

#### FURTHER INFORMATION REQUIRED FOLLOWING THE SUPPLEMENT TO THE DRAFT ENVIRONMENTAL IMPACT ASSESSMENT

#### DEPARTMENT OF PRIMARY INDUSTRY AND RESOURCES – REHABILITAITON OF THE FORMER RUM JUNGLE MINE – JULY 2020

## Table 1 Significant Issues raised in NTG and Commonwealth Agency comments on the Supplement

# & Topic	Ref #	Comment	Further Information Required
Proposal			
1. Ongoing and long-term management	4	Governance, reporting, engineering oversight and auditing plays a significant part in the ongoing and long-term management and success of the proposed activities including proposed mitigation and management commitments. The Supplement and Appendix 1 indicate that further information about this is available.	<ul> <li>Provide further information about the ongoing and long-term management of this Proposal, including:</li> <li>the Governance Board (e.g. participants, purpose, role and responsibilities, for how long it will exist etc.)</li> <li>an outline of audits and technical reviews planned (short and long-term &gt; 20yrs)</li> <li>identifying who will take responsibility for actioning and achieving outcomes of rehabilitation management plans</li> <li>approach to management/provisions after Stage 4 (&gt; 20 years) to ensure the required land management of the cover systems is maintained</li> <li>reporting structures, including communication to stakeholders and the public.</li> <li>The information should be supported with diagrams where possible.</li> </ul>
Terrestrial Enviror	nmenta	l Quality	

# & Topic	Ref #	Comment	Further Information Required
Water treatment plant	8	Appendix 19 of the Supplement (SLR 2020j) outlined the likely water treatment method used in the water treatment plant (WTP), including details of all chemicals used. However, the potential risks and impacts of these chemicals (e.g. flocculant Praestol 2540) and their breakdown products (e.g. environmental contamination from seepage if buried on site) were not addressed.	Provide further information about the potential environmental risks and impacts of chemicals and their breakdown products used in the WTP.
3. Water treatment plant	8	Appendix 19 of the Supplement (SLR 2020j) introduces a recent water treatment technology, the Electrocoagulation MTECH Water, which produces 95% less sludge, requires no chemicals and would be powered by solar. This seems to have environmental benefits compared to the proposed WTP method. It is not clear why this alternative treatment method is not proposed and therefore what the considerations were, particularly in consideration of the waste management hierarchy.	Provide clarification and an outline of the considerations / analysis of the alternative water treatment options such as the Electrocoagulation MTECH Water WTP outlined in Appendix 19 to the Supplement, and justification for the proposed method.
4. Cover systems  – WSF design	12	It is unclear from the tentative wording used (i.e. should) in the Supplement:  a) if the recommended LLDPE liner (Appendix 11) will form part of the Waste Storage Facility (WSF) cover system  b) what other design changes were adopted as a result of the presented new cover performance studies (e.g. Appendix 10, Appendix 11).	Confirm:  What the final WSF cover system design is and  if/how recommendations outlined in respective Appendices, including 10 and 11, would be adopted and implemented.
5. Cover systems  – WSF long term stability	12	Although a high level of investigations and commitments have been made, there are still significant uncertainties of the long-term stability and performance of the proposed cover systems. A sensitivity analysis of design assumptions was not provided.	Provide (as recommended by Taylor et al. (2003)), a cover performance assessment, including modelling, taking into account:  • the properties of proposed borrow materials

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		A major uncertainty is the cover system's heavy reliance on on-going and high intensity management, such as felling of trees and weed management, which cannot be guaranteed at this stage. Worst case future management scenarios, such as development of deep rooted trees or heavy infestation of gamba grass, should be accommodated for in the cover design to reduce the risk of failure as far as feasible.  The Supplement states that design revegetation trials will not be undertaken for the cover systems. Learnings would be achieved through progressive rehabilitation of cover systems and adaptive management. This approach provides only learnings from the early phases of revegetation, but not of the long-term performance of the revegetation and cover systems.  It is unknown if material changes over time and from exposure to radiation, acid, saline and other solute extremes have been considered in the sourcing of materials. For example, the low permeability layers of the current WRD are displaying shrinkage	<ul> <li>the probable changes in material properties over time, including exposure to acid, saline and other solute extremes</li> <li>the unavoidable pedological and biological processes with consideration of local tree and weed species root behaviour, fire regime and soil biota</li> <li>worst case scenarios for all aspects listed above.</li> </ul> A sensitivity analysis of design assumptions must be undertaken and information gaps addressed through targeted investigations and/or field trails. Outcomes of the sensitivity analysis and an outline of the field trails with respective commitments must be provided.
		cracks and formation of polygonal blocky structures partly due to the high iron content in the clay (Taylor et al. 2003). As this high iron content is typical for the region, the proposed local clay materials should be investigated and assessed (lessons learnt).	
		For uncertainties of the erosion assessment see (7) below – Erosion – WSF.	
6. Cover materials	12	New studies of cover materials have been submitted in the Supplement (e.g. Appendices 14, 15) with detailed recommendations for the reconstruction of a Kandosol growth medium, stockpile	Confirm:

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		management and soil testing at time of excavation (to confirm suitability) and long-term (to monitor soil development of revegetation). Appendix 20 also recommends that geotechnical parameters of the borrow materials should be reassessed via flume testing and/or field tests prior to construction to ensure that they comply with specification envelopes.  As these are only recommendations made by respective consultants, it is unclear what will be adopted and implemented. For example, the Draft EIS and Supplement indicated that field trials would be undertaken for the clay materials (2.1, row 12) and lysimeters would be installed to monitor oxygen and water ingress (Appendices 1, 20), but is unclear if the new recommendations for long-term monitoring of soil development under revegetation (Appendix 14) and soil monitoring stations (Appendix 20) will be implemented. They were not found among the proposed monitoring in Appendix 1.	<ul> <li>construction of the growth medium, including stockpile management</li> <li>testing and monitoring of soils and cover systems at the WSF and Dyson's Pit</li> <li>if/how cover material recommendations outlined in respective Appendices, including 14, 15 and 20, would be adopted and implemented.</li> </ul>
7. Erosion - WSF	12	The soil cover assumptions in the WSF erosion modelling (Appendix 10) may be unrealistically high and need to be revised. Given that flume testing results indicate highly erosive soils, the stability of the final landform depends largely on the soil cover. This is also reflected in the erosion assessment (Appendix 10), which states that the type and rate of revegetation is critical to controlling erosion.  The assessment of the WSF erosion rate was based largely on total soil covers of ≥ 80 (dry season) and ≥ 95% (wet season), which mainly consisted of grass foliage cover. The vegetation surveys of the Rum Jungle site (EcoLogical 2014) indicate that such high % are typically achieved by closed gamba grass grasslands or gamba grass invaded woodlands at Rum Jungle. However, soil covers of	Incorporate additional erosion control measures in the cover design that do not rely on vegetation cover.  Provide a residual impact assessment of the erosion risk, and the proposed erosion control and mitigation measures.

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		native grasslands (WSF rehabilitation target) and woodlands are significantly less dense.		
		Soil cover criteria for the WSF were not found in the Revegetation Strategy (App 27) and the success metrics (Table 7-2, Draft EIS). The latter's erosion criteria is that "erosion processes are self-stabilising".		
		The erosion assessment (Appendix 10) recommends to either match the revegetation plan to the data provided in the report or to re-model soil erosion using the proposed revegetation plan. Both approaches do not take the impact of the annual fire regime into account, which may reduce soil cover, especially grass foliage cover, to < 10%.		
		It is recognised that the proposed batter slopes were assessed under the worst case scenario of no vegetation cover (Appendix 10). However, continuous soil cover of at least 80-95% cannot be assumed under the local fire regime and additional erosion control measures are required to ensure the long-term (500 year) stability of the landforms.		
	10 & 11	The Supplement indicated that materials would no longer be segregated at the deconstruction loading face.	Clarify if PAF-I material would still be deposited in the Main Pit.	
Waste rock segregation			If yes, provide information about a field validated segregation method, and associated quality assurance/quality control program for waste rock identification, segregation and management.	
			If no, would less waste rock be deposited in the Main Pit?	
Hydrology – Surface Water				

	# & Topic	Ref #	Comment	Further Information Required
		20	The River Reinstatement and Flooding Report (Appendix 17 of Supplement), and design drawings for the Main Pit and Reinstatement of the EBFR (Appendix 24) indicate that the dry season Top Water Level of the Main Pit post-rehabilitation will be 1m over the capping layer.	Provide modelling on the worst case scenarios for the potential impacts from the modification of the hydrological processes through the reinstatement of the EBFR flow path, in particular the potential pathways for contaminants to be transported during extreme weather events.
			This is contrary to statements in the supplement that the minimum depth would be 2 m above the capping layer.	Provide an assessment of the potential for erosion of the capping surface over time due to settlement of waste rock.
			The Draft EIS and Supplement state that this water level was estimated based on current groundwater levels.	Provide an assessment of the potential effects of climate change on Main Pit water level, including consideration of
9.	9. Post rehabilitation flow regime – climate change		The depth of water over the backfilled waste rock in the Main Pit is essential information for the NT EPA to consider since the water cover is a critical element of the rehabilitation to prevent oxidisation of stored waste rock.	increased evaporation and potential decreases in groundwater levels.
			For the Supplement, the NT EPA requested that worst case scenarios of climate change impacts be taken into account. This should include not only extremes of high rainfall, but also extremes of low rainfall, falling groundwater levels and increased evaporation.	
			The Proponent needs to consider the potential effects of these extremes on water levels in the Main Pit.	
			The Proponent states that there will be settlement within the Main Pit once it has been capped (Appendix 17 of Supplement). If settlement is uneven, this could result in riffles or dips, leading to altered rates of erosion to the surface.	
10	. Post rehabilitation flow regime	20	The delay in wet season flows reaching the EBFR downstream of the Proposal area was quantified in the Supplement as 24-81 days, depending on wet season rainfall. This is a significant delay,	Provide an assessment of the potential impact of flow delays on downstream aquatic ecosystems, including consideration of alternatives, such as the retention of the EBFR's current flow path.

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		especially in the drier years, which could impact aquatic ecosystems downstream.	
11. Post	20	In the Supplement the Proponent dismissed concerns about impacts of severe weed infestation of the Main Pit, stating that water levels of >2m would prevent the establishment of aquatic weeds.	Provide an assessment of potential impacts of weed infestation of the Main Pit and re-instated EBFR, including potential effects of "clogging" at the inlet and spillways of
rehabilitation flow regime -		Paragrass is known to tolerate water depths of 1 m and more, while Olive Hymenachne is capable of growing in water up to 2 m deep.	both pits on the integrity of landforms and infrastructure.
weeds		Given that the design drawings (Appendix 25 of Supplement) show water levels of only 1 m during the dry season, weed impacts must be re-considered.	
12. Water Balance	21	A Goldsim Water Balance for the site has been completed, however the proponent only provided a table of the cumulative flows across site and for the water treatment plant (WTP) discharge predicted for 2023 (DPIR 2020c).	Clarify whether the water balances are the same or are independent. If they are independent of each other, provide justification for the separate water balance models presented.
		It is also unclear if the Goldsim Water Balance presented in DPIR (2020b) and the high level water balance provided in SLR Consulting Australia (2020j) are the same.	Clarify whether the MCA 2014 Water Accounting Framework was used. If not, provide further information on model construction and estimates and assumptions used in the water balance provided in Appendix 19.
		The proponent provided a remediation high level water balance in Appendix 19 of the Supplement. It is not clear if this Water Balance was prepared in accordance with the MCA 2014 Water Accounting Framework. If not, this framework should be used.	Provide further information on the estimated discharges to the EBFR over all stages of rehabilitation.
13. Flooding	22	The flood assessment (Appendix 17 of the Supplement) does not include a sensitivity analysis that assesses likely impacts of more severe rainfall events on the risk of pit dams overtopping.	Provide a sensitivity analysis for the flood assessment that addresses likely impacts of more severe rainfall events on the risk of pit dams overtopping.
		The Proponent has not examined the erosive potential of stream flows during extreme events, or runoff from earthworks with	Examine the erosive potential of stream flows during extreme events, or runoff from earthworks with leachable

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		leachable solutes (preferential transportation of sediments and contaminants downstream)	solutes (preferential transportation of sediments and contaminants downstream).
Inland Environmen	tal Wa	iter Quality	
	26 30	At this stage, the NT EPA does not have adequate information to assess if the proposed LDWQOs are appropriate to achieve the overall project outcomes and whether they are acceptable to provide adequate protection for the aquatic ecosystems of the Finniss River.  The Draft EIS and Supplement have provided a large amount of information on water quality and the development and application of LDWQOs. The information is spread over a total of at least 8 documents, including several sections of the Draft EIS, a series of reports by Hydrobiology, groundwater and surface water modelling reports, and Appendix 2 of the Supplement.  As previously requested, a concise summary table of proposed protection levels by zone, and proposed guideline values for all contaminants of concern, including a comparison of ANZG default guideline values to the proposed LDWQOs has not been provided by the Proponent, nor has the Proponent provided a suitable data summary that allows a comparison of current water quality to the proposed guideline values.  This has created a significant lack of clarity for regulators, decision makers and stakeholders.  For the NT EPA and other stakeholders to be able to evaluate with confidence if the proposed LDWQOs are adequate for the protection of the Finniss River, and to be able to assess the LDWQOs against the current condition of the Finniss River it is essential to have a concise summary that provides an overview of	<ul> <li>Provide:</li> <li>a summary of current water quality data, specifying LDWOQs and trigger values in the format provided in Table 2. In providing the data, the proponent should include data collected between 2010-2020, or specify the data collection period.</li> <li>Provide a one summary table for each Finniss River zone (1-9).</li> <li>Provide equivalent summaries for groundwater data, grouped by aquifer type and impact/non impact locations depending on data availability (please specify).</li> <li>Provide a summary of trends in water quality over time as graphs.</li> <li>Provide any raw data in Excel format.</li> <li>Consult with the Environment Division of Department of Environment and Natural Resources to clarify and ensure that the proposed LDWQOs meet the requirements for environmental approvals and waste discharge licencing.</li> </ul>

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		<ul> <li>the protection levels proposed for each zone</li> <li>the final proposed LDWQOs and trigger values for ALL parameters of interest in ALL zones of the Finniss River</li> <li>current water quality of the Finniss River (Zones 1 to 9)</li> <li>current groundwater quality in the Proposal area</li> <li>trends in water quality over time</li> <li>Such a summary has not been provided in the Draft EIS or the Supplement.</li> <li>Further consultation with the Department of Environment and Natural Resources is essential to ensure that the proposed LDWQOs meet the requirements for environmental approvals and waste discharge licensing.</li> </ul>	
15. Contaminant transport	31	The contaminant transport modelling (Appendix 28 of Supplement) includes only Cu and SO4. Metals transport can be affected by a wide range of environmental conditions, including pH, redox, the presence of organic matter, colloids and other metal ions. These matters have not been considered.  The proponent has not provided an updated conceptual groundwater model. Therefore the comments made regarding the lack of a detailed (and properly presented) sensitivity and uncertainty analysis means that any discussion on the impact on inland water environmental issues can only be considered partially addressed. For example the sensitivity analysis should include all plausible ranges of parameters.  Given the heterogeneity of the bedrock aquifer, the proponent should consider the potential pathways of faults for contaminant transport pathways	<ul> <li>Provide an uncertainty analysis that considers:</li> <li>All plausible ranges of parameters</li> <li>How metal transport can be affected by a wide range of environmental conditions, including pH, redox, and the presence of organic matter, colloids and other metal ions</li> <li>Potential pathways of faults for contaminant transport pathways</li> </ul>

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	SLR 2020 d	The SLR report outlines the potential risk of toes seepage from the WSF	Provide further information on how DPIR estimated the assimilative capacity to mitigate the impacts of toe seepage in SLR (2020d).
16. Toe seepage from WSF			Further to this, provide information on the risks, potential impacts and mitigation of the toe seepage from the WSF. In particular given there is a risk of the toe seepage from the Central Site WSF could impact the Main Pit wall. The proponent has highlighted there are concerns in relation to the stability of the Main Pit wall in SLR (2020I).
Communities and	econor	my	
17. Traffic	40	The Supplement included a Traffic Impact Assessment (TIA; appendix 16), but it is unclear if all recommended actions will be carried out. Additionally, it has not addressed all the traffic and transport issues considered as required by DIPL Transport Civil Services Division (TCSD).	Provide an outline of how traffic and transport issues will be addressed with DIPL TCSD. Describe the further studies and analysis that will be undertaken to identify the required mitigation measures. Provide a commitment to implement the required measures, and clarify who will be
		The Proponent will need to consult with DIPL TCSD regarding further analysis required and measures to mitigate significant potential impacts to the public in relation to road safety, due to the transport of materials on public roads.	responsible for any required road upgrades.
Culture and herita	ge		
18. Sacred sites	nil	The Proponent provided an Authority Certificate under <i>Northern Territory Aboriginal Sacred Sites Act 1989</i> for Section 2968 Hundred of Goyder (the main Rum Jungle site), and committed to comply with the conditions of this certificate (commitment 9; Supplement).	For each of the proposed borrow areas, Mt Fitch, Mt Burton and related haul and access routes:  EITHER:

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		The Draft EIS and Supplement have not provided an assessment of sacred sites that could be impacted by the proposed works in the borrow areas, haul routes and at Mt Fitch and Mt Burton. The Aboriginal Areas Protection Authority advised that there are known sacred sites in the vicinity of some of the areas proposed to be used for borrow areas and haul routes, and there are significant concerns for the protection of sacred sites in those areas.	Provide a commitment that consultation with Kungarakan and Warai peoples will occur and Authority Certificate(s) will be obtained and complied with.  OR  Provide information on how sacred sites have been (or will be) identified, and avoided, in and near each area. This should be based on 1) consultation with Kungarakan and Warai peoples (and potentially AAPA) and 2) a risk assessment which takes into account landscape features and other aspects with a likelihood to be of cultural significance.
Human health			
19. Sensitive receptors for potential impacts to air quality	37	The Supplement refers to the Draft EIS appendix GHD 2019a: Air Noise and Vibration Air Quality Impact Assessment for identification of sensitive receptors. This provided a conservative assessment (modelling) of impacts to air quality at a selection of sensitive receptors and proposed measures to mitigate impacts.  Viewing of satellite imagery indicates that there are buildings/structures (potentially sensitive receptors) closer to sources of dust emissions than the selected sensitive receptors. This is apparent in Figure 3-6 of the Supplement (and Google Maps imagery).  It is unclear if the Proponent is committed to apply the recommended mitigation measures for dust impacts, as described in GHD 2019a, including the recommendations for addressing radionuclide and combustion emissions (in Table 6-2).	Provide a description of how the selected sensitive receptors are representative of all potential sensitive receptors. If additional sensitive receptors are closer to sources of air emissions (including dust) identified in GHD 2019a, provide a discussion of the potential impacts, and measures to mitigate them, at those sites.  Provide a commitment that the mitigation measures will be implemented in accordance with the Air and Dust Management Plan (commitment 18; Supplement).  For any residents in areas that may be subject to the mitigation measure of temporarily relocation, indicate the consultation that has already occurred on this matter, and provide a commitment that appropriate consultation will occur in accordance with the Stakeholder and Communication and Engagement Strategy (commitment 41; Supplement).

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20. Sensitive receptors for potential impacts to water quality	37	The Supplement refers to Hydrobiology reports. Appendix 3 (Hydrobiology 2013a) outlines the downstream environmental values by zone. Zones 5 and above include recreational use, drinking water, irrigation, stock water and farm supply. Zones 3 and 4 are of most concern as they are immediately downstream of Rum Jungle proper and do not include the full range of human use values (table 6-1). Viewing of satellite imagery (NR Maps / Google Maps) indicates that there are some buildings/houses in zones 3 and 4 and access tracks to the River (EBFR). It is unclear whether/how residents may use the river or water from it.  As the water in these zones of the EBFR is not, and will not be, suitable for many human uses, it is important for the Proponent to communicate with the owners, and anyone who has access to, all properties in zones 3 and 4, regarding appropriate use of the EBFR and its water.	Provide a summary of any consultation undertaken with owners/occupants of the properties with access to the EBFR in zone 3 and 4 in relation to their usage of the EBFR.  Provide a commitment that appropriate communication and engagement with all owners, occupants and visitors to the properties in zones 3 and 4 of the EBFR will be addressed in the Stakeholder Communication and Engagement Strategy (commitment 41).
21. Radiation	38	The Draft EIS and Supplement have not provided adequate information to demonstrate that radiation doses to the public will not be detrimental to human health. The public may be exposed to radiation by being present on site or nearby, or through the consumption of bush tucker (including fish). It is important that a dose assessment is undertaken early, so that if predicted doses exceed dose limits, the rehabilitation design can be altered so as to lower radiation exposure for the future.  The International Commission on Radiological Protection (ICRP) and the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) use a system of dose limitation, in addition to the	Provide a commitment to undertake a predictive dose assessment within the first two years of operation. This should be conducted in accordance with guidance by the International Commission on Radiological Protection (ICRP) and the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA). If predicted doses exceed dose limits, alterations to the project design and management may be required.

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		requirement for exposure and doses to be as low as reasonably achievable (ALARA).	

# **Table 2 Clarification of matters related to Commonwealth EPBC Act**

Item #	Further Information Required								
1	DAWE will need to review and approve the proposed Hazardous Materials Management Plan that will include but is not limited to the following information:								
	methods for storage, transport, handling, containment, disposal and emergency management of hazardous materials (including fuel)								
	disposal of hazardous material (including naturally occurring radioactive material (NORM)) or wastes								
	possible release of each hazardous material.								
2	Please provide cost benefit analysis of the project and why the current format was chosen. As the project is a publicly funded project it is important sound cost benefit analysis is carried out for all elements of the project. Estimated ongoing costs should also be included.								
3	Please outline the name of the agency responsible for endorsing or approving each mitigation measure or monitoring program.								
4	Please provide consolidated tables at the end of each section summarising the avoidance and mitigation measures outlined in the section and the predicted effectiveness of mitigation measures (i.e. expected outcomes).								
5	Please provide a list in each section that outlines the statutory documentation and policies that are relevant.								
6	Please provide details of any local or State government planning scheme that interacts with the project and if any environmental assessments are being carried out under these schemes. Please provide details of how these schemes provide for any prevention, minimisation and management of any relevant impacts.								
7	Please include the full name and postal address of the designated proponent in the EIS as required under the EPBC Act.								
8	Please address previous comments provided around deficiencies in the assessment of alternatives.								

Table 3: Data Summary Template for Surface water data (for DPIR to complete – refer to Table 1 above).

ZONE (please specify)	Indicators																			
	Phys-chem				other	other				Metals (dissolved)										
Proposed Protection Level:	EC	рН	DO	Tur	Alkalinity	SO4	TSS	Αl	As	Cd	Cu	Со	Fe	Mg	Mn	Ni	Pb	Zn	U	
(please specify)	μS/cm	s.u.	%	NTU	mg/L	mg/L	mg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	μg/L	
Comparative Guideline																				
Values:																				
ANZG 2018																				
Proposed																				
LDWQO																				
Wet season (Nov-Mar)																				
Median																				
80 <sup>th</sup> /20 <sup>th</sup>																				
percentile																				
Max																				
Min																				
SD																				
No. of samples																				
No. of sites																				
Dry Season (May to																				
October)(if applicable)																				
Median																				
80 <sup>th</sup> /20 <sup>th</sup>																				
percentile																				
Max																				
Min																				
SD																				
No. of samples																				
No. of sites																				