Appendix 1: Additional information required for proposed PRCP schedule

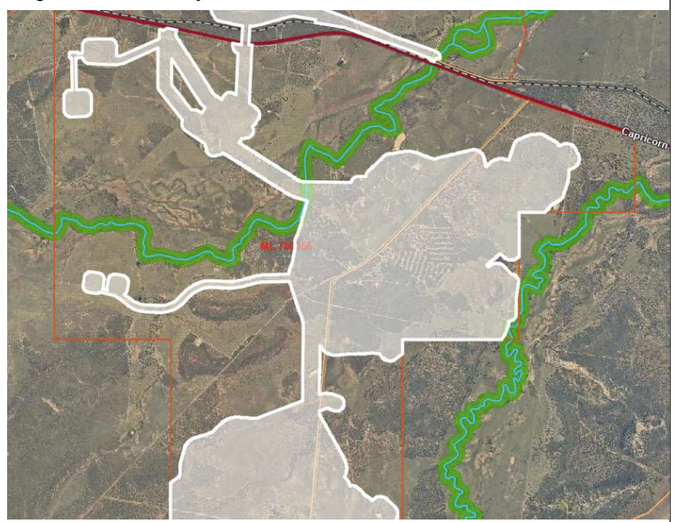
Provide a revised PRC plan (including PRCP schedule) that addresses the following matters:

Item	PRCP Plan/Schedule	Issue	Required Information	Magnetic South Response
1.	**3.1.4.1 Surface water quality**	**Water quality limits** The Water Quality Objectives (WQO) for the Mackenzie River Sub-Basin are reported in Table 7. However, the limits do not appear correct e.g. Chromium (1900 µg/L). Table 30 (section 3.5.4) states that Chromium (1900 ug/L) is a limit from ANZG 2018. The ANZG guideline for aquatic ecosystem protection (95%) and (80%) is 1 µg/L and 40 µg/L respectively. The department requires additional clarity on where the limits presented in Table 7 and Table 30 are sourced, to ensure that appropriate water quality limits are applied to the PRCP for monitoring of rehabilitation.	1. Update the PRC Plan to clarify the source of the limits provided in Table 7 (section 3.1.4.1) and Table 30 (section 3.5.4), 2. If the limits provided in Table 7 and Table 30 have not been transposed correctly from the source material, amend the limits accordingly.	Table 7 and Table 32 have been updated to clarify the source of limits. Water quality limits were sourced from WQO for Mackenzie River Sub-basin and ANZG (2018) guidelines based on 95% ecosystem protection. Limits have been amended to ensure they are transposed correctly from the source material.
2.	**3.1.4.1 Surface water quality**	**Contaminants of concern (CoC)** Table 9 in section 3.1.4.1 shows the surface water monitoring data (2019-2024), however there is no explanation for the parameters chosen to be reported. Only mean data is provided, and the appendices do not include all data collected. The water quality parameters should align with an analysis of the potential contaminants of concern (CoC). The parameters reported in for the PRCP plan are not clearly linked with any analysis of the CoC for the site. Overall the PRCP contains limited analysis of the CoC for the site, and further detail is necessary to demonstrate a meaningful linkage between the monitoring parameters and the contaminants potentially generated by mining. The PRCP guideline section 3.1 requires EA holder to provide baseline information with respect to site hydrology and fluvial networks. In accordance with the PRCP guideline section 3.6.1, the Rehabilitation Planning Part must include a description of the following: • a description of the contaminants that pose a risk to environmental values of the receiving environment. • source, pathway and fate of contaminants that have the potential to impact environmental values. CoC should be consistent between surface water and groundwater. This information is important as it helps to determine the water quality limits, as well as the suitability of monitoring locations to demonstrate the stability and non-polluting state of the final rehabilitated landform. It should be noted that water quality objectives for post-closure are often different to operational water quality limits in the EA. It should be noted that Condition F3 of the EA requires a study of the source of contaminants to be completed for the Water Management Plan, which is due within one month of the grant of ML. This study should have already been completed, and should be provided to support the PRC Plan.	1. Update the PRC Plan to include: • Analysis of contaminants of concern at the site. This should consider the relevant activities on site, and the characterisation of waste material. • Summary statistics of baseline water quality (Table 9) should include median, 80th and 95th percentiles, in addition to mean. • Include all surface water data collected to date as an appendix to the PRC Plan. 2. Provide the Water Management Plan developed in accordance with Condition F3 of the EA including the study of source contaminants.	Table 9 has been updated to include analysis of all contaminants of concern at the site based outlined in the Environmental Protection (Water and Wetland Biodiversity) Policy 2019 and toxicant trigger values from the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2018). Table 9 has been updated to include mean, median, 80th and 95th percentiles in summary statistics. Surface water data collected to date has been attached in Appendix K. The Water Management Plan has been attached in Appendix L.

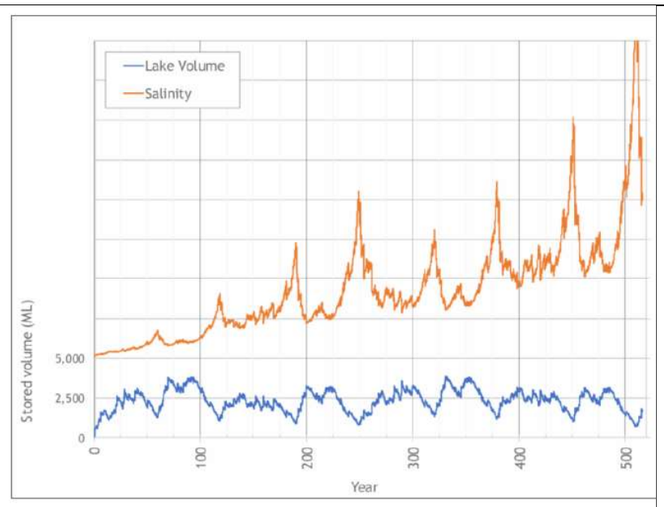
3.	**3.1.5 Groundwater**	**Groundwater environmental values (EVs)** This section comments on the suitability of groundwater for stock uses, however does not provide any information on the environmental values of the groundwater resource. The Environmental Protection (Water and Wetland Biodiversity) Policy 2019 (EPP) identifies the environmental values to be protected for waters and wetlands in Queensland. Environmental values (EVs) can include biodiversity, aquaculture, stock watering, cultural and spiritual values, and recreation or aesthetic values. Figure 20 shows the locations of potential groundwater dependant ecosystems (GDE) areas, however there is no discussion on the importance of the groundwater resource to these GDEs in this section. A detailed description of the groundwater environmental values is required in this section demonstrate that groundwater resources have been considered in the design for closure and underpin the rehabilitation methodology.	1. Update the PRCP Plan to describe the environmental values for groundwater in more detail.	Environmental values for groundwater have been added to the PRCP and described in detail. Descriptions were based on environmental values identified in the EA application documents. Agricultural uses and aquatic ecosystems were identified to be the relevant environmental values to the mining lease and surrounding areas, further discussion is in Section 3.1.5.8
4.	**3.1.5.5 Groundwater quality** **3.1.5.7 Groundwater level**	**Groundwater quality data** Table 10 in section 3.1.5.5 provides a summary of groundwater quality results from monitored bores. Groundwater data should also be presented based on bore specific data, given the range of data presented in the table. Similarly, Figure 24 should provide water level data for individual bores. The groundwater level data (Figure 24) should be provided for each bore to accurately see the changes in groundwater level, however it is appropriate to still identify this data according to hydrogeological unit (as coloured in Figure 24). A complete understanding of bore specific groundwater data is required to ensure the groundwater values are properly considered in rehabilitation. By combining water level data from multiple bores, it is not possible to review trends in individual bores.	1. Update the PRC Plan to include: • Provision of bore specific data as separate table. • Revised Figure 24, showing groundwater level trends for each specific bore • Provision of all groundwater data collected to date as an appendix to the PRC Plan.	Additional groundwater level data has been included in section 3.1.5.7. Bore-specific groundwater monitoring data has been provided in Appendix I.
5.	**3.1.6.6 Land Suitability**	**Land suitability** This section on land suitability states that the assessment was carried out in accordance with the methodologies: • Guidelines for Agricultural Land Evaluation in Queensland (DSITI & DNRM 2015); and • Chapter 10 (Suitability framework for the inland Fitzroy and southern Burdekin area) of the Regional Land Suitability Frameworks for Queensland (DNRM & DSITI 2013). However, the interpretation of data and ranking of the land according to the five-class land suitability system was conducted using the Technical Guidelines for Environmental Management and Exploration and Mining in Queensland (DEM 1995). It is DETSI's preference that the 'Guidelines for Agricultural Land Evaluation in Queensland (DSITI & DNRM 2015)' is used to determined LSA classes, as referenced in the QMRC technical paper 'Grazing as a post-mining land use – implications for leading practice (July 2024). To ensure that the LSA class has been determined appropriately, the PRC plan should include an assessment of the LSA class determined in accordance with the 'Guidelines for Agricultural Land Evaluation in Queensland (DSITI & DNRM 2015)'. If there is any difference in the determination when assessed under each framework this should be	1. Update the PRC Plan to include: • An explanation as to why the DEM 1995 guideline was used to categorise LSA classes, rather than the DSITI & DNRM 2015 guideline • An assessment of land suitability using the DSITI & DNRM 2015 guideline and a discussion on any variation in the results between the two approaches.	Land Suitability Assessment (LSA) classes where categorised based on the guidelines available at the time of assessment, which was the DEM 1995 guideline. The DEM 1995 guidelines provide a sufficient representation pre-mining land suitability for the proposed PMLU of grazing. Reassessing the LSA classes against the DSITI & DNRM 2015 guideline would not change the outcome of the assessment or post mining targets of achieving LSA class 3 or 4.

		discussed in section 3.1.6.6. If preference is given in the PRC plan and Schedule to adopting the results of the existing assessment using the Technical Guidelines for Environmental Management and Exploration and Mining in Queensland (DEM 1995), an explanation should be provided as to why this is the more suitable approach. It is necessary to demonstrate that the QMRC technical papers relevant to land suitability have been duly considered in developing the PRCP.		
6.	**3.1.7 Flora and fauna**	**Regional ecosystems** Section 3.1.7.1 outlines the regional ecosystems present on the mining lease, and it is assumed these are listed from the outcomes of on-ground surveys. It does not recognise the certified regional ecosystem mapping, and whether there are differences between the two. The Queensland Herbarium has recently undertaken a review of the regional ecosystems, resulting from a request by the applicant to change the certified RE mapping. The outcomes of this change should be included in the PRC Plan, and if any differences between the certified RE mapping and the vegetation mapping shown in Figure 30 remain. This is necessary to ensure than the PRC plan is underpinned by the most recent and accurate information available.	1. Update the PRC Plan to include the comparison between the certified RE mapping and on-ground verified vegetation communities.	Figure 37 in Section 3.1.7.1 has been updated to contain current department certified RE mapping and on-ground verified vegetation communities.
7.	**3.1.7 Flora and fauna**	**Conservation significant species** This section notes the following conservation significant species occurring within the project area: • *Cerbera dumicola* – Near Threatened plant species • Southern squatter pigeon (*Geophaps scripta scripta*) – Vulnerable species under the EPBC Act and NC Act • Greater glider (*Petauroides volans*) – Vulnerable species under the EPBC Act and NC Act (also please confirm if it is *Petauroides volans volans*, which is Endangered under the EPBC Act and NC Act). • Rufous fantail (*Rhipidura rufifrons*), which is listed as a migratory and marine species under the EPBC Act • Rainbow bee-eater (*Merops ornatus*), which is a listed marine species under the EPBC Act • Short-beaked echidna (*Tachyglossus aculeatus*), which is not an EVNT species but is listed under the NC Act as Special Least Concern There are no maps showing the location of where these species have been recorded. It is also noted that no Matters of State Environmental Significance (MSES) mapping, including essential habitat, is shown for the project area. This is important, in relation to what PMLU is proposed and whether any rehabilitation considerations have been made for these species in the long-term.	1. Update the PRC Plan to include: • Map of conservation significant species survey records, with MSES and essential habitat mapping • Any rehabilitation considerations for known conservation significant species habitat, and how this relates to the proposed PMLU	Figure 38 in Section 3.1.7.2 has been included mapping the conservation species survey records with MSES regulated vegetation and essential habitat mapping.
8.	**3.2 Community consultation**	**Taunton National Park (Scientific)** Section 3.2.1 states that Magnetic South has undertaken consultation and discussions with underlying landholders, neighbours, native title groups (the Gaangalu Nation People), local council representatives and state government representatives.	1. Update the PRC Plan to include the outcomes of consultation with the Rangers of Taunton National Park (Scientific).	Section 3.2.1 of the Gemini PRCP Supporting Information has been updated to include further discussion on consultation with Taunton National Park (Scientific).

		Table 19 lists a summary of the different entities that have been consulted from 2019 to 2024, with only affected landholders and DETSI (incorrectly identified as Council Meeting) being consulted in regards to the PRCP outcomes. No consultation with Queensland Parks and Wildlife Services (QPWS) Central Region staff, the managers of Taunton National Park (Scientific), which adjoins the ML, has been recorded. It is strongly advised that Magnetic South consult with key contacts for Taunton National Park (Scientific), regarding the outcomes of the Gemini Coal Mine PRCP.		
9.	**3.2.3 Stakeholder engagement plan**	**Community consultation register** This section states that Magnetic South has developed a consultation register (Table 19) in accordance with the requirements of the EP Act. It then says that a summary of the key consultation records relevant to the PRC Plan has been provided in Table 19. There is no full consultation register attached to the PRC Plan, so it doesn't appear that the full register has been provided. As per the PRCP guideline, section 3.5 states that the community consultation register must include: • Consultation dates • Identification of each community member • Description of consultation type • Information provided to the community • Issues raised/discussed by the community • Decisions/outcomes of engagement • Commitments made by the applicant. The community consultation register provided as Table 19 does not include identification of each community member (only industry type/entities), or clearly list the issues raised by the community (these should be separated from the information provided/matters discussed). The register also mentions that objections/submissions were received by affected landholders, however no details of the issues raised in these submissions are included in the register, only information provided/discussion. Therefore it can't be determined how these issues have been considered by Magnetic South and incorporated in the PRCP process. In developing the proposed PRC Plan, the community should at least be engaged on the plan for the mine, PMLUs or NUMAs, areas of disturbance, rehabilitation and management methods, progressive rehabilitation and closure timeframes. The department is legally required to consider any potential impacts on human rights during the decision making process under the *Human Rights Act 2019.* It is important that the application can clearly articulate those cultural rights relevant to the site and how these have been consulted upon to ensure the ongoing protection of cultural rights of those individuals potentially impacted. The application does not clearly identify those cultural rights determined through early engagement or native title engagement. It is likely that the time that has passed since the listed cultural engagement that has occurred, that there may be a further need to re-engage with	1. Update the PRC Plan to either include the full community consultation register as an appendix, or provide more detail to the summarised version in Table 19. It should: • Identify each community member • Separate the information provided to the community, and the issues raised by the community • Confirm whether details of the PRC Plan and schedule (including rehabilitation methods, progressive rehabilitation and closure timeframes) have been communicated to the public, in particular neighbouring landholders and those with cultural connection to the land. • Detail is lacking around the specific outcomes of engagement, particularly in relation to the PRC Plan and schedule and if any matters remain unresolved.	Further information has been included section 3.2.3 of the Gemini PRCP supporting information. The identities of each community members have been provided with reference to property names, rather than the full details of the community member, unless the submission was made through the public notification process. The full Stakeholder Engagement Framework has been attached in Appendix D.

		those individuals and groups relevant to the rehabilitation and ongoing connection to the land to understand their cultural connections. Impacts to cultural values are not able to be determined, unless a proper understanding is presented as to what these potential values include.		
10.	**3.3 Post-mining land use**	**PMLU for remnant vegetation areas** The current land use is recognised as low intensity cattle grazing native vegetation (section 3.3.2) and the PMLU of Low Intensity Grazing is recognised as having two components – Grazing and Grazing Native Vegetation (Section 3.3.3.1). However, the Rehabilitation Milestones and seed mixes proposed (grazing seed mix contains only pasture species), which indicates that the PMLU envisaged over much of the project area will be grazing improved pasture, not native vegetation. Though some of the site has been cleared, significant areas of remnant vegetation remain including that which provides considerable connectivity between two riparian corridors recognised as Regional Biodiversity Corridors, and in which the endangered southern greater glider (*Petauroides volans volans*) has been recorded. Rehabilitation of the site should aim to return the current connectivity and fauna habitat values of the area post mining by rehabilitating all areas currently under remnant vegetation with native woodland vegetation. Converting these areas to improved pasture would be a poor outcome for biodiversity. Regional biodiversity corridors:  Source: Queensland Globe	1. Update the PRC Plan to include: • Revision of the PMLU proposed for areas currently containing remnant vegetation. These areas should not be proposed as grazing PMLU • Consideration for connectivity opportunities between the two riparian corridors identified as Regional Biodiversity Corridors.	The PMLU of Low Intensity Grazing has been updated to only have the Grazing component. Consequently, the PMLU envisaged over the Project area will only consist of grazing improved pasture which will be reflected in the species evident in the seed mix used for rehabilitation. While the department notes that areas containing remnant vegetation should not be proposed as a grazing PMLU, this is inconsistent with the proposed land outcome document (LOD) which is the Gemini EA. Per discussions with the department, the PMLUs are to remain consistent with the LOD and therefore, areas currently containing remnant vegetation will remain as a grazing PMLU. An area of disturbance has been approved for the northern Regional Biodiversity Corridor to construct a water course crossing. This infrastructure is to be retained at the end of mine life from underlying landholder requests. The approved disturbance is 250 m, however, the disturbance distance is 80 m. The undisturbed area will remain untouched and be retained as the identified Regional Biodiversity Corridor to retain current connectivity and fauna habitat values.
11.	**3.3.3 Proposed post-mining land use**	**Proposed PMLU** The proposed PMLUs for RA7 (Retained dams) and RA8 (Diversion drains) are stated to be different between Table 20 and Table 22. These PMLU should be represented consistently in the PRC plan and should align with the Schedule. The stated PMLU in Table 22 for both RA7 and RA8 is grazing, which is considered to be a less suitable approach than the PMLU's stated in Table 20. for diversion drains is 'watercourse' or similar. This is consistent with other approved PRCP	1. Update the PRC Plan to ensure the proposed PMLUs for RA7 and RA8 are appropriate and consistent.	The PRCP has been updated to ensure RAs are appropriate and consistent. RA7 (retained dams – now RA6) has been updated to a retained infrastructure PMLU. RA8 (Diversion drains – now RA7) has been updated to a native vegetation PMLU. The native vegetation PMLU is targeting a rehabilitated ecosystem consistent with RE 11.5.2. The watercourses within the Project area are ephemeral in nature. Consequently, they are unable to support dominant riparian regional ecosystems. Furthermore, the understory has experienced further degradation from grazing. Therefore, targeting RE 11.5.2 is an appropriate representation of pre-mining vegetation.

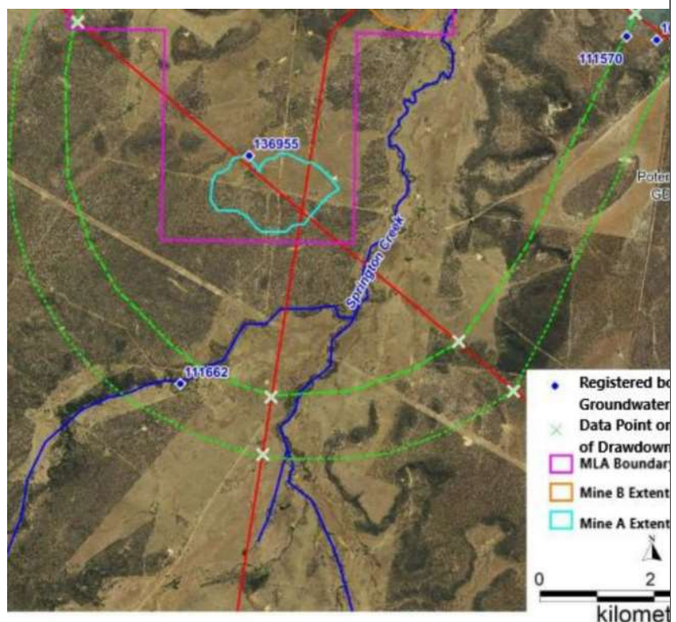
		schedules. The 'watercourse' PMLU should be aligned to a local riparian regional ecosystem (such as RE 11.3.25).		
12.	**3.3.3 Proposed post-mining land use**	**Proposed PMLU** The PMLU listed in Tables 20 and 22 for RA6 is grazing/ native vegetation. The milestone criteria required in the Schedule to ensure a grazing PMLU are distinctly different from the criteria required for a native vegetation PMLU and a mosaic of the two PMLU's is unlikely to be appropriate. The PMLU for RA6 should be limited to achieving grazing or native vegetation. The PMLU for RA6 should be re-evaluated and updated in the PRC plan and Schedule. As noted above in item 10, areas of pre-mining remnant vegetation should be rehabilitated to native vegetation where possible.	1. Update the PRC Plan to clarify the PMLU for RA6. 2. Update the PRCP Schedule to reflect a singular PMLU for RA6 and proposed suitable SMART milestone criteria for its achievement.	The PRCP has been updated to clarify that RA6 (now RA5) will have the singular PMLU of grazing. Consequently, the proposed suitable SMART milestone criteria have been updated to ensure grazing PMLU is achieved.
13.	**3.3.3 Proposed post-mining land uses** **3.5.6.7 Final void study**	**Final voids PMLU** Magnetic South have made a commitment to rehabilitate the final voids to achieve a PMLU of fauna habitat. While this may be achievable in the first 100 years, there is risk associated with the increasing salinity levels and their ability to support an aquatic ecosystem over the long-term. Figure 52 (section 3.5.6.7) shows that the salinity levels are predicted to continue to increase over 500 years for Mine A void. A PMLU must be able to achieve a stable condition, which in accordance with s111A of the EP Act: Land is in a stable condition if – a) The land is safe and structurally stable, and b) There is no environmental harm being caused by anything on or in the land, and c) The land can sustain a PMLU. The requirement for land to sustain a PMLU, and prevent environmental harm, does not end after 100 years. The PRC plan must demonstrate how the final voids will achieve fauna habitat, particularly the aquatic ecosystem component, to reach a stable condition post-closure. The PRCP Schedule must include appropriate SMART criteria that will achieve and sustain the PMLU. As per section 3.2 of the PRCP guideline, it is the applicant's responsibility to provide sufficient evidence and justification regarding any proposed PMLU.	1. Update the PRCP Plan to explain how the final voids will reach a stable condition, and continue to sustain an aquatic ecosystem long-term. 2. Ensure criteria that meet the SMART principle are included in the schedule that will deliver a stable PMLU of fauna habitat.	Modelled salinity of the residual void lakes suggests that they would be unable to support an aquatic ecosystem long-term. Based on this conclusion, DETSI has approved for residual void lakes to be classified as NUMAs. Further information can be found in section 3.4 of the Gemini PRCP supporting information.

		 *Figure 52: A Void post mining salinity*		
14.	**3.3.3.2 Post mining land suitability**	**Grazing PMLU and Land Suitability** Table 21 shows the pre and post mining cattle grazing land suitability class (LSC) areas. Post-mining, there is 1027 ha of land being proposed as LSC class 4, which is an increase of 780.8 ha of the pre-existing class 4 based on LSC calculated using DME 1995 methods. Pre-mining LSC shows that the majority of grazing lands is LSC class 2 or 3. It is expected that the post-mining LSC is returned to the pre-mining LSC. The technical report 'Grazing as a post-mining land use' produced by the Office of the Queensland Mine Rehabilitation Commissioner states that land suitability assessment (LSA) class 1 to 3 are recognised as suitable for a sustainable grazing PMLU. It states "Planning rehabilitation to achieve LSA Class 1-3 is considered leading practice for a grazing PMLU and should be undertaken prior to rehabilitation and inform rehabilitation milestones". Rehabilitating land to a LSC class 4 is not considered commensurate with achieving a sustainable grazing PMLU. The Gemini Coal Mine is not an operational site and therefore it is considered that the design for closure must include the implementation of leading rehabilitation practice that will return the land to a sustainable grazing PMLU with a LSA class no less than 3. Note: retained water storages should not have a PMLU of 'grazing', therefore the LSC should not apply to these areas.	1. Update the PRC Plan and revise rehabilitation techniques to achieve a minimum class 3 LSA. 2. If there are areas that can not achieve LSA class 3, these may need to be proposed as an alternative PMLU.	It is anticipated that rehabilitated dams and mine infrastructure areas will be able to achieve a LSC 3, however all other areas of grazing PMLU will achieve LSC 4. LSC 4 is consistent with pre-mining conditions of these areas. While LSC 4 represented smaller proportion of these areas in pre-mining landscapes, the entire area will aim to achieve LSC 4. Due to LSC 4 intersecting these areas and accounting for factors affecting rehabilitation, such as material handling, achieving LSC 4 is representative of pre-mining conditions. Therefore, areas will be rehabilitated to a landscape consistent with pre-mining conditions.
15.	**3.3.4.1 Alternative PMLUs considered**	**Final void options** This section analyses three options to manage and reduce final landform residual risk. These options are summarised as: • Option 1 – Complete backfill of voids to achieve a modified pre-mining topography • Option 2 – Not backfilling voids	1. Update the PRC Plan to discuss any options that were analysed between listed Option 1 and Option 3, that may result in improved water quality in the residual voids. 2. If current Options 1-3 were the only scenarios evaluated in developing the PRC plan, complete a further options	Options 1-3 were the only scenarios evaluated in developing the PRCP. This is due to there being no other economically feasible option for the Project that would deliver a better environmental outcome for the residual void. Therefore, option 3 remains the preferred option as it is economically viable and results in the best environmental outcome.

		• Option 3 – Partial backfill of residual voids to 80 m below ground level (bgl) Option 3 has been chosen as the preferred option, due largely to the costs associated with Option 1, and the environmental risk associated with Option 2. Option 3 was chosen as studies indicated that, with controls to limit surface water draining to the pits, saline inflows would be significantly reduced if the pit was backfilled to 80 m bgl. However, Option 3 still results in salinity levels that exceed 5,000 mg/L (approx. 9,090 µS/cm) after 100 years. It is unclear if any scenarios were considered to rehabilitate to a level between Option 3 and Option 1 were analysed, to optimise the water quality of the residual voids and reduce residual risk while considering rehabilitation costs. If a void backfill scenario that has the purpose of primarily optimising the water quality in the residual voids has not been evaluated, undertake to necessary analysis to determine the feasibility of a backfill scenario that delivers an improved water quality outcome when compared to Option 3. This analysis is required to ensure that rehabilitation will deliver the best possible environmental outcome for the residual void.	analysis to include a scenario that optimise the water quality outcome for the residual void. 3. If Option 3 remains the preferred scenario after considering further options, provide a justification as to why.	
16.	**3.5.4 Milestone criteria**	**Seed mixes** <u>Grazing</u> Table 25 (Attachment 1 – Grazing PMLU seed mix) includes the species *Bothriochloa pertusa* (Indian bluegrass). This is a highly invasive species and is listed as an environmental weed. The use of environmental weeds in rehabilitation should be avoided to ensure a sustainable PMLU and *Bothriochloa pertusa* should be removed from the proposed seed mix. <u>Native Vegetation</u> For remnant vegetation areas, introduced species, for example Rhodes grass and Stylo should be removed from seed mixes. The species list for native vegetation areas should include trees and shrubs, appropriate to nominated local regional ecosystem(s). The proposed species lists have no designated target regional ecosystem. Appropriate RE types for the areas may include RE11.7.2 or RE11.5.2. Sterile cover crops can be used to aid establishment.	1. Update the PRC Plan and schedule to revise seed mixes and remove *Bothriochloa pertusa* from any seed mixes. 2. State which regional ecosystem(s) are guiding the species selection and provide a justification for their appropriateness with refence to the surrounding landscape and pre-mining conditions. 3. Revise the seed mixes that will be applied to areas which currently (pre-mining) include remnant vegetation, to ensure that trees and shrub species are included which align with a nominated RE type.	*Bothriochloa pertusa* has been removed from all seed mixes in the PRCP. Native ecosystem supporting fauna habitat seed mix species selection has been guided by RE 11.10.3. Native ecosystem seed mix species selection has been guided by RE 11.5.2. These RE types are appropriate as the areas being rehabilitate do not demonstrate a pristine native ecosystem pre-mining. Dominant native ecosystems are not evident in pre-mining landscapes as they have experienced grazing and are supported by ephemeral watercourses. Seed mixes have been revised to ensure that trees and shrub species align with the nominated RE types.
17.	**3.5.4 Milestone criteria**	**Milestone timeframe** Table 34 indicates the typical timeframe for surface achievement of native ecosystem revegetation states that a 10 year timeframe for establishment of mature, self-sustaining vegetation is typical. In the justification column, the proposed timeframe for the achievement of vegetation establishment is just 4 years. The justification doesn't clearly explain how the accelerated delivery of the targeted revegetation will be delivered compared with the typical timeframe. The proposed timeframe of 4 year is likely to be insufficient for suitable revegetation and establishment of a native ecosystem. It is expected that the timeframe of at least 15 years is applied to achieve self sustaining native vegetation, particularly if targeting woodland RE types.	1. Update the PRC Plan and schedule to revise the timeframe for native ecosystem communities.	PRCP and schedule have been revised to contain a consistent time frame of 15 years to allow for establishment of native ecosystem communities.

		Realistic timeframes are required to be nominated in the PRC plan and Schedule to ensure delivery of the PMLU.		
18.	**3.5.4 Milestone criteria**	**Groundwater quality limits** This section includes groundwater quality limits depicted in Table 32 for the PRCP. The data used to determine the limits in this table has not been underpinned by any provision of raw monitoring data. Further, the PRC plan should discuss how this data was used to derive the limits provided in Table 32. Given that the site is currently un-operational, a plan for future data collection and analysis required should also be discussed. This information is required to verify that the groundwater quality limits are suitable to be included in the Schedule to ensure the site is non polluting at closure. .	1. Update the PRC Plan to include: • An explanation of how the groundwater quality limits were derived, based on all available monitoring data 2. All groundwater data collected to date as an appendix to the PRC Plan.	Groundwater quality limits for CoC have been derived from raw monitoring data. The raw data was gathered from the local and regional bore networks, which have undergone continuous monitoring since December 2018. All groundwater data collected to date is attached as Appendix I. Groundwater Monitoring Data in the PRCP.
19.	**3.5.6.2 Soil and cover material**	**Topsoil stockpiles** The section on topsoil states that any topsoil stockpiles will be seeded. Further information is required in this section to clarify this approach. It is recommended that native seed is used for stockpile seeding. It is important to understand the seed mix and methodology proposed for all areas to provide a link to the delivery of the nominated PMLU for the area.	1. Update the PRC Plan to include native seed for topsoil stockpiles.	The grazing PMLU seed mix will be used to seed all topsoil stockpiles to ensure the material remains viable for rehabilitation use. Rehabilitation of a partial understory is targeted for all ecosystems in the Project area. Consequently, all PMLU areas will contain pasture vegetation. Therefore, grazing seed mix is appropriate for use of seeding topsoil stockpiles to ensure delivery of all nominated PMLU.
20.	**3.5.6.2 Soil and cover material**	**Cover system** This section states no cover system is required as the bulk reject stream is expected to be NAF with excess acid neutralising capacity. This conclusion cannot be verified until actual mining operations are commenced. The section also notes that the coal reject material presents a range of geochemical properties which leaves some ambiguity around the presence of PAF material. Given there is some uncertainty around the material properties on site the PRC plan should include a commitment to further material testing. Conservatively, to ensure appropriate rehabilitation is planned for under all scenarios, the PRC plan should include a design concept for a cover system should PAF material be present.	1. Update the PRC Plan to include: • A proposal for additional material testing once operations commence. • Design concepts of a cover system as a conservative approach to potential PAF management.	Section 3.5.7.2 of the Gemini PRCP supporting information has been updated to address this item.
21.	**3.5.6.3 Landform design**	**Habitat features** It is stated that logs will be placed as habitat, but there is little information regarding their source and management. It is important for the PRC plan to detail how habitat features will be included to ensure they are being utilised in a way that best supports the PMLU.	1. Update the PRC Plan to incorporate the following activities: • Logs should be salvaged during clearing for mining activities and stockpiled for rehabilitation both on void edges and in rehabilitated native vegetation. • Processes used to ensure that logs are stockpiled and available for installation in rehabilitation sites.	Littoral zones have been removed from the final landform design. Therefore, logs will not be needed for habitat rehabilitation and will not need to be sourced or salvaged.
22.	**3.5.6.3 Landform design**	**Erosion assessment** Erosion assessment discussed in Section 3.5.6.3 has not been provided in full. The details of the erosion assessment undertaken are essential for understanding the modelling used to underpin any conclusions drawn in the PRC plan and understanding any risks to the final landform. It is also essential in developing the milestone criteria for the Schedule as it relates to erosion.	1. Provide the erosion assessment/WEPP modelling report in full as an appendix to the PRC Plan.	Gemini Coal Mine Erosion Stability Assessment has been attached to the PRCP as Appendix J.

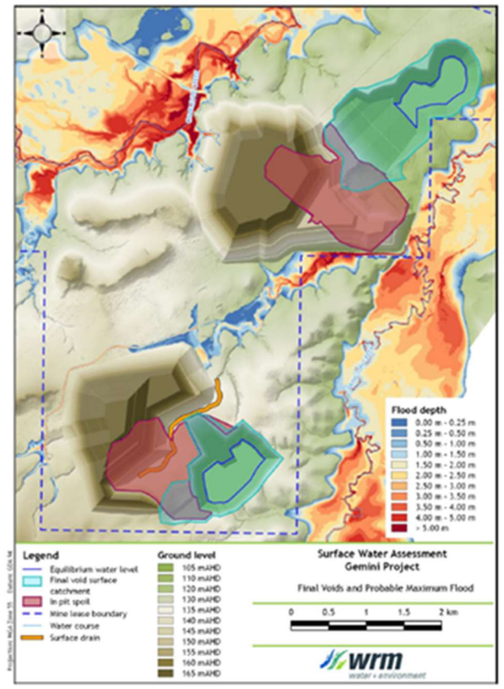
23.	**3.5.6.3 Landform design**	**Highwall stability** Section 3.5.6.3 describes the proposed reshaping of highwalls to achieve a slope gradient of 18 degrees in the upper strata. No information has been provided to demonstrate that these slopes will remain erosionally stable. Further information is required to demonstrate that these slopes, which are likely to include highly erodible materials at or close to the surface, will be stable. All assessment of erosional stability for these areas should include consideration of the erodibility of the materials present and its ability to support sufficient vegetation growth, noting that "weathered material tends to have a higher EC value than the fresh material." (Section 3.5.6.1). The PRC plan must demonstrate that the rehabilitation methods proposed will result in a stable landform, and underpin the milestone criteria applied to the highwall.	1. Update the PRC Planning Part and provide updated erosion assessment/modelling that demonstrates the proposed battered down highwall areas can be expected to remain erosionally stable, with consideration given to slope geometry, material properties, and realistic appraisal of groundcover.	This information has been updated in Section 3.5.7.3 of the PRCP and the full Erosion Stability Assessment has been attached in Appendix J.
24.	**3.5.6.3 Landform design, Schedule**	**Erosion criteria** Rehabilitation milestone criteria do not sufficiently reflect findings of erosion assessment. The erosion assessment discussed in Section 3.5.6.3 found that a minimum level of groundcover was required to ensure erosional stability. This finding should be reflected in all relevant milestone criteria, and further, all milestone criteria should reflect the conditions and parameters applied in the erosion assessment and associated modelling to achieve a stable landform.	1. Update the PRC Plan and schedule to include SMART criteria to manage erosion in accordance with the findings of the erosion assessment.	Erosion stability assessment was carried out for slope profiles in the Project design. The PRCP milestone criteria has been updated to reflect the findings of this assessment and ensure a stable landform is achieved.
25.	**3.5.6.3 Landform design**	**Ramp stability** Given the landform design, and the ability for cattle to access certain areas, there are concerns regarding erosion on ramps down to the pit lakes. This is of particular concern for the Mine A area. The PRC plan should contain a discussion of any specific measures that will be put in place to ensure that sloping areas able to be accessed by cattle will remain erosionally stable. This is to ensure that the PMLU of grazing is appropriate and achievable for these areas.	1. Update the PRC Planning Part to address concerns around erosion risk of ramps down to the pit lakes.	The PRCP has been updated to address concerns around erosion risk of ramps down to the pit lakes. Measures to control erosion caused from cattle accessing areas include achieving milestone criteria and installation of fences to reduce access.
26.	**3.5.6.4 Revegetation**	**Rehabilitation Areas (RAs)** Figure 39 (Rehabilitation areas) does not include RA9. As the Rehabilitation Areas Map is a mandatory inclusion in the PRCP Schedule, the Figure must include all RA's relevant to the schedule.	1. Update the PRC Plan to include RA9 in Figure 39.	The figure has been updated to include all RA's & IA relevant to the schedule.
27.	**3.5.6.5 Hydrogeology**	**Groundwater Dependent Ecosystem (GDE)** Figure 46 shows the predicted drawdown post-mining equilibrium, which shows that a drawdown of approximately 1 to 4 metres is likely to occur at a potential GDE area located 4 km from Mine A final void. This potential GDE is mapped as a high ecological significance (HES) wetland. Conclusions in the Groundwater Impact Assessment (Appendix E) state that based on the evidence available to date, it cannot be conclusively stated that the groundwater system is not continuously saturated from the area below the potential GDE (at RL165 mAHD) to the regional groundwater system (at an elevation of 110 to 89 mAHD). However, it is considered most probable that the ridgeline and the potential GDE is underlain by a perched groundwater system and the drawdown from mining operations has a very low risk of impacting groundwater levels beneath the potential GDE.	1. Update the PRC Plan to include: • Monitoring of potential drawdown impacts to the HES wetland (GDE) to the east of Mine A final void.	Ongoing groundwater monitoring will be conducted to ensure compliance with the EA. Consequently, any potential drawdown impacts to the HES wetland (GDE) will be evident within the compliance monitoring. The 2 m drawdown contour from groundwater modelling is interpreted to pose a very low risk to the potential GDE as the GDE is supported by a perched aquifer. This has been updated in section 3.5.7.5 of the Gemini PRCP supporting information.

		Provide information on any monitoring of this GDE that will be undertaken as part of the PRCP. This should be included in section 3.7.1. 		
28.	**3.7.1 Monitoring methodology**	**Monitoring of GDEs** This section does not include any monitoring of potential GDEs identified on site, or within the drawdown impact area of the project site. It is acknowledged that one confirmed GDE will be impacted directly by mining activities. However, the other confirmed GDE on Charlevue Creek, and the potential GDE associated with the HES wetland (as discussed in item 28 above), should be monitored for drawdown impacts during closure activities.	1. Update the PRC Plan to address GDE monitoring.	GDE monitoring has been updated in section 3.5.7.5 of the PRCP. Compliance monitoring and modelled drawdown will monitor any impacts on the GDEs.
29.	**3.7.1 Monitoring methodology**	**Monitoring sites** The PRC plan does not provide sufficient detail on the analogue/ reference sites for rehabilitation monitoring. Parts of section 3.7.1 cattle grazing is referred to as the only pre-mining land use, however other sections concede that native vegetation communities are also in the landscape pre-mining. Section 3.7.1 should clearly nominate distinct analogue reference sites for each of cattle grazing and native vegetation communities. The section should make clear how many analogue sites will be developed for each pre-mining use, and provide their locations and a description of the current conditions, supplemented with photographs where possible. Section 3.7.1 on page 153 states 'periodic monitoring of reference sites will provide an understanding of the pre-mining landscape, assisting in the future planning and refinement of rehabilitation strategies' which indicates that the reference sites should already be defined and all information should be included in this PRC plan.	1. Update the PRC Plan to provide all the required information on proposed analogue monitoring sites. This should include, at a minimum: • the number and location of sites, • the proposed frequency of monitoring, • The pre-mining land use that the PMLU will be compared to • Photographs of the current condition of the analogue sites.	Section 3.7.1.1 of the Gemini PRCP supporting information has been updated to provide more detail about the analogue/reference sites for rehabilitation monitoring. Three analogue reference sites have been nominated for grazing PMLU. These sites will be monitored on an annual basis, with the survey period occurring post-wet season, to coincide with rehabilitation monitoring. Grazing PMLU will be compared to the pre-mining land use of low intensity grazing.

		It is important for the department to understand the condition of the analogue monitoring sites to ensure that monitoring rehabilitation against these sites will indicate achievement of the desired PMLU.		
30.	**3.7.1 Monitoring methodology**	**Analogue sites** Ground cover and species richness criteria is proposed to be within 2 standard deviations of equivalent analogue sites. As addressed in item 30, more information is required about the analogue sites or the sampling regime that will produce this data. Two standard deviations would potentially lead to accepting outcomes that are too variable and/or too poor.	1. Update the PRC Plan and schedule and supply sampling and monitoring plans and analogue site locations or benchmarks.	The species richness criteria to be within 2 standard deviations of equivalent analogue sites has been removed and replaced with QBEIS index scores. More information about the analogue sites has been updated in Section 3.7.1.
31.	**3.7.1.6 Recruitment**	**Recruitment** This definition (<5cm dbh), which comes from the BioCondition manual, may not be a suitable way to distinguish recruits from the sown vegetation, at least not until the final milestones, as slow-growing species amongst those originally sown may themselves not have attained that girth. The PRC plan and schedule should discuss alternative recruitment indicators that could be used, including low height relative to others of the same species, occurrence of species not in the original seed mix, and/or evidence of flowering/fruiting. This is important to track the success of rehabilitation against all milestones.	1. Update the PRC Plan and schedule to revise the recruitment criteria.	Section 3.7.1.6 of the PRCP supporting information has been updated to include further information regarding the sampling methods of the satellite-derived fractional vegetation cover.
32.	**3.7.1.9 Satellite-derived fractional vegetation cover**	**Satellite-derived fractional vegetation cover** The PRCP Schedule criteria state that satellite-derived fractional vegetation cover will be monitored. The PRC plan must describe the sampling and method to achieve this criteria. Ensure the vegetation type of reference sites is the same/similar to the rehabilitation's target vegetation type.	1. Update the PRC Plan to include details of sampling methods, including a discussion of the following: • Are reference polygons sufficient and comparable and data collected at the same time? • How much variability within the RA is acceptable?	Section 3.7.1.11 of the PRCP supporting information has been updated to include further information regarding the sampling methods of the satellite-derived fractional vegetation cover.
33.	**3.7.1.10 Fauna habitat assessment**	**Fauna habitat monitoring** No details of monitoring are provided in this section. The details of the monitoring program for fauna habitat should be provided in full within the PRC plan to ensure that the fauna habitat PMLU is achieved.	1. Update the PRC Plan and schedule to include details of fauna habitat monitoring, including criteria to monitor success.	Fauna habitat PMLU has been removed from the final landform description. Therefore, there is no longer a need for a monitoring program for fauna habitat.
34.	**3.7.3 Surface water and groundwater monitoring**	**Surface water monitoring** It is noted in this section that surface water monitoring is proposed to be sampled every year during the wet season, following a flow event. The purpose of the water quality criteria is to demonstrate that the PMLU is stable and non-polluting. Therefore, whether there are any short term/medium and long term effects from the PMLU on the receiving environment surface water and groundwater quality is required as part of the PRCP. The ephemeral nature of the creeks is acknowledged, however, one sample per year is not sufficient to demonstrate that the final landform is stable over short timeframes. The suggested frequency is monthly during flow. If there is no flow during the month then no sampling is required. However, if there is flow during a month then a sample is required.	1. Provide an updated PRC Plan that specifies frequency of water quality monitoring at sufficient intervals to consider seasonal variation and be able to gather data to demonstrate a stable and non-polluting condition has been achieved.	Section 3.7.3 of the Gemini PRCP supporting information has been updated to specify that water quality monitoring will occur quarterly during flow events. This frequency will allow for sufficient intervals to consider seasonal variation and demonstrate a stable and non-polluting condition.

		This is to ensure that enough data will be collected at appropriate intervals to provide certainty that the final landform will be non-polluting.		
35.	**3.7.3 Surface water and groundwater monitoring**	**Water quality parameters** This section provides a list of the quality characteristics tested for surface water and groundwater monitoring. However, the quality characteristics are not consistent between surface water and groundwater. As mentioned earlier, the contaminants of concern (CoC) analysis should justify the parameters tested, and should be consistent between both.	2. Update the PRC Plan to include a consistent list of quality characteristics for monitoring both surface water and groundwater quality, based on the outcomes of the CoC analysis.	Surface water and groundwater in the Project area originate from different sources, resulting in different contaminants affecting their quality. A broader range of chemical parameters need to be tested to assess surface water quality. Consequently, separate CoC for surface water and groundwater is appropriate to ensure comprehensive monitoring occurs.
36.	**3.7.4.4 Statistical analysis**	**Statistical tests** T-tests are recommended to compare between means of analogue and rehabilitation sites (or a comparable nonparametric test). However, small sample sizes are likely to mean that statistical tests can't be appropriately applied and, in any case, several completion criteria are concerned with meeting thresholds, or falling within a range of values, and do not depend on demonstrating statistical similarity to analogue sites. It is necessary, however, to consider the level and range of variability that are acceptable within assessment areas to satisfactorily meet milestone and completion criteria. When using BioCondition, an average score with a standard error equivalent to no more than 5% of the BioCondition scoring range is practicable (Accounting for Nature 2022). Reference: Accounting for Nature (2022). Appendix 7. How many BioCondition sites are needed for vegetation asset accounts at property or regional scales? *Accounting for Nature Guidelines for developing Methods to assess Native Vegetation Condition – v1.0.* https://www.accountingfornature.org/key-documents	1. Update the PRC Plan and reconsider how reference and rehabilitation sites are compared.	Section 3.7.4 of the PRCP supporting information has been updated to reconsider how reference and rehabilitation sites are compared statistically.
37.	**Appendix E: Gemini Project – Surface Water Assessment (WRM, 2019)** **Appendix A Flood impact assessment**	**Hydrology & Hydraulic Models for Flood Estimation** Further details are required to understand the models used for flood estimation, with underpin Appendix A and Appendix E including model setup, parameterisation, calibration, and validation using local data. While the XP-RAFTS hydrology model was used, additional details on calibration using local data are required to meet the requirements of Section 41C of the Environmental Protection Regulation 2019. Section A2.7 states: "*The peak design discharges produced by the XP-RAFTS model were validated against the Rational Method and Regional Flood Frequency Estimation (RFFE) estimates*." However, validating the model using the Rational Method, while itself is a simpler and uncalibrated/unvalidated model/equation, is not best practice. While corroboration with RFFE (regional data) is better, the absence of site-specific calibration must be addressed.	1. Update the PRC Planning Part to include detailed explanations of the hydrology model setup, including parameterisation, calibration, and validation, using site-specific catchment parameters aligned with Australian Rainfall and Runoff (ARR) guidelines (2019).	Refer section 2 of Appendix M – specifically section 2.8. There have not been sufficient streamflow data collected in the waterways crossing the project to calibrate the hydrology model. The model has been parameterised using standard RAFTS model parameters and the recommendations of ARR. At the catchment outlet, the resultant peak design discharges compare well to the RFFE in the 1% AEP, and tend to overestimate design flows in smaller events. The RFFE draws on flow information from coastal catchments located well to the northeast of the project area, and likely overestimates flows at the project site – especially in smaller catchments. In very small local catchments the model tends to overestimate flows compared to the Rational Method. In the view of an AQP, the RAFTS model parameterisation is appropriate for the purpose of the project.
38.	**Appendix E: Gemini Project – Surface Water Assessment (WRM, 2019)**	**Hydrology & Hydraulic Models for Flood Estimation** Further detail is required on how long term climate projections have been integrated into the flood estimation. Projections based on IPCC Representative Concentration Pathways (RCPs) should evaluate long-term climate impacts on flood estimation, ensuring compliance with Section 3.4.1 of the PRCP Guideline. While climate change projections seem to have	1. Update the PRC Planning Part to incorporate future climate projections into flood estimation as required by ARR 2019, considering increased rainfall intensity and higher frequency of extreme events.	Refer Section 2.4 and 2.7 of Appendix M. The model has been updated to include the recent updates in ARRv4.2 – which was released after the original assessment. The PMF modelling has been adjusted for the 2011 time-horizon under SSP5-8.5. For smaller events, rainfalls were adjusted to the 2040 time-horizon under SSP2-4.5.

	Appendix A Flood impact assessment	been used for water balance modelling, they have not been integrated into flood estimation. This is important to understand how the final landform features may perform under expected future scenarios.		
39.	**Appendix E: Gemini Project – Surface Water Assessment (WRM, 2019)** **Appendix A Flood impact assessment**	**Hydrology & Hydraulic Models for Flood Estimation** The justification for using 30m LiDAR data from ELVIS for topography should be explained. This resolution is relatively low for floodplain modelling and may not adequately capture the required details, such as dimensions of the final landform or flood levels during operations and at closure, where including dimensions of temporary and permanent diversions are required.	1. Update the PRC Planning Part and explain why 30m LiDAR data was used for floodplain modelling.	Refer Section 3.2.1 of Appendix M. SRTM data was originally used in an upstream portion of the hydraulic model where detailed LiDAR survey was unavailable, in the updated model, this has been replaced with additional Lidar data and a small area of Copernicus DSM (which has a similar point density to SRTM but better vertical accuracy). The affected area is located well upstream of the proposed mine disturbance area, and the source DEM does not(and did not) affect the modelled flow conditions in the vicinity of the landform.
40.	**Appendix E: Gemini Project – Surface Water Assessment (WRM, 2019)** **Appendix A Flood impact assessment**	**Floodplain modelling and mapping** Floodplain modelling must adhere to Australian Rainfall and Runoff (ARR) guidelines (2019). Pits AB and Pit C locations pre-mining are influenced by all flood events as shown in the maps submitted in '20190926 Surface Water Assessment including Appendix (FINAL).pdf'. However, these maps are required to be updated to include the impact of climate change on flood estimation to align with ARR guidelines.	1. Update the PRC Planning Part and incorporate climate change impacts on flood estimation in accordance with ARR 2019.	Per Appendix M, the model has been updated to include the recent updates and this is reflected in the updated results.
41.	**Appendix E: Gemini Project – Surface Water Assessment (WRM, 2019)** **Appendix A Flood impact assessment**	**Flood and floodplain modelling** The PRC plan should address probably maximum flood scenarios and demonstrate how flood levels under a PMF may interact with the final landform. Flood levels up to PMF must be presented, incorporating climate change impacts. Shear stress, stream power, and velocity data must also be included to inform the design of diversions and related infrastructure (temporary and permanent). This to evaluate the risks to the PMLU under all flood scenarios and ensure that where required, milestone criteria are developed to ensure the final landforms will withstand these events.	1. Update the PRC Planning Part to include: • PMF flood levels, incorporating climate change impacts • Shear stress, stream power and velocity data to inform diversion/infrastructure design.	Additional mapping of flood modelling results (including the requested parameters) has been included for the final landform in the 2% AEP, 1% AEP, 0.1% AEP and PMF flood events under existing and final landform scenarios. Refer to Appendix M.
42.	**Appendix E: Gemini Project – Surface Water Assessment (WRM, 2019)** **Appendix A Flood impact assessment**	**Floodplain modelling and mapping** The flood maps for the final landform under PMF conditions (Figure 8.2) do not account for levees or permanent diversions. It appears that the final landform flood plain map has been developed for pre-mining and using the pre-mining flood map. The flood modelling for the final landform must use topography and landform of the final landform in the simulation. This requires clarification. While flood depths exceed 5m at the edge of the dump (and adjacent to 'In pit spoil'), the absence of barriers and potential erosional and structural instability is unexplained. Modelling setups for these scenarios should be clarified, and the stability of the final landform and voids must be demonstrated.	1. Update the PRC Planning Part to include: • Clarification for modelling setups, including how they account for levees and/or diversions. • Rehabilitation strategies for the final landform and voids located within the floodplain to achieve safe and stable landform. • Clarify if Figure 8.2 is developed by flood modelling for the final landform or mapping the final landform on the pre-mining flood map.	Refer Section 3.3.5 and Section 5 of Appendix M. The model terrain includes all earthworks proposed to remain post closure.

		 Figure 8.2 - Final landform and flood levels in Probable Maximum Flood		
43.	**Appendix E: Gemini Project – Surface Water Assessment (WRM, 2019)** **Appendix A Flood impact assessment**	**Diversions** The PRC plan specifies a permanent clean water diversion for an unnamed tributary of Springton Creek, designed to channel clean water around the final landform dumps and voids. Temporary watercourse diversions are also in place during operations. While the minor tributaries may not meet the definition of a watercourse under the *Water Act 2000*, diversions of natural surface waters should follow the general principles of the "*Works that interfere with water in a watercourse for a resource activity*" guideline. This is reinforced in the Gemini EA application material, which states: *Although neither of these tributaries are defined as watercourses under the Water Act, the drainage works will be designed and constructed generally in accordance with the design principles set out in the guideline; Works that interfere with water in a watercourse for a resource activity – watercourse diversions authorised under the Water Act 2000 [OSW/2019/4599] (DNRME 2019). Materials used for levee construction and other civil purposes will be subject to civil engineering testing to meet appropriate design requirements.* Diversions should meet the following principles of the guideline, at a minimum: • Maintain the natural hydrological and hydraulic characteristics of the original watercourse. • Maintain natural geomorphic and riparian vegetation similar to the original watercourse. • Maintain a sediment transport regime, with minimal impact on sediment deposition or erosion.	1. Update the PRC Planning Part to include: • Map of the proposed diversions, clearly showing the original drainage line location and the proposed diversion location. • Clarification around the PMLU for the diversions. The common approach for diversions is a PMLU of 'watercourse / drainage line', aiming at establishing the pre-mining drainage feature (or as close as possible) • Aligned with "Guideline: Works that interfere with water in a watercourse for a resource activity—watercourse diversions authorised under the Water Act 2000", demonstrate that proposed diversions maintain the natural hydrological, hydraulic, and sediment transport regimes of the original watercourse. Include compliance assessment with Watercourse Diversion Guidelines. • Ensure diversions are designed to be self-sustaining and align with progressive rehabilitation goals. Justify whether structural stabilisation (e.g., armouring, revegetation) is needed.	Further information in relation to the proposed watercourse diversions are outlined in section 3.5.7.8 of the Gemini PRCP supporting information.

		• Achieve equilibrium condition. • Minimise erosion and avoid increasing flood risks. • Provide an appropriate floodplain corridor width to accommodate natural processes. • Be designed to be self-sustaining, requiring minimal ongoing maintenance. • Be integrated into the overall rehabilitation plan. • Be considered in floodplain modelling to assess the impact of diversions on flood behaviour and ensure stability of the final landform. • Include structural stability analysis if located through spoil. • Be designed to be hydraulically and structurally stable, e.g., through armouring. Section 3.5.6.3 states that the diversions will be permanent. The PMLU for RA8 (diversions) is listed as 'grazing' in Table 22, 'grazing/native ecosystem' in section 3.5.6.4, and 'native vegetation supporting fauna habitat' in the PRCP schedule. Satellite imagery shows that the majority of the original drainage lines contain trees along the alignment. In accordance with the watercourse diversion guideline, permanent diversions should be rehabilitated as closely as possible to the original surface water feature. Good design and high vegetation cover on banks, including deep rooted plants, is important for the long-term stability of the drainage feature. While there are detailed designs of the diversions included in the PRC Plan (Figure 42 and 43), there are no maps identifying the length of the natural drainage lines that will be impacted, and how the diversions are situated in relation to their original alignment. The details of the diversion should be discussed in detail in the PRC plan. This should include how the diversion has been designed to satisfy the above mentioned criteria, and propose a suitably justified PMLU for the diversion. Appropriate milestone criteria should be included in the PRCP Schedule to monitor and assess the successful operation of the diversion so that it may replicate the natural system as close as possible.		
44.	**Appendix E: Groundwater Impact Assessment (JBT Consulting, 2019)**	**Groundwater Modelling** Section 6 discusses the groundwater modelling used for Gemini Coal Mine. It is not clear whether the water level data from the extensive network of monitoring bores has been used to calibrate the groundwater model. The water level data has not been incorporated in the groundwater model, and limitations of this approach should be clearly identified and discussed. A justification should also be provided as to why this information has not informed the groundwater model.	1. Update the PRC Planning Part and include whether observed water level data from the monitoring bores was used to calibrate the model and if not, what limitations this places on the modelling.	The information requested relates to JBT Consulting, 2019. The numerical model used to support the Gemini Coal Mine PRCP was developed using a two dimensional (2D) numerical flow model called SEEP/W. The water level data from the groundwater monitoring network has not been used to calibrate the groundwater model. Rather the water level data has been used to approximate the initial phreatic surface or groundwater level represented in the SEEP/W model. The initial phreatic surface or groundwater level was generated in the steady state model by applying fixed heads at the boundaries of the model. The boundaries were set at approximately 10 km from the edge of mining so that the boundary conditions did not influence the groundwater response to mining. Fixed head boundaries were used at the model edges to simulate a phreatic surface or groundwater level along the 2D cross section. These are commonly applied in SEEP/W models to generate the initial phreatic surface. The elevation of these fixed heads at the model edges was modified to provide a qualitative match to observed groundwater levels (e.g. monitoring bores) within the project area.

				Hence, bore data was used to set boundary conditions, so the initial groundwater levels reflected observed data. This allows the initial phreatic surface or groundwater level to be a realistic starting condition for subsequent transient or mining-related scenarios. This approach is considered standard practice in SEEP/W modelling and setting boundary conditions (i.e. fixed heads) far from the area of interest (e.g. open cut pit) helps ensure they do not constrain or influence the drawdown predicted by mining. The JBT report does not identify which specific monitoring bores or water level observations were used in the qualitative match for the modelled initial phreatic surface. The SEEP/W model was not calibrated as would normally occur in a 3D numerical model and hence the process of adjusting model parameters (e.g. hydraulic conductivity, recharge, storage) to match a groundwater elevation was not carried out. The model parameters were assigned and fixed based on field data and expert knowledge. Whilst this is considered to be a limitation with the modelling approach, in the near future the Proponent intends on developing a three dimensional (3D) numerical flow model in MODFLOW which will allow a formal calibration to occur. The 3D model will be developed as per the Australian Groundwater Modelling Guidelines. Model outputs from the 3D model will supersede the outputs presented by JBT.
45.	**Appendix E: Groundwater Impact Assessment (JBT Consulting, 2019)**	**Unknown reference** Section 6.1 states: *Seep/W has been used in this study to predict the rate and extent of change to the phreatic surface in response to the ongoing mining of the already approved Central North Mine, as well as the proposed extension of the operation into the extension area.* There is no other mention of Central North mine in the document, it is not clear where the mine is located. All other mines considered in the context of cumulative impacts which may influence the rehabilitation of the site and the closure outcomes should be discussed in detail in the PRC plan.	1. Update the PRC Planning Part and explain where the Central North mine is and how it has been incorporated into the modelling.	The information requested relates to JBT Consulting, 2019. The reference to ongoing mining of the already approved Central North Mine is erroneous and relates to another project completed by JBT around the same time. This refers to the Central North Extension Project of the Jellinbah Coal Mine, often informally called "Central North," located in Central Queensland, Australia. The distance between Jellinbah Central North Extension and Gemini Project is approximately 50 to 70 km. It can be confirmed that no active mining has occurred at the Magnetic South Gemini Mine. The site remains in the development and approval phase. The reference to the Central North Mine in the Groundwater Impact Assessment is erroneous.
46.	**Appendix E: Groundwater Impact Assessment (JBT Consulting, 2019)**	**Links between groundwater model and surface water model** Section 6.2 notes that the WRM2019 average modelled water levels for the two voids have been used as boundary conditions for the post mining groundwater model. However, it appears that under the methodology used there is no allowance for using the water balance predicted surface water levels to refine the groundwater modelling as would normally occur with a numerical groundwater model as an iterative process between the two models. More information is required about the modelling approach taken to affirm the reliability of the modelled outcomes.	1. Update the PRC Planning Part and explain: • why there was no iterative process used linking the surface water model and the groundwater model to refine the groundwater modelling; and • the impact this has had on the groundwater and surface water modelling.	The information requested relates to JBT Consulting, 2019 and WRM, 2020. WRM, 2020 provides the following description: *Due to partial backfilling of the voids, groundwater inflows to the final voids are expected to be negligible. For AB Pit [Mine B] the maximum modelled water level 57.6 mAHD is around 54 m below the void overflow level of approximately 112 mAHD, and well below the potential level of groundwater seepage to the tertiary aquifer. For C Pit [Mine A] the maximum modelled water level is around 54.4 m below the void surface overflow level of approximately 128 mAHD, and well below the potential level of groundwater seepage to the tertiary aquifer.* JBT describes that the final voids are hydraulically disconnected from the shallow Tertiary sediments, with no available flow path to occur via the Tertiary sediments. This is due to the final pit lake elevation occurring well below the base of the Tertiary sediments where it is exposed in the pit wall. JBT provides the following description: *There is no outlet for water within the final void of the AB Pit [Mine B] via the base of Tertiary sediments. There is no outlet for water within the final void of the C Pit [Mine A] via the base of Tertiary sediments. Based on the assessment undertaken above it is concluded that there is a very low risk of water within the final voids of the AB and C Pits impacting the surrounding groundwater system. There is no outlet via the base of Tertiary for water within the final void of either the AB Pit [Mine B] or the C Pit [Mine A], for either the maximum Base Case water level or the maximum High Inflow Case water level.* An iterative process linking the surface water and groundwater models was not undertaken for this assessment likely due to the following considerations: ▪ WRM have modelled the final void water balance components with the understanding that groundwater inflow to the final void is expected to be negligible. Hence, rainfall/runoff is expected to be the largest input to the water balance, and evaporation from the pit lake is expected to be the largest output from the water balance.

				▪ JBT discusses the final voids as being hydraulically isolated from the shallow strata, with no outlet pathways via the Tertiary sediments. ▪ WRM states that groundwater levels in the final voids are expected to stabilise well below the base of the Tertiary sediments and well below any surface spill points, and there is no indication of interflow or return flow to the surface system. Hence, the pit lakes are understood to be sinks into perpetuity. On this basis, an iterative feedback loop between the surface water model and the groundwater model would not substantially change or impact this outcome, nor improve the accuracy of the model predictions. As discussed above, the Proponent intends on developing a three dimensional (3D) numerical flow model in MODFLOW. The 3D model will be developed as per the Australian Groundwater Modelling Guidelines and in consideration of the water management and best practices technical papers developed by the Office of the Queensland Mine Rehabilitation Commissioner. Model outputs from the 3D model will supersede the outputs presented by JBT.
47.	**Appendix E: Groundwater Impact Assessment (JBT Consulting, 2019)**	**Water level contours** Section 6.5.2 states: *The initial phreatic surface was generated in the steady state model by applying fixed heads at the boundaries of the model. The boundaries were set at a distance of approximately 10 km from the edge of mining in order that the boundary conditions did not interfere with the groundwater response to mining, with the boundary conditions set to place the water level within the Tertiary sediments at levels observed from the groundwater monitoring bores for each mining area.* However, no contours are provided to demonstrate these initial heads so they can be compared with observed heads. More information is required about the modelling approach taken to affirm the reliability of the modelled outcomes.	1. Update the PRC Planning Part and provide water level elevation contours showing the initial water levels used in the steady state model and identify which geologic unit they represent.	The information requested relates to JBT Consulting, 2019. JBT, 2019 provides the following description: *It is assessed by JBT Consulting that Tertiary sediments are dry above 120 mAHD and likely dry above 110 mAHD. The presence of dry bores within the Tertiary, as well as the variation in water level between the topographically elevated base of Tertiary and topographically lower base of Tertiary, suggest that a continuous water surface does not exist in the Tertiary sediments and that the elevation of the base of Tertiary will be a control on the presence of groundwater within the sediments.* *Seep/W is designed to simulate flow in both the saturated zone and the unsaturated zone. When mining occurs below the phreatic surface an unsaturated zone is induced in the pit walls as seepage to the excavation occurs. The phreatic surface is a line of zero pore water pressure below which all pore spaces are saturated with water, and is analogous to the water table.* *The initial phreatic surface was generated in the steady state model by applying fixed heads at the boundaries of the model. The boundaries were set at a distance of approximately 10 km from the edge of mining in order that the boundary conditions did not interfere with the groundwater response to mining, with the boundary conditions set to place the water level within the Tertiary sediments at levels observed from the groundwater monitoring bores for each mining area.* Fixed head boundary conditions were set approximately 10 km from the edge of mining (at the model edge) to ensure that the boundary conditions did not artificially constrain or influence the simulated groundwater response to mining. These fixed head boundaries were used at the model edges to then simulate a phreatic surface or groundwater level along the 2D cross section. The elevation of these fixed heads at the model edges were modified to provide a qualitative match to observed groundwater levels (e.g. monitoring bores) within the project area. The JBT report does not identify which specific monitoring bores or water level observations were used in the qualitative match for the modelled initial phreatic surface. Hence there are no further details available to provide on the initial phreatic surface. The SEEP/W cross sections provided by JBT Consulting do not show the full 10 km extent, nor the initial phreatic surface used in the model. Figure 6-4 representation of mining in Mine A shows a phreatic surface at approximately 125 mAHD for the Permian strata and 150 mAHD for the Tertiary sediments. Figure 6-5 representation of mining in Mine B shows a phreatic surface at approximately 75 mAHD for Permian strata and 100 mAHD for Tertiary sediments. These values approximately align with the groundwater level contours shown in Figure 4-2 for the Tertiary sediments and Permian strata. Although the values are generally consistent, the absence of a clearly defined, initial phreatic surface limits the direct validation of the model. As discussed above, the Proponent intends on developing a three dimensional (3D) numerical flow model in MODFLOW. The 3D model will be developed as per the Australian Groundwater Modelling Guidelines and will be calibrated to transient conditions to match against observed groundwater level. Model outputs from the 3D model will supersede the outputs presented by JBT.
48.	**Appendix E: Groundwater**	**Predicted groundwater level elevation contours**	1. Update the PRC Planning Part and provide:	The information requested relates to JBT Consulting, 2019.

	Impact Assessment (JBT Consulting, 2019)	Section 6.6 provides no predicted groundwater level elevation contours for the end of mining or at post mining equilibrium for the major geologic units. These are expected to be provided to demonstrate the relationship between the predicted long term void levels and the long-term groundwater level elevations in the major geologic units and clearly demonstrate sink or source behaviour of the voids. This information is critical to understanding long term outcome for the voids, and affirming whether the voids can be expected to be non-polluting post closure.	• predicted groundwater elevation contours for the end of mining and post mining in the major geologic units. • Clearly demonstrate sink or source behaviour of the voids	The final void water balance modelling completing by WRM (2020) clearly demonstrates that the pit lake elevation equilibrium for Mine B is 52.9 mAHD and 70.3 mAHD for Mine A. These pit lake elevations are well below the observed groundwater elevations from the project groundwater monitoring network. The Groundwater Impact Assessment has been supported by 2D SEEP/W modelling. The use of 2D modelling does not allow for the development of traditional groundwater elevation contours at the end of mining or post mining. At best the 2D model outputs can provide an indication of groundwater elevations along the cross section alignment, however without the development of numerous 2D models or cross section alignments, this cannot be presented as traditional groundwater elevation contours without significant extrapolation between the cross section alignments. Based on the available information the groundwater modelling demonstrates that the final voids behave as a net groundwater sink during the post-mining period. This behaviour is consistent with the hydraulic disconnection of the voids as supported by the vertical separation between final void water levels and the Tertiary sediments aquifer base, and the lack of any identified outlet pathways via the Tertiary sediments. As discussed above, the Proponent intends on developing a three dimensional (3D) numerical flow model in MODFLOW. The 3D model will be developed as per the Australian Groundwater Modelling Guidelines and in consideration of the water management and best practices technical papers developed by the Office of the Queensland Mine Rehabilitation Commissioner. Model outputs from the 3D model will supersede the outputs presented by JBT.
49.	**Appendix E: Groundwater Impact Assessment (JBT Consulting, 2019)**	**Predicted drawdown extents** In section 6.6.1, Figure 6-8 provides the predicted extent of the 2 and 5 m drawdown at post mining equilibrium and Figure 6-7 provides the predicted extent of 2 and 5 m drawdown at the end of mining. It is not clear which geologic unit these predictions relate to. It is noted that despite the very small volumes of groundwater inflow predicted post mining (section 6.6.2) the predicted drawdown extents of both the 2 and 5 m drawdown lines post mining (Figure 6-8) are located at a greater distance from the mine than the end of mining predicted drawdown extents. It appears unusual that if the predicted groundwater inflow to the voids post mining has greatly reduced why the extent of predicted drawdown should increase. Additionally, it is not clear if the model is able to provide the predicted maximum drawdown at specific bore locations should specific water level triggers be required at specific compliance bores. Predicted drawdown should be provided at regular contour intevals, rather than focusing on the 2m and 5m limits in the EA. *Table E3 – Groundwater level triggers* in the EA is provided as an interim measure of protection, however the groundwater level triggers should eventually be changed to be bore specific and reflect the total predicted drawdown at each site. There is a high chance of non-compliance using the current table when the development of the pits cause drawdown exceeding 2m in a year. Following the finalisation of the PRCP schedule, the EA is updated to remove conditions that relate to rehabilitation and the monitoring networks will be aligned between EA and PRCP. Predicted drawdown mapping should also be provided for each hydrogeological unit. It is unclear which hydrogeological unit Figure 6.7 and 6.8 are based on (assumed to be the coal measures).	1. Update the PRC Planning Part and include: • Why the extent of predicted drawdown increases post mining. • Whether the model is able to provide the predicted maximum drawdown at specific bore locations should specific water level triggers be required at specific compliance bores. • Predicted drawdown maps for each hydrogeological unit with regular contours, rather than using just 2m and 5m contours. Drawdown modelling should determine: • the potential drawdown in shallow sediments (tertiary sediments and the alluvium • Connection between the shallow sediments and layers below • Impact of baseflow of creeks and GDEs.	The information requested relates to JBT Consulting, 2019. The modelled extent of 2 m and 5 m drawdown at the end of mining is shown in Figure 6-7, with the extent of drawdown at post-mining equilibrium (i.e. steady-state post-mining drawdown) shown in Figure 6-8. The 2 m drawdown extent represents the drawdown in an unconsolidated aquifer (i.e. Tertiary sediments) whereas the 5 m drawdown extent represents the drawdown in a consolidated aquifer (i.e. Permian strata). As discussed above, the use of 2D modelling does not allow for the development of traditional drawdown contours at the end of mining or post mining. At best the 2D model outputs can provide an indication of drawdown along the cross section alignment, however without the development of numerous 2D models or cross section alignments, this cannot be presented as traditional drawdown contours without significant extrapolation between the cross section alignments. Hence, SEEP/W cannot generate predicted drawdown maps (contour maps) across an entire hydrogeological domain, because it is a two-dimensional model, not a spatially distributed 3D model like MODFLOW. The response difference between the end of mining and post-mining equilibrium (i.e. predicted drawdown increases post mining) is due to the following: ▪ The groundwater system responds slowly to changes in stresses, especially in low-permeability formations such as the Tertiary sediments and the Permian strata. ▪ Hydraulic gradients established during mining persist into post closure, causing continued groundwater movement toward the voids until hydraulic equilibrium is re-established. ▪ Final void acts as a long-term sink as the final void does not fill to pre-mining water levels and remains below the surrounding water table, it continues to act as a sink into perpetuity. The predicted drawdown can be approximated at specific bore locations. However, SEEP/W cannot directly predict drawdown at locations that are not on the modelled cross-section, because it is a 2D model. Potential drawdown for the major units is included for the consolidated aquifer Permian strata (5 m contour) and the unconsolidated aquifer Tertiary sediments (2 m contour). As discussed above, the use of 2D modelling does not allow for the development of traditional drawdown contours. Section 7.2 discusses groundwater dependant ecosystems GDEs and concluded *it is interpreted that the potential GDE is maintained by localised runoff and shallow recharge and that a reduction in the regional groundwater level of approximately 2 m, at a vertical distance of approximately 50 to*

				60 m below the base of the potential GDE, has a very low risk of impacting groundwater levels beneath the potential GDE. As discussed above, the Proponent intends on developing a three dimensional (3D) numerical flow model in MODFLOW. The 3D model will be developed as per the Australian Groundwater Modelling Guidelines and in consideration of the water management and best practices technical papers developed by the Office of the Queensland Mine Rehabilitation Commissioner. Model outputs from the 3D model will supersede the outputs presented by JBT.
50.	**Appendix E: Groundwater Impact Assessment (JBT Consulting, 2019)**	**Recharge rate applied to the spoil** Section 6.6.2 states: *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.* However there appears to be nowhere in the report where the rate of recharge to the spoil is provided. The rate of recharge applied to the spoil can have a significant impact on the predicted inflows to the final voids. The PRC plan should discuss recharge to the spoil in more detail to provide complete information on inflows to the final voids.	1. Update the PRC Planning Part and explain what recharge rate was applied to the spoil in the groundwater model.	The JBT, 2019 report does not clearly explain what recharge rate was applied to the spoil in the 2D SEEP/W model. It only states that the spoil aquifer receives water "mainly from rainfall recharge," and that the spoil inflow does not represent associated water. The report does not quantify the recharge rate or how it was implemented in the model. As discussed above, the Proponent intends on developing a three dimensional (3D) numerical flow model in MODFLOW. The 3D model will be developed as per the Australian Groundwater Modelling Guidelines and in consideration of the water management and best practices technical papers developed by the Office of the Queensland Mine Rehabilitation Commissioner. The 3D model will represent in pit spoil and will apply and document a recharge rate to this spoil. The outputs from the 3D model will supersede the outputs presented by JBT.
51.	**Appendix E: Groundwater Impact Assessment (JBT Consulting, 2019)**	**Groundwater inflow to voids** Section 6.6.2 states: *For the post-mining years the net groundwater inflow rate is zero, as the rate of inflow from the pit walls above the backfilled area of spoil and the final void lake occurs at such a low rate that the rate of evaporation is significantly greater than the modelled rate of inflow.* It is unclear from this statement if there has been an allowance for groundwater inflow through the saturated walls of the final void and up through the sides and bottom of the spoil in the backfilled pits. The PRC plan should identify all sources of groundwater inflow to provide complete information on inflows to the final voids.	1. Update the PRC Planning Part and explain whether an allowance been made for the inflow from groundwater through the saturated sides of the voids and through the walls and base of the backfilled areas of the voids.	SEEP/W can calculate inflows through the various model layers, backfilled spoil, pit walls and surrounding geology. The model setup includes details for this to occur including boundary conditions such as a fixed head at the model edge (e.g. 10 km away), the model includes initial conditions such as the phreatic surface or water table and is run in transient mode. Based on the available information the model does simulate groundwater inflow from the surrounding saturated strata into the final void, including seepage through the saturated pit walls and through the sides and base of the backfilled areas. However, the model files have not been able to be reviewed to verify the model development, or the model outputs presented. As discussed above, the Proponent intends on developing a three dimensional (3D) numerical flow model in MODFLOW. The 3D model will be developed as per the Australian Groundwater Modelling Guidelines and in consideration of the water management and best practices technical papers developed by the Office of the Queensland Mine Rehabilitation Commissioner. The outputs from the 3D model will supersede the outputs presented by JBT.
52.	**Appendix E: Surface Water Assessment (WRM, 2019)**	**Groundwater inflow and final void salinity** Section 8.8 states: *Ground water investigations by JBT Consulting indicate that due to partial backfilling of the voids, groundwater inflows to the final voids are expected to be negligible.* Section 8.10 provides details of the salinity of three components of inflow to the voids and the salinity adopted for those components. Groundwater quality is not considered in this analysis. This is considered significant as it is noted in the groundwater impact report, Section 4.3, that groundwater quality ranges from 15,200 to 28,500 µs/cm. Given the limited linkages between the surface water modelling and the groundwater modelling, the significant gradients between pre mining groundwater levels and the predicted final void levels and the very low predicted groundwater inflows to the voids post mining using the SEEP/W model (despite predicted increasing areas of groundwater impacts post mining) there is doubt over the post mining final void conditions and in particular the predicted salinity in the voids post mining.	1. Update the PRC Planning Part and include: • a sensitivity analysis of the impacts on void salinity of groundwater inflow occurring in the final voids post mining; and • a time frame for the development of a 3D numerical groundwater model and updated surface water model. 2. Provide the numerical groundwater model under development in accordance with condition E4 of the EA.	JBT, 2019 Section 6.7 details a sensitivity analysis of the groundwater model developed for the Gemini Project has been undertaken. The sensitivity analysis results are provided in Section 6.7.2 and Figure 6-9 shows the extent of the drawdown a post mining equilibrium. However, this sensitivity analysis does not include consideration of salinity within the final void. SEEP/W cannot directly model void salinity or solute transport (e.g. salt concentration, TDS) because it is limited to groundwater flow and pore-water pressure in porous media. WRM, 2020 Section 8.10 details the lake salinity solute model as follows: *As the void lake will not spill, and seepage into the local Permian material is expected to be minimal, salinity will rise over time as salts are transported from the local surface catchment and contained in the void. A simple conservative solute model was coupled with the lake water balance to estimate the potential lake salinity. The assumptions will tend to result in the model overestimating long-term contribution of runoff to void lake salinity. Figure 8.8 and Figure 8.9 show the results of the salt balance. Salt accumulates within both voids over time. Under the existing climate conditions scenario, the void lake salinity exceeds a TDS of 30,000 mg/L after approximately 500 years of simulation.* *During the first 200 years, apart from short periods when inflows are very low, and salt concentrations temporarily increase rapidly due to evaporation, lake salinities are predicted to be less than 10,000 mg/L. The potential impacts on receiving water quality will be managed by the site water management system.* Although a conservative solute model was completed by WRM, a sensitivity analysis has not been reported on void salinity. As discussed above, the Proponent intends on developing a three dimensional (3D) numerical flow model in MODFLOW. The 3D model will be developed as per the Australian Groundwater Modelling

		As a result of these concerns, it is considered that initially a sensitivity analysis should be conducted to determine the impact of groundwater inflow into the final voids on final void salinity. Longer term it is considered that a three-dimensional numerical groundwater model should be developed in conjunction with an updated surface water model. It should be noted, condition E4 of the EA requires a numerical groundwater model as part of the groundwater monitoring program, within 6 months of the grant of ML700056. The ML was granted on 12 September 2024, therefore the groundwater monitoring program, including the numerical groundwater model, must be completed by 12 March 2025. It is assumed that numerical groundwater model is still underdevelopment at the time of this information request, but will become available within the RFI response period.		Guidelines and in consideration of the water management and best practices technical papers developed by the Office of the Queensland Mine Rehabilitation Commissioner. An updated 3D model is expected to take approximately three months to develop from commencement. The outputs from the 3D groundwater model will be linked (where practical to do so) with the final void water balance model and will supersede the outputs presented by JBT. As required under condition E4 of the EA, a numerical groundwater model was produced as part of the EA application in the form of the SEEP/W model. The results and interpretation of this model can be found in the Groundwater Impact Assessment (2019) (Appendix E) provided as part of the Gemini Coal Mine PRCP submission.
PRCP Schedule				
53.	**RM8**	**Soil criteria** Soil pH criteria of as low as 4.5 is not supported by technical specialists. A soil pH of less than 5.5 is considered strongly acidic. The development of strongly acidic soils (less than 5.5 pH) can result in poor plant growth as a result of one or more of the following factors: • aluminium toxicity • manganese toxicity • calcium deficiency • magnesium deficiency • low levels of essential plant nutrients such as phosphorus and molybdenum. The soil limits for EC and ESP in the PRCP schedule are supported. The criteria of ESP % <6 is proposed for a depth of 0-10cm, however the proposed topsoil depth is 0.2m. Clarification is required to explain the choice of depth for this criteria.	1. Update the PRCP schedule to provide a more suitable pH range that will facilitate successful plant growth. 2. Update the PRC Plan to clarify why the ESP limit does not apply from 0-20cm, or adjust the schedule accordingly.	Soil tests conducted pre-mining demonstrate that the soil management unit (SMU) identified as Nigel has a lower pH limit of 4.6. As the Nigel soil profile is found within the mine disturbance footprint the soil pH range of >4.5 to <8 outlined in the milestone criteria is appropriate to facilitate plant growth based on pre-mining conditions. The ESP criteria is only proposed for a depth of 0-10cm as it is the most representative depth for growth media post ripping. To reduce the high erosion potential of this depth, grass root development will need to be established to ensure surface soils are stabilised. Therefore, testing needs to ensure that this depth is suitable for initial revegetation and adequate stabilisation of surface soils.
54.	**RM8**	**Topsoil depth** It is noted in the Gemini Coal Mine EA application that a recommended minimum topsoil depth of 0.3 m is stated, and that adequate topsoil material will be available on site to meet this requirement (section 4.2.4). The recent estimated rehabilitation costs (ERC) application for Gemini Coal Mine also accounted for the costs associated with 0.3 m of topsoil application for rehabilitation areas. DETSI has previously commended Magnetic South on this approach, and has factored this approach into the ERC assessment. However, the PRCP criteria only commits to a topsoil depth of 0.2 m.	1. Update the PRCP schedule to reflect previous commitment to topsoil application for rehabilitation of Gemini Coal Mine.	The PRCP schedule has been updated to reflect the previous commitment of a 0.3 m topsoil depth.
55.	**RM18**	**Diversions** There is no criteria specific for measuring the success of the rehabilitated diversions to the surrounding natural watercourses / drainage features. Consideration should be made for providing a milestone for achievement of stable PMLU for the rehabilitated	1. Update the PRCP schedule to include SMART criteria for the achievement of PMLU for the diversions, including quantitative measures of comparing the diversion with the surrounding drainage	RM18 (now 16) has been updated to include SMART criteria for the achievement of a native ecosystem PMLU for the diversions. Added milestone criteria considers the stability and natural features necessary for rehabilitated diversion drains to sustain the intended PMLU. Incorporating natural features and ensuring the area is geotechnically stable is essential to achieving a native ecosystem.

		drainage line. This milestone should have consideration for stability of bed and banks, and supporting self-sustaining native vegetation typical of riparian areas. Criteria relating to reference sites and Index of Diversion Condition (IDC) could be considered.	lines. The PMLU for diversions should be 'watercourse' or similar.	
56.	**RM9, RM11 and RM12**	**Seed mixes** The criteria proposed in the PRCP Schedule requires seeding with minimum 6 native trees/shrubs and 4 native ground cover species. This is considered insufficient species richness to achieve suitable native vegetation outcome that resembles a regional ecosystem.	1. Update the PRCP schedule to augment the species mix with additional species from local regional ecosystems (REs). REs 11.7.2 and 11.5.2 would be considered appropriate for this site.	Both RM9 (now RM8) and RM12 (now RM10) are for the achievement of novel and hybrid native ecosystem, respectively, and are not targeting a specific regional ecosystem outcome. The current species mix and subsequent minimum planning requirements are representative of the pre-mining landscape for RA7, and the expected landform establishment for RA3, given the lack of applicable reference sites. The pre-mining condition is outlined in the Terrestrial Ecology Assessment submitted as part of EA application (Appendix E), which supports the species richness values nominated.
57.	**RM10**	**Seed mixes** The criteria proposed in the PRCP Schedule states that seed mix (grazing RAs) should comprise a minimum of 25% native pasture species, and include a minimum of 3 x 3P native species. DETSI recommends a higher proportion of native seeds being used in the grazing mix, which is important for resilience, species diversity and foraging opportunities for conservation significant species known to the area. DETSI does not support the use of *Bothriochloa pertusa* (Indian bluegrass) in Table 25 for the grazing seed mix. This is a highly invasive species and is listed as an environmental weed.	1. Update the PRC Plan and schedule to: • increase the proportion of native species used in the grazing seed mix • remove *Bothriochloa pertusa* from any seed mixes.	The grazing PMLU areas are being rehabilitated to a modified pasture, consistent to the land outcome described in the EA application. Consultation with the underlying landholder determined modified pasture to be a suitable land outcome and consistent with the pre-mining landscape. Consequently, the species targeted in the grazing seed mix reflect this and include species known to occur in the Project area. The species *Bothriochloa pertusa* have been removed from all seed mixes in the PRCP schedule.
58.	**RM11 and RM18**	**Revegetation** In general the revegetation criteria do not consider other factors which may influence rehabilitation success of the larger PMLU. This includes management of the presence of cattle in PMLU landscape. The revegetation criteria should also address purpose of revegetation to deliver broader enhancement of the fauna habitat values associated with areas of native vegetation, given the conservation value of the surrounding environment. <u>Impacts to littoral zones</u> There is no criteria demonstrating how cattle will be managed to prevent any adverse impacts to the littoral zones between the low wall and base of residual void. The PRCP Schedule should include specific criteria to address these impacts. <u>Native vegetation</u> The PCRP Schedule specifically includes the criteria '>5 native species annually' This criteria is not SMART and will not demonstrate that the native vegetation is supporting adequate or representative fauna communities.	1. Update the PRCP schedule to include criteria to reduce impacts to revegetation of littoral zone. 2. Ensure rehabilitation criteria includes species and habitat elements conducive to the recolonisation of species of interest (e.g. squatter pigeon, greater glider) and monitor establishment of these features to demonstrate capacity of the rehabilitation to provide habitat for these species through time. 3. Ensure that monitoring described in the PRC plan is sufficient to track how similar the fauna communities of rehabilitated sites are becoming to those of reference sites through time. Bird communities are a good proxy for fauna recovery generally.	Littoral zone has been removed from the final landform design. Consequently, all criteria related to littoral zones have also been removed from the PRCP schedule.
59.	**RM14**	**BioCondition** A BioCondition assessment is proposed but there is no regional ecosystem nominated for comparison, no benchmark or reference sites nominated, and no score to be achieved. An example of the BioCondition attributes that are relevant to mine rehabilitation is shown below:	1. Update the PRC Plan and schedule to include: • State which regional ecosystem(s) are guiding the species selection • what the relevant benchmarks are • which BioCondition attributes are to be assessed, and • what score is to be achieved at RM14.	RE 11.10.3 is the guiding species selection for native ecosystem supporting fauna habitat. The PRCP has been updated to reflect the change from BioCondition monitoring to QBEIS methods. The QBEIS scores to be achieved at RM 12 include: a) ≥80% established and persistent native groundcover species from on 18° slopes and intermediate benches. b) >5% native canopy cover on 18° slopes and intermediate benches.

		Table 1. Modified BioCondition framework for mine site rehabilitation **Attribute** **W** a Tree canopy height b Recruitment of canopy species c Tree canopy cover (%) d Shrub cover (%) e Native[1] plant species richness for four life-forms f Non-native plant cover g Native perennial (or preferred & intermediate) grass cover (%) h Organic litter cover **Total** [1] Native species occurring naturally in a site identified by a suitably qualified person as a target Regi listed in a target Regional Ecosystem technical description. The PRC plan is required to include further details on the parameters of the BioCondition monitoring specific to the nominate regional ecosystems types to be achieved. This information in the PRC plan will then underpin the BioCondition framework included as an appendices to the PRCP Schedule.	Page 153 lists several BioCondition attributes so this form of monitoring is envisaged, but it is preferable that BioCondition-based monitoring be explicitly used so that milestone criteria can be measured against established benchmarks.	c) Weed presence is a maximum of 10% of total vegetative groundcover confirmed by an AQP in annual monitoring. The rehabilitation milestone criteria in the PRCP has been updated to reflect this change.
60.	**RM16**	**Littoral zone** ≥ 50% of seeded/planted semi-aquatic or inundation-tolerant species in littoral zone proposed as a criteria. As no target regional ecosystem is designated or reference site indicated, it is difficult to determine if this is an adequate level of species richness. As only 11 species are listed in Table 28 (p 104), only six species would be needed to meet this criteria and that seems low. Further information is required in the PRC plan to identify target regional ecosystems, and relevant reference sites. This information is required to enable suitable milestone criteria to be developed.	1. Update the PRC Plan and schedule to address the following: • state which regional ecosystem is guiding the species selection, • what the relevant benchmarks are, • which BioCondition attributes are to be assessed, and • what score is to be achieved.	The littoral zone has been removed from final landform design due to final void pits classified as NUMAs. Consequently, the RM16 criteria from the original submission has also been removed from milestones.
61.	**RM18**	**Species richness** Species richness targets are given but no sampling regime described and, on their own, species richness targets are not sufficient to demonstrate achievement of the PMLU. As recommended in item 59, it is strongly recommended that the BioCondition approach is adopted.	1. Criteria are not SMART. It is recommended that BioCondition-based criteria is used in the schedule.	RM18 (now RM16) has been updated to reflect the change from BioCondition-based criteria to QBEIS methods. QBEIS index scores to be achieved at RM16 include: a) ≥70% established and persistent groundcover species within the pasture understory b) >30% native canopy cover species c) ≥60% of native tree/shrub species are established and persistent d) Weed presence is a maximum of 10% of total vegetative groundcover confirmed by an AQP in annual monitoring The rehabilitation milestone criteria in the PRCP has been updated to reflect this.
62.	**RM20**	**Fauna habitat criteria** The PRCP Schedule includes the criteria 'Evidence of native species inhabiting or utilising pit lakes'. This criteria does not meet the SMART principles and as discussed in the PRC Plan section of this request, the PRC plan does not contain sufficient information to demonstrate the efficacy of the proposed fauna habitat PMLU, nor the methods for monitoring and managing the success of this proposed PMLU. This criteria is not SMART and will not demonstrate that the voids are supporting adequate or representative fauna communities.	1. Develop SMART criteria that demonstrate the achievement of the fauna habitat PMLU.	RM20 from the original submission has been removed from the PRCP schedule as it is no longer relevant with the transition of the proposed fauna habitat to NUMA.

63.	**RM20 and RM23**	**EA references** The PRCP Schedule criteria when finalised will not refer to sections of the environmental authority. References to the requirements of the EA included in RM 20 and RM23 should be replaced with data in an appendix which will be attached to the PRCP Schedule itself.	1. Update the PRCP schedule to refer to data in an appendix, rather than sections of the EA.	Data has been added to Appendix A which is attached to the PRCP schedule.
64.	**RM23**	**Groundwater level thresholds** The groundwater trigger thresholds in the EA are not appropriate for use in the PRCP schedule. The groundwater trigger thresholds should be based on groundwater drawdown modelling and present the maximum drawdown level.	1. Update the PRCP schedule to provide a separate list of groundwater level thresholds for inclusion as an appendix to the schedule, based on the groundwater drawdown modelling.	The groundwater trigger thresholds in the EA have been based on groundwater drawdown modelling to present the maximum drawdown level. The EA outlines approved environmental impacts from the Project, which are used to guide the PRCP schedule.
65.	**RM23**	**Water quality limits** As stated earlier, surface water and groundwater quality limits should be based on site-specific data and CoC analysis. The limits in the EA are for operational purposes, and not necessarily relevant for post-closure.	1. Update the PRCP schedule to provide water quality limits as separate tables for inclusion as an appendix.	Surface water quality limits in the EA are based on the ANZG (2018) guidelines and Mackenzie River WQO. These guidelines provide limits to support and protect the identified EVs identified to be relevant to the Project. Groundwater quality limits in the EA have been based on data gathered from pre-established compliance monitoring bores within the groundwater monitoring network. These trigger levels have been proposed as interim trigger levels to be reviewed after collection of an additional two years of data to ensure they are relevant for post-closure.