information collected from</p>	<p>a) Manual water level monitoring is currently undertaken on groundwater monitoring bores at 2-monthly intervals. In addition to manual water level monitoring, bores that are located within the Charlevue Creek alluvium (DW7076W) and Springton Creek alluvium (DW7292W1) are fitted with data loggers, which are recording at 3-6 hourly intervals.</p> <p>b) Refer to response (b) in issue 84 and to the response to issue 86.</p> <p>c) Refer to response (b) in issue 85</p> <p>d) For bore DW7292W1 (Springton Creek alluvium - Site 17) a data logger was fitted initially in April 2020. However, the data logger was found to be faulty and the data was unusable. A new data logger was installed in July 2020 and has been recording at 6-hourly intervals since that time. Section 8.2.4 of the <i>EA Application: Revised Supporting Information</i> document has been updated to reflect this.</p> <p>e) Two downstream gauging and water quality monitoring stations have been installed on Charlevue and Springton Creeks. These stations are initially being used to gather background flow and water quality data and will transition to downstream monitoring points once construction of the project commences.</p> <p>Prior to commencement of operations, additional stations will be installed upstream of the mine on both Springton and Charlevue Creeks. The location of these stations, along with the monitoring regime is outlined in the REMP Design Document.</p> <p>f) The predictions from groundwater modelling will be reviewed on an ongoing basis once mining commences and drawdown data becomes available to validate the predictions of the groundwater model. The groundwater model will be re-calibrated as necessary and updated predictions of groundwater impacts and mitigations measures made as appropriate.</p> <p>g) A revised groundwater monitoring network that comprises compliance bore sites and reference bores sites is presented above in response (b) in issue 85 and described in Section 8.4 of the <i>Revised Supporting Information</i>. Additional monitoring bores will be installed as required around sources of potential contaminants, though it is noted that these are best installed once the facilities themselves (e.g., dams) are installed, to avoid the bores being destroyed during earthworks and to allow targeted bore placement.</p>

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		<ul style="list-style-type: none"> It is interpreted that the potential GDE exists in an area where the groundwater system is very localised and is perched above the regional groundwater system; and, The groundwater lens that is interpreted to be located beneath the potential GDE is likely to be maintained by seasonal surface water runoff rather than the regional groundwater system." <p>These vague statements do not provide certainty that the wetland will not be impacted by the activity. The figure below shows that the drawdown extent is modelled to extend to the HES wetland.</p>	<p>the monitoring of the Alluvium will be incorporated into the refinement of the conceptual and numerical groundwater models. This should include verification of specialist opinions relating to the probability that the potential GDE's are underlain by a perched groundwater system and that the riparian vegetation (within Charlevue and Springton Creeks) are reliant on moisture or perched groundwater existing for a period of time after a flow event rather than being reliant on groundwater.</p> <p>g) Review monitoring bore locations to ensure the main potentially impacting activities on site are monitored, as well as any potential impact to the HES Wetland to ensure detection of any significant impacts. Provide and justify the consolidated monitoring bore network.</p>	
89	Drawdown	The results of drawdown modelling are described by a 5m and a 2m drawdown extent. This selection is based on the definition of bore trigger thresholds for	As per Section 126A(2)(c)(iii) of the EP Act provide a description of the aquifer or aquifers	<ul style="list-style-type: none"> The Quaternary alluvium is assessed to be a perched system where water exists within this unit (i.e. the alluvium is generally hydraulically separated from the underlying regional groundwater system). It is therefore conceptualised that groundwater level drawdown within the Permian coal measures will have minimal impact on water levels within the alluvium.

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		<p>the <i>Water Act 2000</i> and have been used to estimate the potential impact on existing groundwater users.</p> <p>The potential for impact on environmental values has been assessed as low risk and the likelihood dependency of the vegetation on groundwater for survival is assessed as unlikely. The assessment does however conclude that drawdown from mining may affect water levels in the alluvium at some locations and ongoing monitoring is recommended.</p> <p>Interim groundwater level triggers that instigate investigations into groundwater resource impacts, which are informed by modelling should be selected for the protection of environmental values. These are useful for assessing model predictions, evaluating drawdown impacts, instigating investigations and implementing mitigation measures.</p> <p>The association between stages of mining/time and drawdown within each aquifer has not been well described.</p> <p>It is suggested that the applicant undertake some preliminary work to model the rate of drawdown in order to assess the model and expected impacts during operation and potential measures to be taken to ensure the predicted drawdown is not exceeded.</p>	<p>where the water level in that aquifer is predicted to decline because of the exercise of underground water rights.</p> <p>Establish and provide drawdown triggers (including a rationale) based on the identified Environmental values. Once sufficient data is obtained, the proponent is required to nominate compliance bores and propose limits for relevant indicators.</p> <p>Undertake further modelling to determine the rate of drawdown to fully assess the expected impacts and include sufficient monitoring controls are in place to identify and manage any potential impacts</p> <p>Consider undertaking a bore survey to identify the potential impacts of drawdown on potentially impacted properties.</p>	<ul style="list-style-type: none"> The water level is predicted to decline primarily within the Permian coal measures in response to mining. It is noted that the Tertiary sediments are not a continuously saturated unit across the mine site, though where the unit is saturated it could be expected that drawdown impacts would extend to this unit within the area of identified drawdown A Groundwater Monitoring Plan has been provided as Appendix E to the <i>EA Application: Revised Supporting Information</i> document, with details of the compliance and reference bores also outlined in Table 50. Once sufficient water level drawdown data is available to validate the model predictions, further groundwater modelling will be considered if necessary. A bore survey of neighbouring properties (i.e. properties that adjoin the MLA) will be undertaken once the Project is approved

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		The model indicates an impact of the drawdown on registered bores outside the MLA boundary.		
90	Chapter 3 requirements (Water Act, 2000) - Associated Water	<p>New projects within a regulated groundwater area have a statutory right to take underground water ('associated water') under section 334ZP of the <i>Mineral Resources Act 1989</i>. The project is therefore subject to the underground water obligations set out in Chapter 3 of the <i>Water Act 2000</i>, including the requirement to prepare Underground Water Impact Reports (UWIR) and Baseline Assessment Plans (BAP) before dewatering begins. Make good provisions under Chapter 3 of the <i>Water Act 2000</i> also apply.</p> <p>The application form indicated that the Gemini will be exercising their right to take or interfere with underground water. Section 126A of the EP Act outlines the information requirements which must accompany a site-specific application where a resource activity involves the exercise of underground water rights and ensures that upfront assessment of the impacts to environmental values from the exercise of these underground water rights has been undertaken.</p> <p>The information requirements detailed in the guideline <i>Requirements for site-specific and amendment applications – underground water rights, V1.01</i> (ESR/2016/3275) (the guideline), are required to be met for the Gemini application. The guideline suggests</p>	<p>Address and provide the information requirements in the guideline Requirements for site-specific and amendment applications – underground water rights, V1.01 (ESR/2016/3275).</p> <p>Recalibrate the Numerical Model and test the Conceptual Model by increasing the accuracy of field data once sufficient data is available to improve the certainty of the model outputs and the identification of potentially impacted environmental values.</p>	<p>The <i>EA Application: Revised Supporting Information</i>, including Appendices C and E, provide information relevant to the assessment of the EA Application.</p> <p>Prior to the take of underground water, information required by the guideline Requirements for site-specific and amendment applications – underground water rights, V1.01 (ESR/2016/3275) will be packaged into a specific Underground Water Impact Report and Baseline Assessment Plan.</p> <p>Once sufficient data becomes available to validate the groundwater model, the data will be used to recalibrate the numerical groundwater model if required.</p>

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		<p>specific methods and information that the department believes to be appropriate to meet the requirements of 126A of the EP Act, and types of Environmental values that the department believes to potentially be affected by the exercise of underground water rights.</p> <p>As discussed under previous sections the limited sampling and representation of aquifers presents an underlying source of uncertainty and concern for the department, due to its limited ability to capture spatial and temporal variability. Any modelling (Numerical, Flow, Conceptual, Water balance) undertaken on the basis of limited sampling is thus potentially equally uncertain.</p> <p>Recalibration of the Numerical Model and testing the Conceptual Model by increasing the accuracy of field data once sufficient data is available is considered necessary to improve the certainty of the model outputs and the identification of potentially impacted environmental values.</p>		
Air Quality				
91	Appendix I Section 3.3.2 Sensitive receptors Figure 4 Location of sensitive receptors	Figure 4 shows the locations of each of the sensitive receptors within close proximity to the Gemini Coal Project. However, the figure provided does not provide sufficient information to assist the department to make a decision.	Provide a map utilising satellite imagery and GPS co-ordinates of all sensitive receptors, including those which have compensation or purchase agreements to	Figure 77 of the <i>EA Application: Revised Supporting Information</i> document has been updated to include satellite imagery and the location of all sensitive receptors (including those which have had compensation or purchase agreements).

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			assist with the department's assessment.	
92	Appendix I Section 3.3.3.1 Existing sources of emissions	<p>Insufficient consideration has been given to emissions from Bluff Coal Mine as an existing emissions source. Bluff Coal Mine is located approximately 25km west of Dingo.</p> <p>Potential cumulative impacts from Bluff Coal Mine must be considered as part of the overall assessment of the Gemini Coal Project.</p>	Amend the Air Quality and Greenhouse Gas Assessment to consider potential cumulative impacts of Bluff Coal Mine.	<p>Appendix I is now Appendix L, Section 3.3.3 of Appendix L of the <i>EA Application: Revised Supporting Information</i> document has been revised to include reference to the Bluff Coal Mine that is located 11 km west of the Gemini Project.</p> <p>Potential contributions from the Bluff Coal Mine on sensitive receptors are expected to be adequately accounted for in the Blackwater monitoring data used to determine background particulate concentrations utilised in the cumulative assessment of the Gemini Project. Further, the Bluff Mine is currently in care and maintenance with no certainty of return to operations.</p> <p>Results were compared against Environmental Protection (Air) Policy air quality values and have been updated in Section 9.3.3 of the <i>EA Application: Revised Supporting Information</i> document.</p>
93	Appendix I 3.3.3.2.1 Existing ambient air quality	<p>It has been stated that "The nearest available monitoring site for PM₁₀ and PM_{2.5} is located at Blackwater Township, approximately 35 km west of the Project site'.</p> <p>Statements made in Section 3.3.3.2.1 suggest that the applicant has not undertaken onsite ambient air quality monitoring to determine the background air quality for the Gemini Coal Project.</p>	<p>Describe in detail, what ambient air and dust monitoring was undertaken at the site to determine the background and/or current air quality for the Gemini Coal Project.</p> <p>Consider at least one year of data before adopting background levels.</p> <p>If onsite ambient air quality monitoring was not undertaken as part of the ambient air quality assessment, demonstrate how air quality data taken at Blackwater for a four-month period is sufficient</p>	<p>Ambient monitoring has not been conducted on-site. Therefore, data from DES's monitoring station at Blackwater was relied upon to characterise the existing environment.</p> <p>It was noted DES does not conduct monitoring for certain parameters such as total suspended particles (TSP) and dust deposition at its Blackwater site and publicly available data for the region is limited. Therefore, background levels of TSP have been derived from the measured PM₁₀ data at Blackwater. Dust deposition rates have been based on typical dust deposition rates for rural areas.</p> <p>Section 3.3.3.2 of Appendix L of the <i>EA Application: Revised Supporting Information</i> document has been revised to include 12-months of data from the DES monitoring station at Blackwater for the period April 2019 to April 2020. Background concentrations used in the assessment have been revised to reflect this 12-month period.</p> <p>Temporal and meteorological variation was further considered in the context of background air quality at the Blackwater monitoring site to explain existing exceedances of the Environmental Protection (Air) Policy objectives. A summary of these occasions and temporary/meteorological influence is provided in Section 3.3.3.2.1 and Table 4 (Appendix L) of the <i>EA Application: Revised Supporting Information</i> document</p> <p>Section 9.2.3 of the <i>EA Application: Revised Supporting Information</i> document has been updated to reflect changes to background concentrations used in the assessment.</p>

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			to demonstrate the expected background air quality, with consideration of temporal and meteorological variation, at the Gemini Coal Project.	
94		<p>It has been stated that “For the purposes of the cumulative impact assessment, the ambient background concentrations of PM₁₀ and PM_{2.5} were taken as the 70th percentile 24-hour average from the Blackwater monitoring site. Use of the 70th percentile value is based on the methodology published by Environmental Protection Agency Victoria (EPA Victoria, 2007) and is accepted in Queensland.”</p> <p>The use of the 70th percentile value does not adequately assess the maximum impact likely to occur as a result of the Project.</p>	<p>Provide the maximum background level 24-hour average PM₁₀ and PM_{2.5} concentrations for all sensitive receptor locations, consistent with the requirements of Departmental Guideline – Application requirements for activities with impacts to air (ESR/2015/1840).</p> <p>Provide a table showing the number of times that 24-hour average PM₁₀ and PM_{2.5} concentrations were predicted to exceed 50 micrograms during the monitoring period.</p>	<p>The issue raised by DES is unclear as to whether it is referring to ambient monitoring data or predicted concentrations due to the Gemini Project. Therefore, both have been responded to below.</p> <p>Ambient Monitoring Data</p> <p>Section 3.3.3.2 of Appendix L of the <i>EA Application: Revised Supporting Information</i> document presents 12-months of ambient monitoring data collected by DES at Blackwater. A discussion on days when the 24-hour concentrations of PM₁₀ and PM_{2.5} exceeded the air quality objectives has been included within same section.</p> <p>Predicted Ground-level Concentrations</p> <p>Table 8, Table 10 and Table 12 of Appendix L of <i>EA Application: Revised Supporting Information</i> document has been updated to provide maximum background level 24-hour average PM₁₀ and PM_{2.5}, TSP, and dust deposition at each sensitive receptor predicted to occur due to the operation of the Project. Predicted concentrations at each sensitive receptor are presented for the Project in isolation, and for the Project with additional ambient background concentrations. The 24-hour concentrations of PM₁₀ and PM_{2.5} represent the maximum predicted.</p> <p>Table 9, Table 11 and Table 13 of Appendix L of <i>EA Application: Revised Supporting Information</i> document further indicates the number of times that 24-hour average PM₁₀ concentrations were predicted to exceed the Environmental Protection (Air) Policy objective of 50 µg/m³ for each sensitive receptor (including an ambient background concentration).</p>
95	Appendix I Section 3.4.2 Standard mitigation measures Table 5 Standard dust control	Published emission estimation calculations specifically for mining activities are included in the National Pollutant Inventory Emission estimation technique manual for Mining (NPI Manual). This guideline has been utilised by the applicant to estimate emissions from the mining operation. It is	Address why the reduction factor levels have been significantly underestimated or provide justification for the use of varied factors that deviate from the guideline.	<p>The ‘<i>NSW Coal Mining Benchmarking Study</i>’ (Katestone, 2011) indicates that 85% control of haul road dust emissions is achievable through a combination of watering level 2 (75% control), use of chemical suppressants (84% control) and reduction of vehicle speeds to 30 km/hr (85% control).</p> <p>Review of the ACARP report ‘<i>Mobile Sampling of Dust Emissions from Unsealed Roads</i>’ PROJECT C20023 – Stage 2 Final Report, prepared by Pacific Environment Limited also indicated haul road emissions could reach up to 85% to 95% reduction efficiencies through watering alone (ACARP 2015). Although the ACARP study did not identify the circumstances required to achieve such control</p>

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	<p>measures and relative reduction</p> <p>Table 6 Emissions inventory for year 2, year 8 and year 15</p>	<p>considered that this is a best practice approach to the emissions estimation process for mines proposed in Australia. This methodology is the generally adopted approach to emissions estimation and the referred documents are independent standards that are considered the best reference documents for emissions related information.</p> <p>There are however some issues with Katestone’s approach that are not in accordance with the guideline and will have a discernible effect on the emission level estimates. There appears to be some issues with the emission reductions being claimed for the standard mitigation measures proposed by the applicant for the control of fugitive dust emissions from the mining related activities. Table 5 of the Air Quality and Greenhouse Gas assessment report lists “standard dust control measures”, which when applied, result in a percentage reduction in the overall calculated emissions from a particular mining related dust generating activity.</p> <p>The application of emission reduction factor is a standard approach in the process of calculating estimated dust emissions and is covered under the NPI Manual. The percentage reduction for some of the “standard dust control measures” are not however in line with the reduction factors that are listed in the NPI Manual.</p>	<p>Demonstrate the feasibility of the options selected.</p>	<p>efficiencies, it, in combination with the ‘<i>NSW Coal Mining Benchmarking Study</i>’, supports the attainability of 85% control efficiency on haul roads.</p> <p>Therefore, no changes were made to the emission reduction factors used in the air quality and (GHG) greenhouse gas assessment.</p> <p>Additionally, Magnetic South have demonstrated a commitment to achieving mitigation requirements in order to attain compliance as demonstrated through the implementation of an <i>Air Quality Management Plan (AQMP)</i> and <i>Trigger Action Response Plan (TARP)</i> including real-time monitoring of dust levels and meteorological conditions.</p> <p>The feasibility of these mitigation measures has been detailed in Appendix C of Appendix L of the <i>EA Application: Revised Supporting Information</i> document which contains an example of the AQMP to be implemented for the Gemini Project.</p>

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		<p>Of concern are the claimed percentage reductions for hauling of material. Katestone are claiming an 85% reduction factor for hauling of ROM coal and hauling of overburden. The NPI manual only allows 50% for level 1 watering (2 litres/m²/hr) and 75% for level 2 watering (>2 litres/m²/hr). The emissions from hauling activities are by far the most significant sources of dust for the mining activity (see emissions inventory in Table 6 of Katestone report).</p> <p>The variation of the two above mentioned reduction factors away from the accepted standard levels under the NPI Manual will have a dramatic effect on the levels of dust that are estimated to be emitted from the mining activities.</p> <p>It is not clear if the operation is predicted to be able to meet the water demand for the higher rate of watering required for the Level 2 rate of great than 2 litres/m²/hr, as again, these factors have not been considered by the applicant to the level of detail that is considered to be required to demonstrate the options are at least feasible.</p>		
96	Appendix I Section 3.5 Air quality impact assessment	<p>Section 3.5 discussed the results produced from the air quality modelling.</p> <p>Each of the subsections within Section 3.5 stated that “using standard, and when necessary, additional mitigation</p>	<p>Update the air quality model, and results, to reflect the NPI manual.</p> <p>Describe in detail the mitigation measures to be</p>	<p>Refer to issue number 95 regarding the emission reduction factor used and the feasibility of the proposed mitigation measures.</p> <p>Similarly, refer to Appendix B (Surface Water Assessment) of the <i>EA Application: Revised Supporting Information</i> document that demonstrates adequate amounts of water will be available to meet the water demand for the proposed dust suppression.</p>

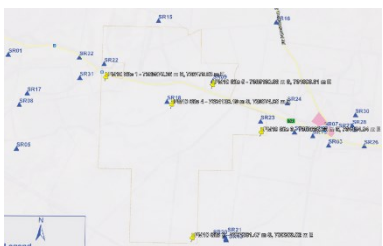
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		<p>measures predicted 24-hour average and annual average concentrations of PM₁₀ comply with relevant air quality objectives at all sensitive receptors. Additional mitigation measures may include restricting overburden and ROM haul to between 7am and 6pm on days when 24-hour averaged maximum PM₁₀ is predicted to exceed 50 µg/m³."</p> <p>Table 5, Section 3.4.2, stated that an 85% reduction factor for hauling of ROM coal and hauling of overburden has been applied. The National Pollutant Inventory Emission Estimation Technique Manual for Mining (NPI manual) only allows 50% for level 1 watering (2 litres/m²/hr) and 75% for level 2 watering (>2 litres/m²/hr). As such, the department considers that the modelled results are significantly underestimated.</p> <p>No further information has been provided in relation to which mitigation measures were applied in the model or in which instances that these mitigations are likely to be applied.</p>	<p>applied to mitigate impacts to air quality resultant from the Gemini Coal Project, including an assessment of the feasibility of the mitigation measures in application.</p> <p>Provide information to confirm that adequate amounts of water will be available to meet the water demand for the higher rate of watering required for the Level 2 rate of greater than 2 litres/m²/hr.</p>	
97	Appendix I Section 3.5 Air quality impact assessment	Based on a review of the proposed mining schedule, annual production schedule and the relative location of the closest sensitive receptors, Year 2, Year 8, and Year 15 of the Project were identified as being likely to generate the worst-case potential for dust impacts over the life of the Project.	Include modelling of air quality in the pre-mining and post-mining phases as well.	<p>The selected years used within Appendix L of the <i>EA Application: Revised Supporting Information</i> document are expected to be the worst-case mining years based upon volumes of material extracted. Modelled impacts from the selected years 2, year 8 and year 15 will be significantly greater than contributions of emissions to air from pre- or post-mining activities, invalidating the relevance of assessment of pre- or post-mining activities.</p> <p>Therefore, no changes to Appendix L of the <i>EA Application: Revised Supporting Information</i> document was made.</p>

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		Modelling of TSP, PM10, and PM2.5 should be done across all stages of the project life (in years 1 and 20).		
98	Appendix I Section 3.6 Mitigation	<p>The proposal to enter in discussion and as appropriate commercial agreements with surrounding landholders (such as property purchases and air conditioner/purifier installations) cannot be relied upon by the department as demonstrating the management of impacts of dust and particulate matter.</p> <p>No further information has been provided in relation to the proposed air quality monitoring network.</p>	<p>Commercial agreement discussions are not appropriate at this stage and further information is required demonstrating that the impacts of dust and particulates will be managed appropriately.</p> <p>Describe in detail the proposed air quality monitoring network for the Gemini Coal Project, including GPS locations, parameters to be monitored and monitoring equipment to be installed.</p>	<p>Three approximate monitoring locations have been proposed as part of the air quality monitoring network, these locations include:</p> <ul style="list-style-type: none"> northwest corner of the existing MLA boundaries and directly east of the proposed TLO and closest to SR22 (726358, 7386469); east of the MLA boundaries closest the Dingo township at SR07 (737777, 7383220); and south of the MLA boundaries closest to SR14 (728569, 7374873). <p>These approximate locations are provided within Figure C2 (Appendix C) of Appendix L of the <i>EA Application: Revised Supporting Information</i> document.</p> <p>At minimum, monitoring of air quality at these locations will include:</p> <ul style="list-style-type: none"> continuous monitoring of PM10 at one primary location; continuous monitoring of PM2.5 at one primary location; dust deposition monitoring at one primary location; and meteorological monitoring (including temperature, wind speed and direction) at a single location representative of the Project. <p>Monitoring equipment will be installed in accordance with relevant standards (i.e., dust deposition - <i>AS/NZS 3580.10.1:2003</i>, wind speed and direction - <i>AS/NZS 3580.14:2014</i>, PM₁₀ - <i>AS3580.9.6</i> and PM_{2.5} - <i>AS3580.9.10</i>) or otherwise approval from the administering authority.</p>
99	Modelling results	<p>The standard mitigation measures include watering of haul roads, dust suppression sprays for drilling and loading and unloading operations, enclosure of conveyors and crushers, and a telescopic chute and sprays on the train unloader.</p> <p>Is there sufficient water of the right quality available for dust suppression uses as required?</p>	<p>Provide further detail on how the proposed standard mitigation measures will be implemented.</p> <p>Demonstrate that sufficient water volume of sufficient quality will be available during the course of the year for all dust suppression measures that they plan to</p>	<p>The potential air quality impacts on sensitive receptors have been updated in Section 9.3 of the <i>EA Application: Revised Supporting Information</i> document. The assessment has shown that:</p> <ul style="list-style-type: none"> standard and additional mitigation measures may be required throughout the life of the mine to achieve compliance with the air quality objectives; and the number of days per year when the additional mitigation is required may be as many as 50 days per year. <p>Magnetic South has demonstrated a commitment to achieving mitigation requirements in order to attain compliance as demonstrated through the implementation of an AQMP and TARP.</p> <p>Standard dust control measures include but are not limited to watering and/or suppressants, vehicle speed reduction, drill dust suppression sprays, water sprays, enclosure and telescopic chute water</p>

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		<p>With only these above-mentioned standard dust mitigation measures implemented, it is predicted that the mining operation would cause exceedances of the ambient PM₁₀ 24h averaging period criterion of 50 µg/m³ that is specified under the <i>Environmental Protection (Air) Policy 2019</i> (EPP Air). The modelling output shows this to occur at multiple sensitive receptors, and at multiple stages throughout the progression of the mining activities over the mines projected lifespan. The model also predicts exceedances of the ambient PM10 annual averaging period criterion of 25 µg/m³ that is specified under the EPP Air.</p> <p>The exceedances of the EPP Air policy identifies the potential risk for unacceptable impacts from dust and particulates.</p> <p>To address the identified issue of excessive PM₁₀ at the surrounding receptors, the applicant has proposed additional mitigation measures to help the proposed operation achieve compliance with the ambient guideline values. The Katestone report only states the following in relation to these measures:</p> <p style="text-align: center;"><i>Additional mitigation measures may include restricting overburden and ROM haul to between 7am and 6pm on days when 24-hour averaged</i></p>	<p>implement as fugitive dust controls.</p> <p>Provide an Air Quality Management Plan (AQMP) which provides further detail and information on the mitigation measures and management controls that will ensure the required impact mitigation is achieved and must include the following:</p> <ul style="list-style-type: none"> • further detail in relation to the control measures that the applicant will implement to control fugitive dust sources, • the proposed monitoring program for dust and particulates, • detail of how the real time dust monitoring network will be used to predict when additional dust control measures are required, • detail in relation to the operational implementation of the additional dust control measures they will need to rely upon to ensure PM₁₀ is effectively controlled. 	<p>sprays. Additional mitigation measures may include but are not limited to the modification of activity rates or ceasing of certain operations.</p> <p>Real-time monitoring of dust levels and meteorological conditions will be used as validation and feedback for the proactive dust management systems. When PM₁₀ monitoring data triggers TARP threshold values, responsible personnel will receive alerts and operations will be appropriately managed to minimise the risk of adverse dust levels impacting nearby sensitive receptors.</p> <p>Air quality and meteorological data will further be reviewed daily by site staff in accordance with a meteorological forecast system and a dust risk forecast system to assist with the appropriate management of operations. In the event of any air quality incidents or non-compliance with air quality criteria, reporting protocols to the administering authority for incidents and non-compliance will be followed.</p> <p>Refer to Appendix B (Surface Water Assessment) of the <i>EA Application: Revised Supporting Information</i> document which demonstrates through the water balance model that adequate amounts of water will be available to meet the water demand for the proposed mitigation measures. A water supply pipeline is also proposed to provide make up water during dry periods if required.</p>

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		<p><i>maximum PM₁₀ is predicted to exceed µg/m³.</i></p> <p>It appears that Katestone have then applied a percentage reduction in the emission loadings from overburden and ROM hauling equal to the corresponding percentage reduction of time the activities are conducted through the day when the additional controls are being implemented. While such management options are in theory feasible, they might be quite difficult from an operational point of view to actually initiate this in time to be effective following the detection of high dust. It would also potentially be necessary to do this on a high number of days (in the order of 59 days based on the modelled predictions), which potentially would have a high operational impact on production. The applicant has not provided any detail on how this will be achieved, or if it is economically feasible for the mining operation to do so.</p>		
100	Supporting information Section 14 Draft EA conditions	The Air EPP that commenced on 1 September 2019 no longer allows for 5 exceedances of the guideline level. It is recommended that the proposed condition B1 shown in section 14 of the AARC report be amended to remove the “for no more than five exceedances recorded each year” text from the point b) item. It is acknowledged that this is the wording of the model mining condition, and was included to accommodate a previous reference	Amend proposed condition B1 to remove the “for no more than five exceedances recorded each year” text from the point b) item.	Section 14 is now Section 15 and EA condition B1 (b) has been amended to reflect the Environmental Protection (Air) Policy 2019, that commenced on 1 September 2019.

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		<p>attached to the PM₁₀ 24h guideline level specified under the Air EPP, making allowance for up to five exceedances of the guideline level per year for bushfires etc. The recently remade EPP Air commenced on 1 September 2019. No exceedances are allowed for now, so the reference to allowing for exceedances of the criteria on five occasions for bushfires etc. should be removed.</p>		
101		<p>It is recommended that the applicant consider an additional proposed environmental authority condition requiring that continuous monitoring of ambient PM₁₀ levels be conducted. This should be supplementary to the existing proposed condition B2 shown in section 14 of the AARC report, not replace it.</p> <p>The recommended form of continuous monitoring is a tapered element oscillating microbalance (TEOM), operated in accordance with AS 3580.9.16. These do however require a housing hut and access to 240V power, so there is a chance that a different form of monitoring more suited to remote location installation could be proposed by the applicant and considered by the department as required.</p> <p>Associated real time meteorological station monitoring would also need to be conducted by the applicant in accordance with the relevant Australian Standard (AS/NZS 3580.14), and it is</p>	<p>Include additional EA condition(s) that implements real time, online meteorological monitoring in accordance with the relevant Australian Standard (AS/NZS 3580.14).</p>	<p>An additional EA condition has been added to ensure real-time PM₁₀ ambient monitoring will occur in accordance with relevant standards. Section 14 is now Section 15, Section 15 - Schedule B (Air) of the <i>EA Application: Revised Supporting Information</i> document has been updated accordingly.</p>

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		recommended that this requirement is also locked into a site-specific condition.		
102		 <p>Figure 1 – Recommended continuous real time PM₁₀ monitoring locations (with red coloured sensitive receptors indicating they exceed the air quality guideline level for PM₁₀ 24h)</p> <p>The five locations shown in Figure 1, have been recommended to give a balance of coverage of the potentially impacted sensitive receptors that would need to be monitored and the most economic number of monitoring stations (as they are expensive to install and operate). The monitoring stations should all have telemetry to allow real time notification of excessive dust concentrations so that corrective actions can be implemented by the mine operators as required, which has been proposed as a control measure.</p>	<p>Include an additional EA condition(s) that implements real time, online PM₁₀ ambient monitoring, at the five recommended sites shown in Figure 1 above. This should be conducted in accordance with the relevant Australian Standard. It is recommended that TEOM type ambient dust monitors are utilised by the applicant and are operated in accordance AS 3580.9.16.</p>	<p>An additional EA condition has been added to ensure real-time meteorological monitoring will occur in accordance with relevant standards. Section 14 is now Section 15. Section 15 - Schedule B (Air) of the <i>EA Application: Revised Supporting Information</i> document has been updated accordingly.</p>
GHG Assessment				
103	Appendix I Section 4.3.1 Emissions	Scope 1 and 2 greenhouse gas emissions were estimated on an annual basis for the Project, taking into account only diesel combustion, fugitive	Provide further information.	Project vulnerability to climate change or adaptation measures are not applicable to the reporting requirements of GHG emissions and therefore do not need to be addressed within this assessment.

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		<p>emissions of methane from mining and the electricity usage and explosives (presented in Table 14).</p> <p>No vulnerability to climate change or adaptation measures have been addressed in the application.</p> <p>Project doesn't consider all sources of GHG emissions, which can lead to possible underestimation of overall emissions. In particular, there are also emissions in the site preparation phase, like scope 1 and scope 3 emissions from vegetation clearing and preparation, spreading mulched vegetation; in the operational phase: from bitumen transport, road construction, drainage construction emissions, waste disposal emissions (landfilling), transport emissions, indirect emissions (NOx, CO, NMVOCs, SO2) and emissions in a closure phase (grassland/other rehabilitated land emissions/sinks, etc).</p> <p>Also, include a separate chapter to address a vulnerability of different landforms to climate change and adaptation strategies.</p>		<p>Appendix I is now Appendix L, the GHG assessment has been updated to include GHG emissions associated with land clearing, refer to Section 4.4.1 of Appendix L of the <i>EA Application: Revised Supporting Information</i> document.</p> <p>Section 4.4.2 of Appendix L of the <i>EA Application: Revised Supporting Information</i> document provides an estimation of Scope 3 emissions. Scope 3 emissions included in the assessment are GHG emissions associated with the end-use of product coal and rail transport of coal. Scope 3 GHG emissions included in the Gemini Project assessment does not account for emissions relating to construction materials (approximate 5% total contribution). Therefore, out of all the possible Scope 3 emissions, the assessment is expected to account for at least 95% of total Scope 3 emissions associated with the Project.</p> <p>All estimated GHG emissions have been updated in Section 10.3 of the <i>EA Application: Revised Supporting Information</i> document.</p>
104	Appendix I Section 4.3.1 Emissions Table 14	Modelling has been completed for year 1 – 19 only, despite the mine being identified to have a 20-year life span. Are there no emissions associated with rehabilitation?	Modelling for construction, operation and decommission (including rehabilitation) is required.	See issue number 103 for land clearing. GHG emissions for rehabilitation activities have been estimated and included in Section 4.4.1 of Appendix L of the <i>EA Application: Revised Supporting Information</i> document.
105	Appendix I	A range of options for Magnetic South Pty Ltd to manage Project related GHG	Provide and discuss any site-specific mitigation	Due to the maturity of the coal industry, best practice is generally achieved through the design and selection of equipment. Section 4.4.4 of Appendix L of the <i>EA Application: Revised Supporting Information</i> document.

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	4.4.3 GHG mitigation and management	emissions are presented in this chapter. However, it is very broad and doesn't include information about how much is expected in the reduction of GHGs and emissions strategies.	scenarios, along with estimated of possible CO ₂ -eq reduction (and associated costs) from different scenarios. Include land-use, construction, waste sector emissions as well.	<i>Information</i> document has been revised to include further detail on the consideration of energy and fuel efficiency in the design and selection of processes and equipment.
106	Appendix I Section 4.4.3 GHG mitigation and management	In section General, it states "identifying opportunities" for GHG emissions.	Provide further information on the opportunities.	<p>Section 4.4.4 of Appendix L of the <i>EA Application: Revised Supporting Information</i> document was revised to list further GHG mitigation opportunities.</p> <p>These include, but are not limited to:</p> <ul style="list-style-type: none"> • minimise vegetation clearing at the Project to the authorised areas required for Project development; • design efficiency to reduce energy and fuel consumption; • investment in equipment with higher fuel efficiencies; • spontaneous combustion of coal will be managed to avoid unexpected emission through the burial of reactive materials, spoil dump design, temperature monitoring and spoil dump ventilation; and • ongoing monitoring and reporting of GHG emissions including an annual review of energy use to identify potential energy efficiency opportunities on a regular and ongoing basis. <p>Additional mitigation measures that be reviewed and implemented where appropriate, include:</p> <ul style="list-style-type: none"> • equipment load optimisation, route optimisation and production scheduling; • equipment maintenance in accordance with supplier guidelines to ensure equipment efficiency is retained; • onsite power factor correction optimised to minimise the usage of grid electricity; • use of solar-powered lighting to reduce electricity demand; and • adjust peak electricity demand through production scheduling to allow for optimal and well utilised diesel power generation capacity.
Noise				
107	Appendix J Section 4.4 Noise Logging	Monitoring of environmental noise to determine background levels L90 [dB] was conducted between 7 and 19 June 2019. However, this doesn't represent a complete seasonal spectrum of levels of environmental noise.	Monitoring in other seasons should be considered before establishing (adopting) background levels (at least two seasons).	Appendix J is now Appendix M. Noise monitoring was conducted by ASK as part of a Noise Impact Assessment (ASK 2020) in a quiet period (during winter) to achieve conservative background noise levels.

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				<p>In consultation with Antione David at DES (June 2020), the approach to noise monitoring by ASK was deemed acceptable and further monitoring for this issue was not required. In this instance, no amendments to the <i>EA Application: Revised Supporting Information</i> document were undertaken.</p>
108	Appendix J Section 5.3.3 Background creep	<p>Background creep has been mentioned but no information has been provided. How will background creep be prevented or minimised?</p> <p>Give consideration to the requirement in the Noise Measurement Manual (EM1107)</p>	<p>Give consideration to the cumulative impacts on all affected environmental values.</p>	<p>Section 11.3.4 of the <i>EA Application: Revised Supporting Information</i> document has been updated to include an assessment of background creep and cumulative noise impacts.</p> <p>In consideration of the <i>Noise Measurement Manual (ESR/2016/2195 - formerly EM1107)</i>, background creep is defined as 'a gradual increase in the total amount of background noise in an area or place' (DES 2020b). Therefore, consideration of cumulative impacts, including other developments, is required to ensure background creep is minimised in accordance with the subordinate Environmental Protection (Noise) Policy recommendations.</p> <p>From this, an assessment of cumulative impacts identified the Bluff Mine as the nearest other existing mine to the west. The sensitive receptors that have the most potential to be impacted by the Project to the west are SR22, SR31 and SR32 with night-time noise levels of up to 36 dBA, 33 dBA and 31 dBA L_{Aeq} respectively. The Bluff Mine is over 12 km from these receptors (SR22, SR31 and SR32) and only 1 km from the township of Bluff. Given the requirement to comply with noise criteria in the township, it would be expected that Bluff Mine noise levels at the receptors would be well below the 35 dBA noise limit and would not significantly contribute to exceedances at these locations.</p> <p>Based on the information above, it is unlikely that cumulative impacts would contribute to background creep due to broadscale noise limits adopted by other mining operations such as the Bluff Mine and also the Jellinbah Mine in the surrounding region (detailed noise limits are provided in Section 11.3.1 of the <i>EA Application: Revised Supporting Information</i> document).</p> <p>Additionally, it is noted that the Bluff Mine is currently in care and maintenance with no certainty of a return to operations during the life of the Gemini Project.</p>
109	Appendix J Section 6.4 Modelling Scenarios	<p>Mining noise emissions from the Gemini Project have been predicted for the following three mine year scenarios:</p> <ul style="list-style-type: none"> • year 2; • year 8; and • year 15 <p>These years were selected to give a representation of mine noise levels near</p>	<p>Include preparation (years 0 and 1) and post-mining/closure phases (year 20) in the modelling.</p>	<p>In consultation with Antione David at DES (June 2020), the approach to noise modelling by ASK for the three operational years was deemed acceptable and further scenarios not required. In this instance, no amendments to the <i>EA Application: Revised Supporting Information</i> document were undertaken.</p>

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		<p>the beginning, middle and end of the project. However, project life is 20 years and there will be considerable noise emissions from transport in the mine closure period (same as in the clearing/pre-mining phase) that must be taken into consideration.</p>		
110	Appendix J Section 6.6.2 Cumulative Noise Impacts	<p>It has been stated that the nearest existing mine is Bluff Mine which is 12km to the west. The sensitive receptors that have the most potential to be impacted by the Gemini Project to the west are SR22, SR31 and SR32. The Bluff Mine is over 10 km from these receptors. Given the significant distance and that adverse wind conditions cannot occur for both mines simultaneously at these receptors since they are in opposite directions, it is unlikely that cumulative noise impacts from both mines will be an issue.</p> <p>Further information is required to identify the potential cumulative impacts.</p>	Present data/charts and present a scenario with noise levels under “No WIND” conditions, to support statements made.	<p>Cumulative noise is addressed in Section 11.3.4 of the <i>EA Application: Revised Supporting Information</i> document. Based on the data reviewed for cumulative noise, this is predicted to not be an issue for the Project, as discussed above.</p> <p>The obligation for the nearby Bluff Mine and Jellinbah Mine to comply with noise criteria in the township means that any data acquired from a 'No WIND' scenario is considered not needed to confidently conclude that cumulative impacts from the Project are unlikely.</p> <p>Additionally, it is noted that the Bluff Mine is currently in care and maintenance with no certainty of a return to operations during the life of the Gemini Project.</p>
111	Measurements	<p>The noise criteria have not been based on the Model Mining conditions (ESR/2016/1936). For night time the noise criteria following the Model Mining condition would be 2dB more stringent than the derivation made using the Environmental Protection (Noise) Policy 2019 Planning for noise control.</p> <p>The noise criteria should be derived using the Model Mining conditions. The night time criteria should be 35dBA instead of 37dBA and this worsens the</p>	Provide further information.	<p>Day and evening noise limit of 40dBA and night limit of 35dBA has been updated in Section 11.3.1 of the <i>EA Application: Revised Supporting Information</i> document in accordance with the <i>Model Mining conditions (ESR/2016/1936)</i> (DES 2017b). These limits are conservative and below the limits set for other mining operations in the nearby region such as the Bluff Mine and Jellinbah Mine.</p> <p>Under these new noise limits, subsequent modelling results, and relative exceedances have been updated in Section 11.3.3 of the <i>EA Application: Revised Supporting Information</i> document. It has been noted that a number of properties have been purchased by Magnetic South since the previous EA Application submission to DES. As a result, these dwellings are assumed to be vacant prior to the commencement of operations and thereby, not assessed as sensitive receptors. A full updated list of the relevant sensitive receptors used within the assessment of noise exceedance is provided in Table 53 and shown in Figure 77 of the <i>EA Application: Revised Supporting Information</i> document.</p>

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		<p>noise exceedances during night time by 2dB with the worse exceedance going from 13dB to 15dB and add another 3 sensitive receptors in exceedance, raising the total number from 6 sensitive receptors exceeding night time noise criteria to 9 sensitive receptors exceeding the night time criteria. Further information is required about the mitigation of nuisances.</p> <p>In addition, L_{A1} (Model Mining Conditions) and L_{Amax} for sleep disturbance (EPP Noise 2019) has not been assessed. Further information is required.</p>		<p>Moreover, an assessment of sleep disturbance was undertaken in the L_{Aeq} parameter rather than L_{Amax}, L_{A01} and L_{A10} parameters. This monitoring decision is due to:</p> <ul style="list-style-type: none"> • most mine noise source data being available in the L_{Aeq} parameter; • extraneous noise events (e.g., birds, animal and farm activities) in the L_{Amax} parameter making compliance monitoring challenging; and • L_{A01} and L_{A10} noise levels are generally dominated by insect noise during warmer months and it is not strictly possible to remove insect noise from the measured L_{A01} and L_{A10} parameters. <p>In this instance, the use of L_{Aeq} was considered the preferred parameter. Where noise limits of L_{Amax}, L_{A01} and L_{A10} are specified for the Project, they would be 15, 10 and 5 dBA higher respectively than the L_{Aeq} noise limits.</p> <p>A sleep disturbance limit of 50dBA L_{Amax} (equating to an indoor limit of 45 dBA L_{Amax} plus 5 dBA) was used within the assessment. As a result, it was identified that sleep disturbance would not be a significant issue. Moreover, an investigation by ASK into sleep disturbance measured as L_{Amax} within the Environmental Protection (Noise) Policy identified no listed noise limits to be aware of.</p>
112	Modelling	The weather scenarios considered are for neutral and adverse meteorological conditions. South-easterly or westerly winds have not been measured and noise impacts would be considered worse under those conditions. Report the percentage of days under those conditions.	Provide modelling for south-easterly and westerly wind conditions.	The SoundPLAN model has been formatted to predict all noise levels under unfavourable 'adverse' day and night meteorological conditions using wind conditions from the south-east and west directions as per DES's request. The results have been entirely modelled using these described conditions (i.e., 100% of days) and updated in Section 11.3.3 of the <i>EA Application: Revised Supporting Information</i> document.
113	Sound sources	The sound power levels reported for the machines modelled are appropriate. The sound power level of the Drill Caterpillar MD6420 is not listed specifically but is listed as drill which may differ. Sound power level of Cat MD6420 should be used for the model for accuracy and should be listed.	Provide further information.	The drill caterpillar MD6420 was the only drill equipment used to inform the modelled noise results, and sound power values for this piece of equipment were confirmed with the distributor. All references to drill noise source power levels within the technical noise report by ASK (2020) have been updated to list the drill caterpillar MD6420 and ensure consistency.
Waste				

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114	Supporting information Table 3 Applicable ERAs for the project (page 4)	Incorrect ERA category is referenced – the correct category should be ERA 63 1 (b)(i).	Update using Departmental Guideline for Model operating conditions ERA 63 – Sewage Treatment (ESR/2015/1668).	<p>Table 3 of the <i>EA Application: Revised Supporting Information</i> document has been correct to ERA 63 1 (b)(i).</p> <p>Table 75 of the <i>EA Application: Revised Supporting Information</i> document has also been corrected to ERA 63 1 (b)(i).</p>
115	Supporting information Section 12 General	<p>It is a regulatory requirement for applicants to demonstrate that they have considered the waste and resource management hierarchy for any proposed ERA.</p> <p>A cleaner production program should identify and implement ways of improving a production process that:</p> <ul style="list-style-type: none"> • uses less energy, water or another input; • generates less waste; and • generates waste that is less environmentally harmful. <p>Applicants must identify any:</p> <ul style="list-style-type: none"> • cleaner production and waste management strategies to be implemented; and <p>cleaner production and waste management strategies which were considered but are not going to be implemented and the reasons for not implementing them (if applicable).</p>	To ensure the generation of waste is avoided and/or waste is re-used as much as practical, cleaner production philosophies and waste management strategies should be adopted and detailed in the application.	<p>Waste management strategies for the Project will be developed and implemented in accordance with the waste and resource management hierarchy, as detailed in Section 12.5 of the <i>EA Application: Revised Supporting Information</i> document.</p> <p>The application of the waste and resource management hierarchy for the Project’s waste management strategies are detailed in Section 12.3, Table 68 of the <i>EA Application: Revised Supporting Information</i> document.</p> <p>Magnetic South will progressively seek cleaner production to maximise operational efficiency whilst minimising energy consumption and waste generation and disposal. Potential cleaner production techniques are detailed in the <i>EA Application: Revised Supporting Information</i> document, Section 12.6, and include, but not limited to, the following:</p> <ul style="list-style-type: none"> • improving operation and maintenance practices to reduce the resource consumption and minimise waste generation (e.g., reuse of water within the mine water management system and CHPP system); • selecting best available technology for the CHPP, with consideration of the environmental and economic factors to maximise water use and energy efficiency, minimise dust emissions and waste generation; • site extraction design to minimise the volume of waste rock respective to the excavated coal; • reusing resources on-site that would be otherwise classified as wastes; and • closed-loop recycling where a product is recycled and used again in the same form (e.g., wooden pallets, tyres). <p>Magnetic South seeks to prioritise cleaner production and waste management strategies for all generated waste types, unless it is not feasible.</p>
116	Supporting information	Sewage will be treated in an STP. Treated effluent will be released for irrigation. More information is needed to	Describe any waste treatment processes proposed and the anticipated end products	Onsite treatment of waste will be limited to the treatment of sewage effluent within a STP towards the northwest boundaries of the MLA at the location in Figure 7 of the <i>Revised EA Application: Supporting Information</i> . Treatment will comprise standard primary (removal of solids) and secondary (nutrient removal and disinfection) methods.

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	Section 12.5 Waste management	determine the conditions required to manage risk.	<p>of these processes including the quality of the irrigation water quality.</p> <p>Include details of any waste residues from the process including sludge.</p>	<p>A Land-based Effluent Disposal Assessment Report has been undertaken in accordance with the current industry standards for wastewater management set out in <i>AS/NZ 1547:2012 On-site Domestic Wastewater Management</i> and provided in Appendix N of the <i>EA Application: Revised Supporting Information</i> document. Treated effluent will be released within a designated irrigation management area and is expected to achieve the water quality parameters set out in the Eligibility Criteria and Standard Conditions for Sewage Treatment Works (ERA 63) – Version 2. These limits also align with the quality which would be expected from a basic sewage treatment plant as per Table A3.2 of the Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 1).</p> <p>Sludge will be dewatered on site and the resulting dried sludge will be removed via a licensed regulated waste contractor. No waste residues are anticipated, and tank system sludge accumulation is expected to be 0.0kg dwt/year.</p>
117		Paints and miscellaneous chemicals will be transported offsite by a licensed regulated waste contractor and treated at a licensed waste facility before disposal.	Provide details about how waste will be treated and disposed of.	<p>Treating and disposing of waste will be undertaken offsite and will be carried out in a way that causes least harm to the environment and can be achieved through the following methods:</p> <ul style="list-style-type: none"> • employing a bio-treatment to degrade material into a compound or mixture; • employing a physico-chemical treatment (for example, evaporation, drying, calcination, catalytic processing, neutralisation, precipitation or encapsulation) to obtain a compound or mixture; • blending or mixing waste to obtain a compound or mixture storing or repackaging waste; • employing thermal processes, with or without catalysts, to convert waste into a non-hazardous material; • disposal to a landfill; or • thermal destruction without recovering heat or another secondary product. <p>Magnetic South will use waste management services within the region such as Cleanaway Emerald Liquid Waste Services (Cleanaway). Facilities offered by Cleanaway including recycling and treatment of waste paint (water and solvent-based), metal, plastic, waste oil and coolant will be utilised (Cleanaway 2019a and Cleanaway 2019b).</p> <p>Further descriptions of the treatment and disposal of waste are described in Section 12.7 of the <i>EA Application: Revised Supporting Information</i> document.</p>
118		Disposal of waste is to be considered when no other economically feasible option is available. How was it determined that waste that is proposed to be disposed of is not economically	Applicants must describe how they have addressed the waste and resource management hierarchy.	Magnetic South will ensure all wastes that are not suitable for onsite reuse, recycling or treatment would be able to do so at offsite waste facilities. Where practicable, consumable suppliers will collect and recycle the waste product, and consider off-site recycling services that may be available. Before disposing of waste to landfill, Magnetic South will consider the reuse and recycling of the waste within practicable measures.

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		<p>viable to be managed under a more preferred management option (i.e., avoid, reduce, re-use, recycle, recover, and treat)? In particular, how was it determined that the only viable option for scrap tyres is to dispose of in pit?</p>	<p>Outline why other, more desirable, waste management strategies were unsuitable. Provide information to support their selected mitigation and disposal strategies.</p>	<p>Waste that will be disposed of offsite includes general waste, tyres, and wastes that are no longer in reusable or recyclable conditions such as wooden pallets, refurbishable items and personal protection equipment (PPE). These waste streams are fundamental to daily operations and other waste management avenues (e.g., avoid, reduce, reuse, and treat) were considered unsuitable. For instance, tyres will be transported offsite to a supplier for re-treading for reuse (as addressed in <i>Table 68</i> of the <i>EA Application: Revised Supporting Information</i> document) and air filters will be re-used and cleaned until considered inappropriate.</p> <p>As recycling of tyres was considered unsuitable and not economically feasible due to extreme travel distance to facilities. Subject to demonstrating to the administering authority that no other use higher in the waste management hierarchy can be practically implemented, waste types will be disposed of onsite in a designated tyre disposal area of the backfilled Pit AB and/or Pit C. These disposal areas will be managed to avoid any impedence on saturated aquifers, cause contamination or compromise the stability of the final landform.</p> <p>Burial of waste tyres can lead to environmental impacts associated with contamination, fire risk and health risks. There is also a risk that compounds may leach from the tyres and contaminate soil, groundwater and surface water, and a possibility that tyre piles may become breeding grounds for insects; particularly mosquitoes, rodents and other animals. Tyres have also been known to cause fires that release pyrolytic oils and other compounds into the soil and groundwater and through smoke, coupled with contaminated runoff of water used to extinguish the fire.</p> <p>To mitigate these impacts, the storage and disposal of tyres generated by mining activities will be in accordance with ‘<i>Operational Policy for Disposal and storage of scrap tyres at mine sites</i>’ (ESR/2016/2380) (DES 2014). Further details of the disposal of scrap tyres will be addressed in the <i>Waste Management Plan</i>.</p>
119		<p>The applicant must investigate options for reusing all wastes generated onsite, including recycling options for the wastes. This includes seeking an end of waste approval to enable reuse of any regulated wastes generated onsite. Reuse options should consider both reusing wastes onsite and offsite, or between industries. For example, reuse of sewage sludge obtained from a</p>	<p>Identify waste streams (types) and provide details of any potential final reuse of the wastes. Refer to https://environment.des.qld.gov.au/management/waste/business/end-of-waste-classification for further information.</p>	<p>The identified waste streams (types) for the Project are addressed in the Section 12.3 of the <i>EA Application: Revised Supporting Information</i> document. Table 68 of the <i>EA Application: Revised Supporting Information</i> document (anticipated waste generation from the construction and operation of the Project) lists the potential reuse of waste onsite, which includes:</p> <ul style="list-style-type: none"> • refurbishable items; • green waste; • PPE and other small items; • timber / reusable pallets; • waste oils; and • engine oil / fuel air filters.

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		sewage treatment plant may be appropriate for land application to support improved pastures.		
120	Supporting information Section 12.6 Regulated waste management	All non-mobile activities must provide a drawing or site-plan showing waste storage areas, processing areas, recycling or re-processing areas, and disposal locations. This must include details for wastes generated onsite, as well as raw and treated wastes. This should be used to identify potential risks.	Include a site plan of the storage, handling and disposal locations.	<p>A conceptual layout showing the location of waste processing and handling areas (including the CHPP, MIA, STP, regulated structures and waste rock emplacements) is shown in Figure 7 of the <i>EA Application: Revised Supporting Information</i> document.</p> <p>A detailed design layout of the MIA and associated infrastructure, including storage areas, is shown in Figure 11 of the <i>EA Application: Revised Supporting Information</i> document.</p>
121		Due to differences in the descriptions of waste disposal for regulated wastes and waste disposal for general wastes in permissible waste types, it is important that the applicant understands the definitions and significance of the waste types used in the ERA description. The waste disposal ERA description includes the waste descriptors; general; regulated; limited regulated; and clinical waste. Definitions of these waste types are included in the EP Regulation (Schedule 19).	Provide a description of all types of waste with regard to the EP Regulation definitions.	Table 68 of the of the <i>EA Application: Revised Supporting Information</i> document has been updated to reflect the waste category descriptions listed in the Environmental Protection Regulation 2019. The waste categories relevant to the Project include general, green, regulated and limited regulated. A full list of these waste types generated during construction, operations and decommissioning phases of the Project is provided in the updated table.
122		<p>Describe the method of transport for the regulated wastes and details of the transport.</p> <p>Where regulated wastes are to leave the site, provide details of the transporter or company receiving the wastes.</p>	Provide information on the machinery and proposed method of transport for waste.	<p>All regulated waste generated onsite will be arranged by Magnetic South to be transported offsite for recycling, treatment or disposal at a licensed facility. Contractors within the region such as JJ Richards & Sons will be responsible for collection of regulated waste bins as well as collection of recyclable wastes (e.g., cardboard).</p> <p>Waste handlers are required to submit waste tracking information to DES as part of the system for tracking waste listed in Schedule 9 Part 1 of the Environmental Protection Regulation 2019 (i.e., regulated wastes). Waste handlers are defined as generators, transporters, and receivers of wastes. Waste Transport Certificates are to be completed by waste handlers (i.e., generators, transporters, and receivers of waste) and submitted to DES as part of the process for tracking wastes in Queensland.</p> <p>Regulated waste will only be removed and transported from the site by a person who holds a current licence to transport such waste under the <i>Environmental Protection Act 1994</i>. The transport of</p>

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				<p>regulated wastes from the Project will be conducted in compliance the system requirements outlined by DES in 'Waste tracking guideline – Overview of managing waste tracking in Queensland (ESR/2016/2425) Version 2.01' (DES 2018).</p> <p>Skip bulk or lift trucks will be used for heavier and/or bulkier waste materials such as empty waste oil containers, scrap metals and timber pallets. Mine affected water may be piped, trucked via liquid tankers, or transferred in compliance with EA conditions.</p> <p>Further information regarding the machinery and proposed method of regulated waste transportation will be detailed in the <i>Waste Management Plan</i>, which will be developed at a later stage. The commitment will form part of the contractual arrangements and will be developed with licenced contractor.</p>
123	Supporting information Section 13.1 Environmental Objectives and performance outcomes	Identify the risk of migration of contaminants from the waste material to surface water. Also, the potential for flood waters to interact with waste rock placements. Sediment is a regulated waste and the impacts of sediment run off on the adjacent waterways should be addressed considering their proximity to the waste rock emplacements.	Discuss the management of sediment run off and mitigation measures especially for potential impacts to Charlevue Creek.	<p>As described in Section 13.4.2 of the <i>EA Application: Revised Supporting Information</i> document, surface water and seepage from mining waste storage areas will be monitored to ensure that key water quality parameters remain within appropriate criteria.</p> <p>Environmental monitoring will be conducted in accordance with a receiving environment monitoring program to ensure that the receiving environment of Charlevue Creek and Springton Creek are not impacted by the Project activities. Water quality and stream flow will be monitored.</p> <p>Erosion and sediment control structures will be developed and implemented during operations in accordance with <i>Best Practice Erosion and Sediment Control</i> (IECA Australasia 2008). These include but are not limited to:</p> <ul style="list-style-type: none"> • retention of riparian vegetation where possible along Charlevue Creek and Springton Creek; • limiting land clearing to the minimum required for safe operations of the Project; • diversion of clean overland flow/runoff from the upper reaches of Springton Creek and Charlevue Creek around the out-of-pit waste rock emplacement associated with Pit C and Pit AB; • progressive rehabilitation and seeding of topsoil as soon as possible for landforms; • waste rock emplacements will be limited to a slope of 1V:10H (adhering to a maximum slope of 6°) and a maximum height of 190 mAHD; and • erosion control measures such as bunding and sediment traps will be positioned between receiving waters (Charlevue Creek and Springton Creek) and disturbed areas (Pit AB and Pit C), roads and mine water dams during operations in accordance with Best Practice Erosion and Sediment Control (IECA Australasia 2008). <p>Section 7.3.6 of the <i>EA Application: Revised Supporting Information</i> document address the potential for flood waters to come into contact with waste rock emplacements. As a result, it was concluded four</p>

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				waste rock locations could potentially interact with flood waters, however the likelihood of erosion and migration of sediment from these dumps is minimal due the anticipated low velocities of 0.2 m/s - 1.2 m/s.
124	Supporting information 13.3.3 Potential impacts on surface and groundwater resources Appendix D – Table B4	The concentration of most trace metals/ metalloids tested for water in contact with coal reject and mining waste materials is typically below the LOR and below the applied water quality guideline criteria.	Address why the LOR is greater than the water quality guideline recommended limits and address how results were achieved that were less than this limit i.e., the LOR for Selenium was 0.1 mg/L, the Aquatic Ecosystem water quality maximum is 0.011 mg/L and results of 0.02 mg/L were found.	<p>The concentration of most trace metals/metalloids tested for water in contact with both coal reject and mining waste materials is low, typically below the limit of reporting (LOR) for the laboratory analysis, and below the applied water quality guideline criteria.</p> <p>It is noted that the LoR used for Selenium (Se), Cadmium (Cd), Chromium (Cr), Copper (Cu) and Zinc (Zn) in the water extract tests on coal reject samples in Appendix H (Attachment C, Table C4) of the <i>EA Application: Revised Supporting Information</i> document was below recommended guidelines and all results were less than this value. Instead, the Kinetic Leach Column Tests results provided adequate data exhibiting a LOR of below the applied water quality guidelines.</p> <p>As a result, for these metal course reject dissolved concentrations of Se, Zn, Cr, Cu and Cd exceeded the trigger values for freshwater aquatic ecosystems (95 % species protection), and Se exceeded trigger values for livestock drinking water guideline values. Similar results were observed for fine reject dissolved concentrations.</p> <p>Whilst there are no specific regulatory criteria for metal/metalloid concentrations in leachate from mining waste material on mine sites in Queensland. The Australian guideline values for livestock drinking water and aquatic freshwater eco-systems are provided for context are not intended to be interpreted as "maximum permissible levels" for site water storage or discharge" (ANZECC and ARMCANZ 2000).</p>
125	Supporting information 13.4 Mitigation measures, management and monitoring	<p>It was stated that most mining materials appear to be susceptible to dispersion and erosion, additional testing including field trials, may be needed when the mine is operational and bulk materials are being generated. Such tests would help to determine the most appropriate management option for progressive rehabilitation of these materials during operations at mine closure.</p> <p>There are a number of studies that have been completed on the optimum rehabilitation practices for resource</p>	Provide detail on the proposed management options for rehabilitation of waste rock during operations. Address other management options that were considered.	<p>A detailed summary on the rehabilitation of waste rock emplacements has been updated in Section 4.4.6 of the <i>EA Application: Revised Supporting Information</i> document.</p> <p>In summary, the technical assessments (Appendix G, Appendix H and Appendix I of the <i>EA Application: Revised Supporting Information</i> document) identified no significant risks for rehabilitation and waste rock materials were considered suitable for rehabilitation.</p> <p>Alternative PMLU options were considered such as dryland cropping, improved pastures and native pastures were considered, however on the basis of economic value, deemed unsuitable due to limited soil nutrient deficiencies, soil water availability, soil wetness, erosion and surface condition. As a result, low intensity grazing was determined the preferred PMLU for waste rock emplacements on the basis of pre-mining land suitability, landholder/stakeholder preferences, existing land use and environmental values of the surrounding landscape.</p>

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		activities in the Bowen Basin and best practice has been established.		
126		The waste rock emplacement surface, during construction and at completion of the final landform, should be sloped to direct excess surface drainage towards collection points such as sediment dam(s) or the final void.	Describe and illustrate the location, design and methods for constructing dumps for waste rock and any subsoil that should not be replaced in rehabilitation. Also discuss the inputs and processes for collection in sediment dams.	<p>The location of waste rock emplacements, including drainage works, is detailed in Section 4.4.6 of the <i>EA Application: Revised Supporting Information</i> document.</p> <p>The design parameters and methods for the construction of waste rock emplacements has been detailed in Section 4.4.6 of the <i>EA Application: Revised Supporting Information</i> document. In summary, three waste rock emplacements (one temporary) will be progressively constructed throughout the course of operations and be designed to have externally draining slopes of 6°, elevation 175 – 190 mAHD and slope length 530 m – 540 m.</p> <p>Topsoil resources have accounted for a stripping depth that excludes any sodic subsoil material (refer to Section 4.2.4 of <i>EA Application: Revised Supporting Information</i> document). All surface runoff from newly rehabilitated slopes will be directed into sediment dams until revegetation uptake is stable and adequate to control soil erosion. Further details on sediment dam design and methods has been provided in Section 3.4.3.3 of <i>EA Application: Revised Supporting Information</i> document.</p>
127		Potentially reactive rocks can be clay rich, saline waste rock typically occurring in coal overburden, that, when exposed by mining and used for construction of waste rock emplacements, stockpiles, roadways etc. becomes dispersive and will readily erode. A major issue for mine sites is the generation of high sediment loads in storm runoff.	Describe the chemical and physical properties of the waste rock and subsoil and assess the properties that affect their erosion potential.	<p>The chemical properties of the mining waste materials are discussed in Section 13, and in Section 4.4 of Appendix G, of the <i>EA Application: Revised Supporting Information</i> document.</p> <p>In summary, a chemical assessment of waste rock reveals an ESP ranging from low (4.5%) to very high (31.5%) with an elevated mean of 19.3%. ESP values above 14% are considered strongly sodic. As a result, waste rock material is likely to have elevated sodicity levels and may be susceptible to dispersion and erosion. The application of addition of gypsum will be used as necessary to reduce erosion potential, and fertiliser will be appropriately applied to some mining waste materials to provide a reasonable growth medium for revegetation and rehabilitation. It is recommended that further field investigations are undertaken when the mine is operational and bulk waste-material is generated.</p> <p>The chemical and physical properties of subsoil material are discussed in Table 21 and Section 13.4.5 of the <i>EA Application: Revised Supporting Information</i> document and further detailed in Appendix I of the <i>EA Application: Revised Supporting Information</i> document. The Geoffrey and Kosh SMU comprise most of the Project area. Chemical and physical properties of these SMUs are therefore representative of subsoils characteristics of the Project area. The subsoils of the Geoffrey and Kosh SMUs are considered strongly sodic (ESP >14%) and may become dispersive and therefore susceptible to erosion. A physical assessment of these subsoils also revealed medium to medium-heavy clay texture (>45% clay) of the Geoffrey and Kosh SMU. Clay rich soils may be more susceptible to erosion due to the small size (<0.002 mm) of clay-sized particles, particularly if soils are dispersive. As a result,</p>

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				subsoil characteristics of each SMU were used to inform stripping depths for topsoil resources and minimise the risk of dispersion during rehabilitation. Management measures to limit erosion and sediment run-off is detailed in Section 13.4.1 of the <i>EA Application: Revised Supporting Information</i> document.
128		Tailings is a waste product.	Describe the processes for storage and handling and include the management plans and mitigation measures for preventing environmental harm.	<p>The process of handling tailings (fine coal rejects) is described in Section 3.6.3 of the <i>EA Application: Revised Supporting Information</i> document. In summary, tailings will be dewatered and conveyed to a rejects bin and combined with the coarse reject material. The combined material will be loaded onto trucks for placement in out-of-pit or in-pit spoil dumps.</p> <p>To ensure environmental harm is prevented throughout this process, the following measures will be implemented:</p> <ul style="list-style-type: none"> • operational sampling and geochemical testing of representative samples of all coal reject material (coarse rejects and tailings) will be strategically undertaken at the CHPP to verify and extend the findings of the assessment for future management; • coal reject materials will be transferred from the CHPP and encapsulated within a much larger volume of NAF overburden material in spoil emplacements with excess neutralising capacity well away from the outside surface of the final rehabilitated landforms; • coal reject material will be placed at a depth where there is a lower risk of connectivity to surface water or groundwater resources; • if coal reject materials are left exposed to oxidising conditions for an extended period of time prior to encapsulation, dosing with agricultural limestone would be considered as a contingency measure; and • surface water and seepage from the coal reject storage areas will be monitored to ensure that key water quality parameters remain within appropriate criteria.
129		The likelihood of spontaneous combustion has not been addressed.	<p>Assess the risk of spontaneous combustion for the proposed coal mine and provide the following information:</p> <ul style="list-style-type: none"> • describe the quality and quantity of carbonaceous material in the waste stream • discuss the potential of spontaneous 	<p>A discussion of spontaneous combustion potential for the coal has been included as Section 13.3.4 of the <i>EA Application: Revised Supporting Information</i> document.</p> <p>The geochemical properties of the Gemini coal provide for a lower propensity for spontaneous combustion. Notwithstanding, the following prevention and control measures will be adopted to maintain a low risk of spontaneous combustion:</p> <ul style="list-style-type: none"> • dispersal and burying of reactive materials within spoil; • controlling ventilation through compaction and capping; • design of spoil dumps to minimize erosion & cracking of capping material avoiding the risk of air ingress; • firefighting equipment readily available at appropriate locations; • regular inspections and maintenance of firefighting equipment; and

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			combustion for coal waste stockpile areas <ul style="list-style-type: none"> discuss the prevention and control measures adopted for spontaneous combustion Describe the likely impacts of spontaneous combustion incidents on the receiving environment.	<ul style="list-style-type: none"> operator training.
130		The water balance would assess each of the major water fluxes into and out of the final void. These include surface runoff, groundwater movement, interactions with waste rock and evaporation.	Conduct a water balance assessment for the pit lakes in the final landform.	The water balance has been conducted for the final voids, with the outcomes of the modelling summarised in Section 7.3.5 of the <i>EA Application: Revised Supporting Information</i> document, and addressed in detail in Section 8.11 of Appendix B.
General				
131	Regulatory requirements - Environmental Objectives	Under Schedule 8, Part 3, Division 1 and 2 of the Environmental Protection Regulation 2019 (EP Reg), the relevant environmental objectives for operational assessment have been stated in the application. A demonstration of how the proposal meets the environmental objectives and performance outcomes has not been provided.	At this stage, insufficient information has been provided to demonstrate that the environmental objectives can be met. Detail how environmental objectives and performance outcomes will be achieved or not achieved.	Sections 5, 6, 7, 8, 9, 11, 12, 13 of the <i>EA Application: Revised Supporting Information</i> document lists the corresponding environmental objectives for air, water, wetlands, groundwater, noise, waste, land detailed in Schedule 8, Part 3, Division 1 and 2 of the Environmental Protection Regulation 2019. The following sections of the <i>EA Application: Revised Supporting Information</i> document, detail how the environmental objectives and performance outcomes will be achieved: <ul style="list-style-type: none"> air - Section 9.4; surface water - Section 7.4; wetlands - Section 6.4; groundwater - Section 8.4; noise - Section 11.4; waste - Section 12.5 and Section 13.4; and land - Section 4.4 and Section 5.4.
132	Regulatory requirements - Environmental impacts	Provide further details of the potential or actual impacts on environmental values including: <ul style="list-style-type: none"> the associated likelihood, magnitude and duration of risk; 	At this stage, insufficient information has been provided to demonstrate the potential or actual impacts on environmental values.	Potential and actual impacts for the Project have been addressed and described throughout the <i>EA Application: Revised Supporting Information</i> document, including the specific assessments contained within the Appendices. Section 14 of the <i>EA Application: Revised Supporting Information</i> document has been updated to address the potential or actual impacts on environmental values during the construction, operation and

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		<ul style="list-style-type: none"> • whether any of those impacts might cause serious environmental harm, and what is the likelihood of that harm; • what an acceptable level of impact on the environmental values is, taking into account any management objectives for those values; • any existing control measures that are implemented to minimise impacts on environmental values; and • whether any conditions need to be imposed to prescribe how impacts that carry a risk of causing serious environmental harm must be managed. <p>The following technical guidelines explain how to provide the necessary information:</p> <ul style="list-style-type: none"> • application requirements for activities with impacts to air (ESR/2015/1840) (PDF, 528KB) • application requirements for activities with impacts to land (ESR/2015/1839) (PDF, 177KB) • application requirements for activities with noise impacts (ESR/2015/1838) (PDF, 399KB) • application requirements for activities with impacts to water (ESR/2015/1837) (PDF, 214KB) • application requirements for activities with waste impacts – (ESR/2015/1836) (PDF, 167KB)* • requirements for site-specific and amendment applications – 	<p>Address the risks and impacts of each relevant activity during the construction, operation and decommissioning stages of the Project.</p> <p>Provide a risk assessment that identifies the likelihood of an impact occurring, the management/mitigation measures proposed, the consequence of the managed impact and the overall risk matrix.</p> <p>Address the following:</p> <ul style="list-style-type: none"> • Account for potential level of residual impact on environmental and community values. • Consider the cumulative impacts of environmental values that would be generated. 	<p>decommissioning stages of the Project in accordance with <i>AS ISO 31000:2018 Risk management – guidelines</i>.</p> <p>The risk assessment has been carried out to identify and address associated Project risks, these include:</p> <ul style="list-style-type: none"> • the likelihood of an impact occurring; • the management/mitigation measures proposed; • the consequence of the managed impact; • potential levels of residual impacts on environmental and community values; and • the cumulative impacts on environmental values.

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		<p>underground water rights (ESR/2016/3275) (PDF, 505KB).</p> <p>*The Operational Policy – Disposal and storage of scrap tyres at mine sites – ESR/2016/2380 (PDF, 95KB) may also be relevant.</p> <p>In addition, use the guidelines relevant to your proposed environmentally relevant activities.</p>		
133	Management Plans	<p>Providing the necessary plans can help to demonstrate how the applicant can perform their due diligence and meet their environmental obligations otherwise conditions might be imposed to require the implementation of a system to manage risks to the environment.</p> <p>Management plans or mitigation measures mentioned in the Supporting information report include:</p> <ul style="list-style-type: none"> • Sediment and Erosion Control Management Plan; • Receiving Environment Monitoring Program (in accordance with the Departmental Guideline <i>Receiving Environment Monitoring Program guideline</i> (ESR/2016/2399) and Schedule F – Water in the Departmental Guideline <i>Model Mining Conditions</i> (ESR/2016/1936)); • Site Water Management Plan (in accordance with condition F27 in the Departmental Guideline <i>Model Mining Conditions</i> (ESR/2016/1936)); 	<p>At this stage, insufficient information has been provided to demonstrate that proposed mitigation strategies will prevent the occurrence of environmental harm or nuisance.</p> <p>Develop and provide the relevant mitigation and management plans to demonstrate how risks will be managed and how the applicant will meet their environmental objectives as part of the information request response otherwise demonstrate that a plan is not required at this stage.</p>	<p>An <i>Erosion and Sediment Control Plan</i> has been provided as Appendix P attached to the <i>EA Application: Revised Supporting Information</i> document.</p> <p>A <i>Receiving Environment Monitoring Program Design Document</i> has been provided as Appendix Q attached to the <i>EA Application: Revised Supporting Information</i> document.</p> <p>An example <i>Air Quality Management Plan</i> is provided as Appendix C of the Air Quality and GHG Assessment (Appendix L of the <i>EA Application: Revised Supporting Information</i> document).</p> <p>Although it is not appropriate to have all listed Management Plans developed at this stage of the Project's design and assessment process, management measures within the following sections have been updated within the <i>EA Application: Revised Supporting Information</i> document to provide information on how risks will be appropriately managed by Magnetic South, these include:</p> <ul style="list-style-type: none"> • <i>Site Water Management</i> (discussed in further detail in Section 7.4.1); • <i>Land Disturbance Permit System</i> (discussed in further detail in Section 4.5); • <i>Weed and Pest Management</i> (discussed in further detail in Section 4.5.4); • <i>Emergency Response and Spill Management Plan</i> (discussed in further detail in Section 5.4.3.1); • <i>Fuel and Hazardous Liquids Storage and Management Plan</i> (discussed in further detail in Section 5.4.3.2); • crossing design for fish passage during low and high flow events (discussed in further detail in Section 6.4.3); • <i>Topsoil Management Plan</i> (discussed in further detail in Section 4.4.3); • <i>Cultural Heritage Management Plan</i> (discussed in further detail in Section 5.4.8); • <i>Noise and Blast Management Plan</i> (discussed in further detail in Section 11.4.2); and • <i>Non-Mineral Waste Management Plan</i> (discussed in further detail in Section 12.8.1).

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		<ul style="list-style-type: none"> • Land Disturbance Permit System; • Weed and Pest Management Plan; • Emergency Response and Spill Management Plan; • Fuel and Hazardous Liquids Storage and Management Plan; • Crossing design for fish passage during low and high flow events; • Noise and Blast Management Plan; • Topsoil Management Plan; • Cultural Heritage Management Plan; • Air Quality Management Plan; and • Generated Waste Management Plan. 		<p>Specific management plans will be developed following the EA and ML approval, once Project certainty has been assured and detailed design has progressed.</p>

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