Further Information Request

Rum Jungle Rehabilitation Project – Environmental Impact Statement

NORTHERN TERRITORY GOVERNMENT

Document title	Further Information Request
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0.3	29/07/2021	J. Hartnett	Internal Review
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1.0	23/8/2021	As above	Issued Report

Acronyms	Full form
AHD	Australian Height Datum
AMD	Acid and metalliferous drainage
EBFR	East Branch Finniss River
EIS	Draft Environmental Impact Statement (DPIR, 2020)
DCMC	NT Department of the Chief Minister and Cabinet
DENR	NT Department of Environment and Natural Resources *Now Department of Environment Parks and Water Services (DEPaWS)
DISER	Cth Department of Industry, Science, Energy and Resources
DIPL	NT Department of Infrastructure, Planning and Logistics
DITT	NT Department of Industry Tourism and Trade* formerly the Department of Primary Industry and Resources.
DoF	Department of Finance (Cth)
LDWQO	Locally Derived Water Quality Objectives
LLDPE	Linear low-density polyethylene
NGO	Non-Government Organisation
NT	Northern Territory
NT EPA	Northern Territory Environment Protection Agency
NTG	Northern Territory Government
PAF	Potentially Acid Forming
QA/QC	Quality Assurance/ Quality Control
RFI	Request for Information
RGC	Robertson GeoConsultants
RMP	Radiation Management Plan

SIS	Seepage Interception System – installed around Intermediate and Main WRDs
ToR	Terms of Reference
WDL	Waste Discharge Licence
WRD	Waste Rock Dump (existing)
WSF	Waste Storage Facility (proposed)
WTP	Water Treatment Plant

Tables and Figures

Contents

1. Purpose

Following the submission of the Environmental Impact Statement (EIS) (DPIR, 2019) and the subsequent Supplementary Report (DPIR, 2020), the NT EPA have requested further information on key points of the submission to aid the environmental assessment of the Project. The Request for Information can be found at Appendix 1. This report aims to provide clarification on the identified issues outlined below and aid the NT EPA in its assessment.

2. Project Update

A detailed Business Case for the rehabilitation of the former Rum Jungle Mine site has been prepared for the Australian Government as per the *Project Agreement for the Management of the Former Rum Jungle Mine site (Stage 2A)*. A decision on the funding for Stage 3 has now been made, and support given by the Australian Government to move forward with the Rehabilitation Project; interim funding has also been granted for Stage 2B under a *Federation Funding Agreement*. This will support continued environmental monitoring, site safety works and maintenance activities, and the implementation of a Traditional Owner Land Management Traineeship Program.

3. Request for Further Information

3.1. On-going and Long-term Management

Comment	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.
Further Information Required	Provide further information about the ongoing and long-term management of this Proposal, including: • the Governance Board (e.g. participants, purpose, role and responsibilities, for how long it will exist etc.) • an outline of audits and technical reviews planned (short and long-term > 20yrs) • identifying who will take responsibility for actioning and achieving outcomes of rehabilitation management plans • approach to management/provisions after Stage 4 (> 20 years) to ensure the required land management of the cover systems is maintained • reporting structures, including communication to stakeholders and the public. The information should be supported with diagrams where possible.

Response

<u>Project Governance Overview</u>

In preparation for Stage 3, the Proponent has drafted several guiding documents – including Governance Framework, and Project Board Terms of Reference – to support the long-term management and success of the Project. The proposed structure of Stage 3 Project Governance is a Project Board whose function is to provide direction to the Rum Jungle Project, and a Project Advisory Panel to ensure that the Project Board has access to professional advice and recommendations from an independent and skilled resource

experienced in similar major capital works projects. The proposed structure of Stage 3 Project Governance is included at Figure 1: Project Governance Model.

Project Board

The Project Board as a minimum shall be comprised of the following members:

Role	Position
Senior Responsible Officer (Chair)	Deputy Chief Executive Officer NT Dept Industry, Tourism & Trade
Senior User	Senior Executive Director NT DCMC
Senior Supplier	Head of Division Cth DISER
Senior User	Assistant Secretary Cth DoF

Other parties who will, at the discretion of the Chair, attend regular Project Board meetings, but will not have voting rights include; the Project Advisory Panel, Project Director, Project Assurance, and Technical Expert/Consultants as required.

The key responsibilities of the Project Board include, but are not limited to:

- providing guidance and support to the Project Director and Project team to facilitate completion of the Project within agreed objectives detailed in the Project Management Plan;
- overseeing development of the Project Management Plan to ensure it aligns with stakeholder expectations and the Project solution defined in the agreed Detailed Business Case;
- reviewing and endorsing systems of project, risk, compliance and benefits management in accordance with the Project Management Plan;
- ensuring that the Project Director and Project team are consistently and effectively identifying and mitigating material risks to the successful completion of the Project;
- monitoring and controlling the progress of the Project at a strategic level;
- assessing and approving changes proposed to Project scope, schedule, goals and cost estimate, in accordance with delegated authorities;
- removing obstacles that could impede success (e.g. help to resolve inter-project boundary issues, exert organisational authority and the ability to influence especially in an out-of-control situation);
- considering any emergent issues or risks to the Project and proposing solutions to support Project success;
- providing solutions to escalated stakeholder issues and concerns; and
- ensuring overall business assurance of the Project – that it remains on target to deliver the expected benefits and that the Project will be completed within its agreed tolerances as defined in the Project Management Plan.

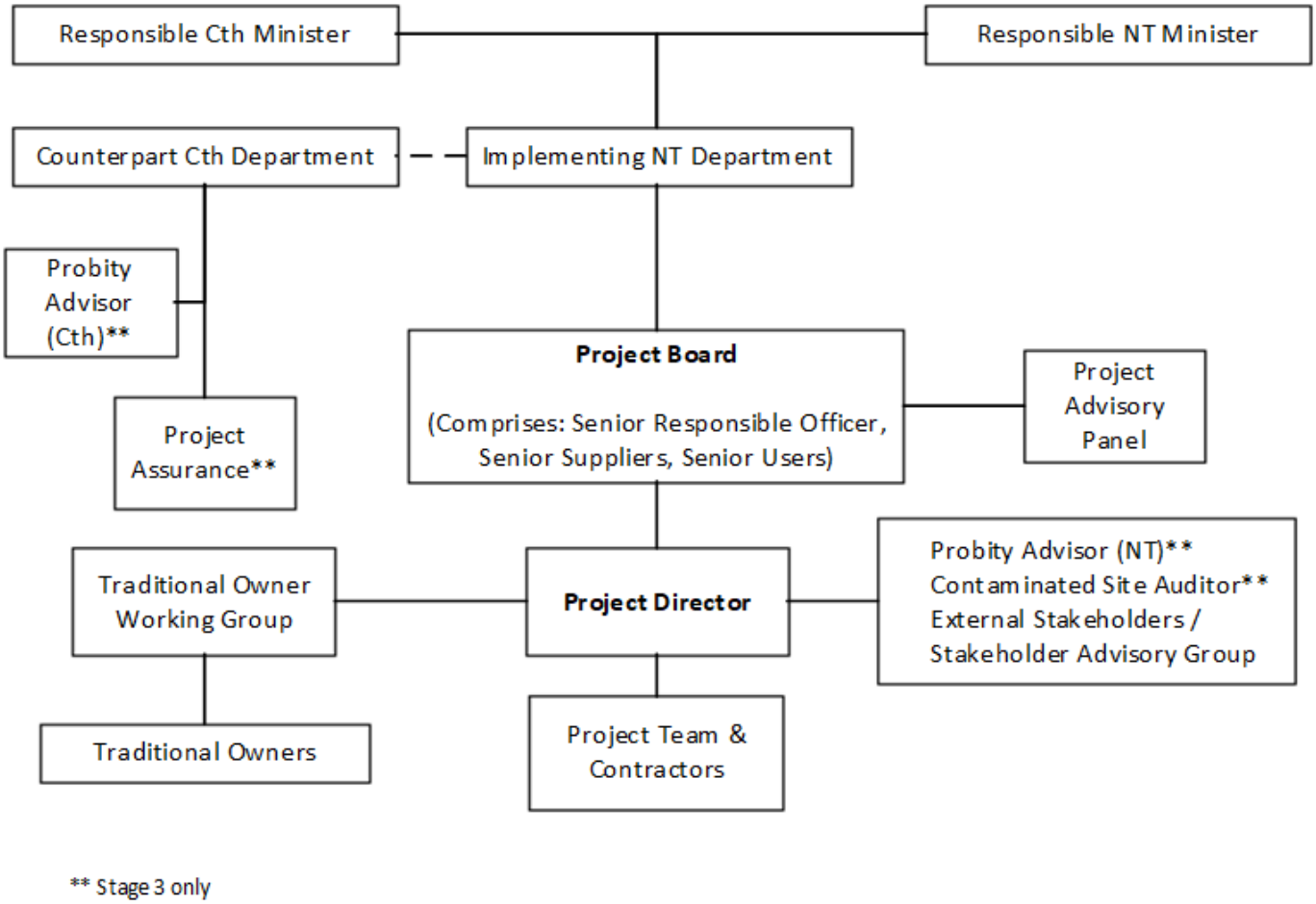

Figure 1: Project Governance Model

The Traditional Owner working group, Project Advisory Panel and other technical experts are yet to be formed and formalised however this Governance Model is the target framework to be established to support Project delivery.

The Project Board Terms of reference will be reviewed immediately at Project commencement and throughout Stage 3, following each Gateway Review or on a two-yearly basis, whichever comes first. The Terms of Reference will also be reviewed during the Stage 3 transition between the construction and monitoring phases.

Reporting Cycles

Project Board reporting cycles are outlined by the Rum Jungle Board Terms of Reference (ToR). Prior to the commencement of Stage 3, the Board is scheduled to meet every two months; upon commencement of Stage 3, the Project Board is scheduled to meet on a monthly basis. The Project Board may agree to consider out-of-session decisions, including where urgent decisions arising from the performance of the Project are required.

Reporting of exceptions and trigger events during the Construction and Stabilisation phases will be carried out through the Project's reporting structure, including reporting of progress internally via the Governance Board reporting cycle.

Project challenges that arise will be addressed at the lowest level in the Project with the authority to do so as outlined in the delegations framework; when an issue is identified at a level without the authority to

resolve them, the issue must be escalated through the chain to the appropriate level. Issues should be addressed within the specified time frame to reduce the risk of overwhelming the Project (Table 1: Issue Escalation and Resolution).

Table 1: Issue Escalation and Resolution

Decision Maker	Trigger	Process	Timeframe to Escalate	Timeframe to Resolve
Team Manager	Exceeds authority	Bring to attention of Project Director	Raise within two (2) business days of identifying	Expect resolution within five (5) business days
Project Director	Exceeds authority	Bring to attention of Senior Supplier	Raise within two (2) business days of identifying	Expect resolution within 10 business days
Senior Responsible Officer	Issue to be discussed with Senior Supplier(s) and relevant agencies	Bring to attention of Project Board via scheduling a Project Board meeting/out-of-session engagement	Raise within five (5) days of identifying	Expect resolution at next Project Board meeting or identification of next steps to ensure resolution
Project Board	Presented by Senior Responsible Officer	Address at Project Board meeting or through out-of-session engagement	N/A	Resolve within 10 business days of it being brought to its attention

To ensure transparency of Project performance, the Project Director will implement a range of scheduled and ad-hoc reporting activities outlined by a Project Management Plan or related sub-plans. The Project Management Plan or relevant sub-plans will define the timing and distribution of all reports, including the distribution of reports to the Project Board.

Reporting of progress and management actions to regulatory agencies are expected to be carried out annually during the Construction phase, then two yearly post-operations during Stage 3 and 4. The quality assurance process includes regular reporting and utilises technical experts to provide independent advice and assurance at key points in the project schedule. Table 2: Quality Assurance Reporting provides examples of project components subject to quality assurance reporting. A Quality Management Plan will be the formal framework to ensure that the appropriate methodologies and standards are applied and that project outputs are ultimately delivered fit-for-purpose.

Table 2: Quality Assurance Reporting

Project Component	Advice to be provided	Timing	Responsible	Recipient(s)
All of project	Assurance oversight of project delivery	In advance of each Project Board meeting	Technical Advice / Assurance	Project Board
Construction Works Project Quality System Audit	Audit findings, including corrective action requests	Periodic	QA/QC Construction Supervision	Site Manager
WTP Quality System Audit	Audit findings, including corrective action requests	Periodic	Site Superintendent	Site Manager
Environmental reporting under EPBC Act[1]/EP Act[2] approval or Waste Discharge Licence[3]	Preparation of required monitoring report or must be prepared in consultation with	As required	Qualified Person	Environmental Manager

Contaminated Sites Auditor

The Proponent has engaged a certified Contaminated Sites Auditor for the purpose of providing stakeholders with an additional level of confidence that the rehabilitation strategy and delivery will result in the restoration of environmental values of the Project area and downstream in the EBFR. The Auditor has been involved with the Project from the early design phase and has audited the Remediation Action Plan work which was taken as the full Draft and Supplementary EIS documentation and all associated technical reports and engineering design works. This Audit report is attached at Appendix 2 and highlights findings and actions moving forward. The Auditor will be required to make annual inspections of the operational site to check and validate the construction process is in line with the key actions identified in the construction quality assurance and control documents. The Auditor may at times be required to report findings to the Project Board or provide expert input or advice.

The Auditor will also be required to work with the Project team, Kungarakan and Warai at any point in future where a change in land use is contemplated. For example, post-construction it may be possible for some land areas to be made available for cultural use well prior to full land claim resolution however it will be the role of the Auditor to guide that process based on land and water quality. A Land Use Management Plan will require an agreed set of actions to maintain site quality and to ensure that future land use is safe.

The Proponent will continue to use an appropriately qualified person under the New South Wales or Victoria framework to ensure that expert input and advice are being provided in conjunction with fulfilling the requirements of the contaminated sites auditing processes.

Project Advisory and Assurance Services

As shown in Figure 1: Project Governance Model), the project Governance Model includes Project Assurance and a Project Advisory panel. The Project Assurance and Project Advisory Panel will be engaged

[1] *Environment Protection and Biodiversity Conservation Act 1999* (Cth).
[2] *Environment Protection Act 2019* (NT).
[3] Under the *Water Act 1992* (NT).

by the Commonwealth Lead Agency and will report to the Project Board as outlined by the Project Governance Framework.

Project Advisory Panel

The objectives of the Project Advisory Panel are to ensure that the Project Board has access to professional advice and recommendations from an independent skilled resource experienced in similar major capital works projects. Project Advisory services will include providing:

- Specialist advice, knowledge and recommendations to the Project Board in relation to the Project Management Plan, the Project execution strategy, contracting and procurement strategies and Project performance, as requested by the Project Board;
- Expert opinion on issues raised by the Project Board, Project Director or various stakeholders; and
- Advice to the Project Board on the effectiveness and transparency of Project reporting.

Project Assurance

The objectives of the services provided by Project Assurances are to ensure transparency and improve accountability in Project delivery. Project Assurance will provide:

- assurance that project management is conforming to required processes and standards;
- a risk, status, quality review and assessment mechanism over Project activities and structure;
- early warning of potential Project issues and risks which might affect Project success;
- considered recommendations on what to do to address specific and generic issues and concerns identified; and
- confidence to stakeholders that the Project can be delivered to time, budget and quality.

Stakeholder Engagement and Stakeholder Advisory Group:

The Proponent acknowledges that surrounding communities and environmental non-government organisations (NGO) have an ongoing interest in the delivery of Stage 3 of the Rum Jungle Rehabilitation Project and its environmental outcomes, through and post-construction. To ensure that reporting and communication with Traditional Owners, the public and key stakeholders is maintained throughout Stage 3, the development of a Traditional Owner Working Group and a Stakeholder Advisory Group has been incorporated in the Project Governance Model (Figure 1: Project Governance Model).

Stakeholder Engagement

Community and stakeholder engagement is an important component of the project. The overarching goal of the community engagement process is to promote a high level of confidence that the NT Government is managing delivery of the Rum Jungle Rehabilitation Project across delivery and environmental and social aspects. The project will continue to build upon existing engagement activities and will include:

- communications to:
    - (i) Traditional Owners, both of the site (Kungarakan and Warai) and downstream;
    - (ii) Coomalie Community Government Council, Batchelor residents and businesses; and
    - (iii) other relevant stakeholders.

For Stage 3, a detailed Stakeholder Engagement Plan will be developed. The document will outline the engagement strategies, methods and channels for communication, routine and trigger event reporting, and management of stakeholder contact lists, including the requirement for annual reviews on all communication processes. Key principles of stakeholder engagement and risk communication will be incorporated in the development of the Stakeholder Engagement Plan, which includes objectives to:

- clearly communicate actions being undertaken to address social and economic impacts and to provide opportunity;
- clearly communicate actions being undertaken to protect the environment;
- build relationships with stakeholders through appropriate levels of engagement.

The Stakeholder Engagement Plan will apply the International Association for Public Participant's (IAP2) *Quality Assurance Standards* (2015) to provide confidence and certainty in community and stakeholder engagement practices. The Project Board will also provide guidance to the Project team on the implementation of communication and engagement activities. Outlined within the draft Project Governance plan the Stakeholder Advisory Group will meet every three months, or as agreed, to discuss matters related to the Project. Proposed communication and engagement activities will be outlined in the Stakeholder Engagement and Communication Plan.

Stage 3 Project Management Plan

The Stage 3 Project Management Plan (PMP), to be developed prior to Stage 3 commencement, will provide an overview of the Project objectives and how the Project will be executed, monitored and controlled. The PMP will clearly outline:

- The process and timeline for technical reviews and audits
- Responsibilities for actioning and achieving outcomes of proposed rehabilitation management plans.

Long-term management, maintenance, and monitoring post Stage 3 will be developed and form the foundation of Stage 4 Project Management Plan, however, will require further funding arrangements. At this stage it is expected that the management strategy for cover systems will be similar to those presented in the Stabilisation Phase Monitoring Plan but will implement an adaptive management approach based on data collected from the Construction and Stabilisation Phases of Stage 3.

3.2. Water Treatment Plant

Part 1	
Comment	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.
Further Information Required	Provide further information about the potential environmental risks and impacts of chemicals and their breakdown products used in the WTP.

Part 2	
Comment	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.
Further Information Required	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.

Response

At this stage the final Water Treatment Plant methodology has not been decided. The process for determining the approach for WTP design and technology use will be via a market driven process. The known inputs and outputs for WTP design are water quality and flow rates which are highly dependent on the Main Pit Backfilling process. A groundwater treatment train will be required to manage long term groundwater recovery and treatment to address the impacted groundwater systems across site and this will carry on for a period of time after completion of the WSF construction and Pit Backfill works. The surface water treatment train will be required to manage the displaced waters from the Main Pit and also the wet season runoff from the WRD and WSF work areas.

Final design and technology selected for the work will be dependent on the following criteria:

1. Cost and value for money where value for money is driven by:
    a. Redundancy in capacity to manage the volume and quality variations at input. Priority given to solutions that do not impede Main Pit Backfill rates
    b. Raw material demands including concrete, power supply and chemicals – higher preference given to lower impact solutions.
    c. Waste material outputs – higher preference given to lower impact solutions.
2. Degree of compartmentalisation and packaging of plant. There are several design and operating solutions that can be manufactured offsite and dropped into site to reduce construction and final demolition processes. Additional modules can also be added should water quality change in an unforeseen way.

Therefore at this stage it is not possible to provide further detail around chemicals to be used at the WTP or the breakdown products of those chemicals. This will only be known once the detailed design process is complete for the WTP in the coming 18-24 months. Additionally, all alternative technologies will be considered as the market will be approached through an Expression of Interest process to test the market for innovative solutions to the water treatment problem. The reference design provided with the EIS documentation package is for reference purpose only to allow for cost estimating and preliminary planning works to take place.

3.3. Cover Systems – WSF Design

Comment	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).
Further Information Request	Confirm: • the final WSF cover system and geo-liner design • if/how recommendations outlined in respective Appendices, including 10 and 11, would be adopted and implemented.

Response

As discussed within the EIS Supplementary report, several recommendations for the WSF design were presented in the SLR Stage 2A Detailed Engineering Design (Appendix 11 of the Supplementary), the recommendations adopted by the Proponent include:

For the upper 'flat' surfaces of the WSF's:

- Topsoil; overlying
- 2m growth medium; then
- 1.5mm Linear low-density polyethylene (LLDPE); then
- 0.5m compacted clay liner; overlying
- 2.0m thick oxygen-scavenging layer.

Capping for the WSFs batter slopes:

- Topsoil; overlying
- 2m growth medium; then
- 0.5m compacted clay liner; overlying
- 1.1m to 1.7m thick oxygen-scavenging layer.

Revegetation for all areas:

- Broadcast native cover (the details of which are to be further developed by DITT in consultation with vegetation experts and informed by revegetation trials).

Further recommendations adopted by the Proponent include those presented in SLR 2020a (Appendix 10 to the Supplementary) and are outlined below:

- The recommended batter slope of 9°to 14° to prevent excessive erosion
- Selective revegetation of suitable species in vulnerable areas that are likely to experience higher runoff speeds to reduce erosion risk
- Rapid and progressive revegetation as WSF progresses to prevent deterioration of bare soil

- The adoption of rock armouring to control erosion in “worst case scenario” (see section 3.4).

Recommendations that pertain to the construction phase for finalising the design as outlined in SLR 2020a and adopted by the Proponent include:

- The in-field testing of borrow materials to ensure compliance with specification envelopes
- The finalisation of the Project Revegetation Plan will reflect the findings and data provided within the SLR 2020a report
- Sharp edges at crests will be avoided to reduce localised gully erosion
- Ongoing updates to the WSFs design, including consideration of erosion requirements, will be made during construction if required due to variable bulking or compaction factors, or unexpected finds onsite
- Strict QA/QC in terms material placement to meet specification and ensure long-term integrity and stability of WSFs.

The Proponent is committed to delivering an approach to achieve chemically and physically stable landforms as first priority. The recommendations outlined above aim to meet strict geochemical and geotechnical quality control requirements for the WSF’s long-term stability.

3.4. Cover Systems – WSF Long-term Stability

Comment	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 and the geo-liners. A sensitivity analysis of design assumptions was not provided. 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 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.

Further Information Request	Provide (as recommended by Taylor et al. (2003)), a cover performance assessment, including modelling, taking into account: • the properties of proposed borrow materials • the probable changes in material properties over time, including exposure to acid, saline and other solute extremes • the unavoidable pedological and biological processes with consideration of local tree and weed species root behaviour, fire regime and soil biota • worst case scenarios for all aspects listed above. 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.

Response

The proponent has already undertaken a cover options analysis (SLR 2020b, Appendix 11 to the Supplementary) which takes into consideration the available and suitable cover material options for WSFs plateaus, side slopes and revegetation, and a Multi Criteria Analysis (MCA) to address environmental, financial, and technical factors. Information from this assessment has enabled the Proponent to carry out further design work to inform the erosion assessment (SLR 2020a, Appendix 10 to the Supplementary) and the WSF Construction report (SLR 2020k, Appendix 20 to the Supplementary). While the cover system will be a crucial element in the Projects rehabilitation plan it is not the only control on the long-term chemical stability of the WSFs.

AMD Prevention and Chemical Stability

AMD prevention, management and the long-term chemical stability of the proposed WSF landforms are fundamental elements in the rehabilitation design the Rum Jungle site. The primary controls for future AMD production are the elimination, as far as possible, of water infiltration and influx of oxygen, and the lime amendment to reduce pyrite mineral oxidation and secondary mineral reactions. This construction methodology (described below) means that the long-term stability of the WSF's does not rely solely on the cover system to provide AMD prevention and management and instead has been designed with multiple mechanisms to regulate the internal environment and manage AMD. While the cover system has been designed to meet the requirements of best practice covers as described in The Leading Practice Sustainable Development in Mining Series AMD Handbook (DIIS, 2016), it is the internal WSF construction methods and mechanisms that are key to facilitating the long-term chemical stability.

Cellular Construction

As described within the Draft EIS documentation, the internal controlling mechanisms include cellular construction methodology and placement in thin 0.5m compacted lifts to regulate internal particle size segregation, reduce pore spaces and settlement issues generally associated with top-down or end-dumped construction. This will also function to increase density, water residence time and saturation and maintain an alkaline environment within the WSF. Waste rock will be compacted in conservative 0.5m layers to ensure sufficient chemical amelioration and compaction to achieve the construction requirements. The WSF's will be built up vertically in sections (cells), as outlined in the construction approach in Appendix 20 of the Supplementary Report, to allow part or all of the cover system to be constructed prior to the wet season for each cell. The cellular construction and capping also allows for the progressive revegetation of surfaces to reduce rainfall infiltration and cover erosion, rapidly stabilise new surfaces and allow for adaptive management of the revegetation program as it progresses. This approach will also improve the quality of surface water runoff during the construction phase as the exposed operational work areas will

be minimised; however, additional controls for managing run-off, including sediment trap ponds and pH amendment through the WTP, will be implemented.

Waste Rock Amendment

The addition of agricultural lime ($CaCO_3$) to the waste rock prior to compaction further aids in AMD prevention and control, primarily by neutralising existing acidity within the PAF waste rock and reducing the solubility and mobility of currently mobile heavy metals Cu, Ni, Co, Mg. The secondary benefits of the chemical lime treatment of waste rock include the suppression of the AMD generation process through kinetic inhibition by raising pH levels to 7 and facilitating a CO_2 enriched environment within pore spaces. A significant amount of geotechnical work was undertaken to establish the neutralant treatment rates (RGC & Jones, 2019) and to inform the technical specifications outlined in Appendix 20 (section 8) of the Supplementary Report. A strict geotechnical testing regime will be enforced during the waste rock placement and compaction process to ensure the correct neutralant dose is applied to each block of placed waste rock.

Cover System

The combined cellular construction and waste rock amendment strategy means that there is a reduced reliance on the WSF cover systems as the only / primary control of future AMD production. While the cover system has been designed with a dual purpose – to develop a viable substrate for revegetation and to limit oxygen and water ingress into the waste rock – the importance of the long-term landform stability and AMD management is priority. If long-term stability cannot be achieved with the outlined native vegetation cover, then the incorporation of additional rock armouring to stabilise surfaces will be considered as an adaptive management approach in future. The long-term risks associated with the cover and WSF design are included in the Rum Jungle Risk Register and are discussed in more detail in the following section.

Conservatism in Design

The three components outlined above, work in conjunction to control and manage AMD within the WSF's, and have a significant amount of conservatism built-in which aims to reduce the long-term risks and improve design performance. The reduction of lift heights, the strict geotechnical requirements and the progressive revegetation strategy of the cover systems all aim to facilitate the best rehabilitation outcomes for long-term stability. The Proponent will take an adaptive management approach to the assessment of long-term success and the ongoing monitoring and management of the site will ensure rehabilitation objectives are maintained.

Long-Term Risks and Worst Case Scenario

The long-term risks associated with AMD prevention and WSF landforms were captured in the Rum Jungle Risk Register (GHD 2019f Rum Jungle Risk Register ref. 3, 51, 52, and 53). The risks highlighted in this section pertain to the failure of the WSF due to insufficient neutralant, damage to capping, poor design/construction and inappropriate material selection, and consider impacts to human health, terrestrial environmental quality, radiation, and inland water environmental quality. Following the risk assessment framework, outlined in section 3.4 of the EIS, and the mitigation/management procedures for the described risks, the residual risk profiles for the above WSF related risks were reduced to Medium/Low. Due to the reassessed low risks, specific trigger levels and actions have not been developed; however, the project will take an adaptive management approach to the newly constructed landforms.

The long-term stability of landforms were also discussed in section 9.2.2 of the EIS and highlighted that a key outcome of the proposed works will be that the project area is stable over a long timeframe and does not require further significant rehabilitation. Therefore the geophysical and chemical stability of constructed landforms and the success of revegetation activities are key to the overall success of the

works. Failure of the WSF's through non-compliance of design specifications or a poorly constructed WSF would be considered the "worst case scenario". Details of the WSF Construction Quality Assurance requirements are included in section 8 of Appendix 20 of the Supplementary Report (SLR 2020k, WSF Construction and General Site Civil Works) and outline the geotechnical requirements and validation program for construction. The geotechnical quality control will be in accordance with relevant Australian Standards. Dedicated and appropriately-experienced construction supervision will be critical to ensuring design specifications are achieved and compliance with the QA/QC program. A Construction Report will also be produced following the completion of the project which will include QA/QC results and any deviations from the specifications.

Risks to Revegetation

The most significant risks to the ecological restoration program are outlined in Appendix 27 of the Supplementary Report (Top End Seeds, 2020) and consider the impact of weeds, fire and feral animals to revegetation success. The management of these risks will be critical to the success of the revegetation activities and the long-term stability of the cover systems, therefore they have been incorporated into the Trigger Action Response Plan outlined in the Draft Monitoring Plan (DPIR, 2020) Appendix 1 of the Supplementary Report. While trigger levels and responses have been outlined, the current Monitoring Plan is a draft document and a more detailed Revegetation Monitoring Plan will be developed during Stage 3 incorporating recommendations from the Top End Seeds 2020 Strategy Framework. Following an adaptive management approach, site-specific knowledge and the assessment of the progression and performance of revegetated areas will be utilised in forming the revegetation success criteria.

3.5. Cover Materials

Comment	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 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.
Further Information Request	Confirm: • construction of the growth medium, including stockpile management • testing and monitoring of soils and cover systems at the WSF and Dyson's Pit • if/how cover material recommendations outlined in respective Appendices, including 14, 15 and 20, would be adopted and implemented.

Response

Growth Medium Construction and Management

As outlined in Appendix 14 of the Supplementary report, the ideal growth material for the WSF would be a soil profile similar to the Kandosols that naturally occur and are dominant throughout the surrounding landscape. The preferred Kandosol growth medium that has been adopted by the Proponent is outlined in detail in Appendix 14 of the Supplementary report, and in summary will consist of:

- 0-20 cm (SL to SCL texture – A1 horizon)
- 20-60 cm (SCL to CLS texture – A2 horizon)
- 60-120 cm (CLS to SLC texture – B21 horizon)
- 120-200 cm (SLC to SLMC texture – B22 horizon)

The quantity of available soil materials from the available borrow areas appears to not provide sufficient material of the exact textures required for the A1 and A2 horizons of the Kandosol (SLR 2020e). As there are insufficient quantities of material available to construct the A1 and A2 horizons, it will be the responsibility of the contractor to create the desired mix for the medium. The SLR 2020e report identified that there are sufficient quantities of the B21 and B22 horizons.

An analysis of the quality of the soil materials in the borrow areas (SLR 2020e) found that there were some instances where unsuitable materials were uncovered; however, this can be rectified through treatment with a small volume of readily available ameliorants such as lime and gypsum. It will be the responsibility of the contractor to construct the growth medium and follow the stockpile management as set out in Appendix 14 and 15 and adopted by the Proponent.

Growth Material Testing and Monitoring

Prior to placement of the growth material, a representative number of samples are to be collected from the stockpiles and tested to understand the physical and chemical properties of the material. The adopted testing procedures include sampling at >200mm beneath the stockpile surface to ensure a representative sample, with each stockpile to be tested. The number of samples from each stockpile will be dependent on stockpile size and could range from 3 to 10 samples per stockpile. The adopted stockpile test parameters are outlined in detail in Appendix 14 of the Supplementary report.

The results of the stockpile testing will determine if any specific physical, chemical and/or biological treatments are required to ensure the growth material meets the indicative growth material success criteria set out in section 1.7.4 of Appendix 14 of the Supplementary report.

Bi-annual monitoring of the of the growth material during the revegetation establishment phase has been adopted by the Proponent – for periods following the end of the dry season and the end of the wet season – to compare soil changes resulting from annual and seasonal climate variations. Monitoring will include soil profiled down to the clay capping (but not into the capping) and sampling. The adopted growth material design and success criterial are outlined in Table 5 of Appendix 14 of the Supplementary Report.

Monitoring of the growth material has been recommended to continue post-establishment for a period of 10 to 15 years, a recommendation adopted by the Proponent that will be incorporated in the post-rehabilitation monitoring plan and associated with erosion and vegetation monitoring activities. The post-rehabilitation plan will be developed under Stage 3 of the Project.

The assessment of water and oxygen ingress, and water levels and quality will be required to assess the performance of the WSF's post-construction. The Proponent had adopted the recommendations to include a series of lysimeters and soil moisture monitoring stations as indicated by Appendix 22 (pages 13 to 15) of

the Supplementary Report. Monitoring and data collection from the WSF lysimeters has also been included in the Trigger Action Response Plan of Appendix 1 of the Supplementary Report (DPIR, 2020).

3.6. Erosion – WSF

Comment	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 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.
Further Information Request	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.

Response

At this stage of the Project, due to heavy time and budget restrictions, the Proponent is unable to pursue further modelling work under Stage 2B. At this juncture, an adaptive management approach to erosion control is preferred. As WSF surfaces are revegetated and monitored, if erosion performance is poor this will trigger an adjustment to surface treatments (rock armour, drainage upgrades or revegetation practice changes). As noted above in section 3.4 the Proponent is placing a high importance on achieving stable non-eroding landforms, in the worst case scenario where a native vegetation cover cannot be established the focus will shift to mitigating erosion risk and the use of rock armouring will be considered.

Fire management onsite will be critical to the establishment and success of revegetated areas. Vegetation dieback across site and invasion of weeds is exacerbated by uncontrolled fires which, in turn, is intensified by increased fuel loads from invasive species, particularly Gamba grass. As such, fire protection and exclusion from sensitive areas will be necessary for at least 5 years post revegetation to improve seedling

establishment and soil stability. Species selected for revegetation will be in according with the principles outlined within the draft EIS Chapter 7.11 Ecological Rehabilitation Strategy. This section of the EIS highlights the importance of successful rehabilitation relying on the selection of adequate and sustainable vegetation to stabilise landforms and meet rehabilitation objectives.

Revegetation of the old tailings dam area is scheduled to commence under Stage 2B of the Project and information gained and lessons learned from this will be incorporated into the final revegetation plan for the WSF's. In the worst-case scenario of revegetation failure and therefore insufficient establishment of ground cover, the long-term stability of the WSFs and the environmental values downstream are the primary concern. Aesthetic goals of remediation become second to ensuring the control of erosion and AMD. In this worst case scenario, the Proponent will look to utilise engineered covers such as rock armour on the WSFs to safeguard the stability of land forms however this is an extreme solution and is unlikely to be required.

Post-Construction Monitoring and Adaptive Management

There are two fundamental management aspects that will be crucial to the long-term success and rehabilitation goals: stabilisation of constructed landforms, both physically and chemically and ecological restoration of historic and newly disturbed areas. Both aspects have clear management objectives and outcomes that have been established through a stakeholder consultation process and from baseline site and surrounding conditions. There are multiple stages of the Project where the scope of the management objectives will differ depending on the purpose and potential impacts of the work and the Project has therefore been broken down into the construction, stabilisation and monitoring and closure phases. This format also fits within the Federation Funding Agreement between the NT and Australian Governments, which provides a framework for facilitating initiatives in the Environment sector, aims to reduce the complexity of funding arrangements, and to maintain accountability and transparency in project delivery. This means, however, that while project funding support for Stage 3 has been identified, the Proponent will still need to secure Stage 4 funding arrangements.

Management Objectives

The Proponent has a high level of certainty that rehabilitation objectives can be met; an adaptive management approach is necessary to facilitate this. Adaptive management will be crucial during the Stage 3 Stabilisation and Monitoring phase and will allow the Proponent to quickly and efficiently identify, select and implement management actions as required, monitor the ecosystem response and evaluate the effectiveness of those implemented actions. Monitoring of new landforms will inform the project's need to implement management actions and include WSF's vegetation and erosion monitoring post-Wet season to identify drainage repair remedial actions.

A Trigger Action Response Plan is included in the Draft Monitoring Plan (Appendix 1 of the Supplementary Report) and includes risks to revegetation areas and WSF landforms. To demonstrate that the landforms are stable (as per the rehabilitation success metrics).

The following monitoring and reporting activities will be undertaken:

- Production of a WSF Construction Report demonstrating that landforms are built in accordance with agreed design specifications (including QA/QC results as per its Quality Assurance and Control Plan) and any variation from that specification is noted
- Monitoring for erosion of both terrestrial and aquatic landforms, and the development of remedial work plans, if necessary.
- Fire exclusion and mitigation through the maintenance of fire breaks and re-planting/re-seeding, as needed.

- Stage 3 Post-construction Stabilisation and Monitoring phase: a monitoring plan will be developed where landforms and vegetation systems are intensely monitored and repaired as required. The QA/QC Plan for this phase will contain triggers for geotechnical stability, erosive stability, vegetation performance and water quality.

The Trigger Action Response Plan also covers construction quality assurance and control of the WSF's, established by project engineers, to be overviewed by the Contaminated Sites Auditor on behalf of the Governance Board.

3.7. Waste Rock Segregation

Comment	The Supplement indicated that materials would no longer be segregated at the deconstruction loading face.
Further Information Request	Clarify if PAF-I material would still be deposited in the Main Pit. 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?

Response

Material used in the Main Pit backfill process will primarily be composed of PAF-I waste rock, the majority of which will be the 0.8Mm^3 of waste rock stored within the Intermediate WRD. Additional material from Dyson's Backfilled pit and the Main WRD will also be placed within the Main Pit to meet the design elevation specifications as outlined within the SLR 2020p Main Pit Design Drawings (Appendix 25 of the Supplementary report). Materials will not be segregated at the deconstruction face as the Project has an adequate understanding of the volumes and percentage of PAF material stored in the existing facilities as indicated by Figure 2 below.

Geochemical testing will still be carried out on the tipping face of the new WSF to ensure that the correct lime dose rate is applied. This process is well documented within section 3.3 of this report and section 7 of the Draft EIS and procedures will be tested and evolve over the construction period.

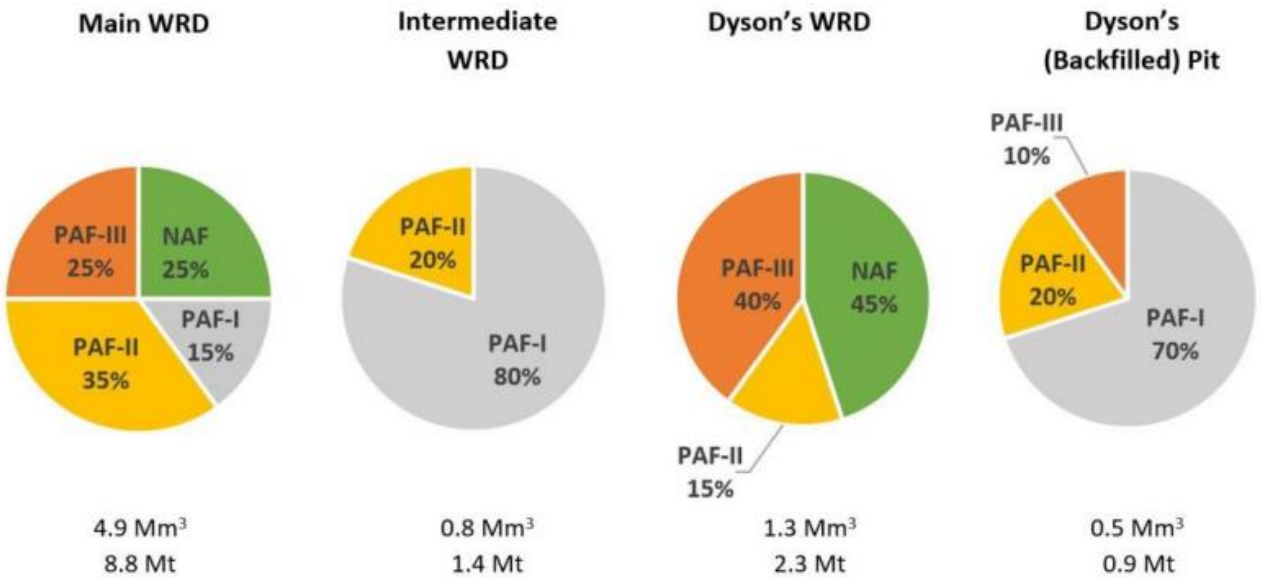

Figure 2: Distribution of PAF materials by current Waste Storage Location

3.8. Post Rehabilitation Flow Regime – Climate Change

Comment	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. This is contrary to statements in the supplement that the minimum depth would be 2 m above the capping layer. The Draft EIS and Supplement state that this water level was estimated based on current groundwater levels. 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. 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.

Further Information Request	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. Provide an assessment of the potential for erosion of the capping surface over time due to settlement of waste rock. Provide an assessment of the potential effects of climate change on Main Pit water level, including consideration of increased evaporation and potential decreases in groundwater levels.

Response

Main Pit Water Level and Backfill Settlement

The drawings included in Appendix 24 of the Supplementary Report show the operating water levels during the Main Pit backfilling process only, and do not indicate the final post-construction water level. The water level within the Main Pit will be closely monitored during the backfill process, during this time there is likely to be a 1 – 2m variation in the wet to dry season water levels as shown in the design drawings.

The final height of the waste rock within the Main Pit will be 4m below dry season ground water levels and the clean fill cover will be 2m below dry season groundwater levels. While only 5cm of water cover is required to prevent AMD production, a maximum height of 2m below dry season groundwater levels will be maintained post-backfill. The 2m water cover is not the only control on AMD production and the design has a significant level of conservatism built in due to the addition of the lime to the waste rock as a neutralising agent to the backfill process.

The reasoning behind having an adaptive management approach to the final landform of the outlet and the low flow realignment channel is that it enables the Proponent to make design decisions based on how water moves through reconstructed surfaces during the stabilisation phase. While the EBFR realignment is an important cultural objective for the Project, the decision on the final flow split will place a crucial importance on the environmental values downstream and maintaining the minimum 2m water cover. While the Main Pit backfill process has been scheduled to occur over a 26 month program (SLR 2020l), the realignment will take place at a much slower rate – 5-8 years (SLR 2020h) – once the backfilling has been completed. During this time, water will continue to be split between the existing diversion channel and the Main Pit. This flow split may only be maintained during the stabilisation phase, or may be permanent, depending on the realignment success and performance – including maintenance of the necessary level of water cover.

As noted in Appendix 17 of the Supplementary Report, 5.6m to 6.6m of settlement/consolidation within the Main Pit is anticipated over a 170 year period (SLR 2020h), which will further increase the depth of waste rock below the dry season groundwater levels over time. Settlement of waste rock within the backfilled pit was considered during the design process; details of the settlement assessment are within Appendix 21 (SLR, 2020l) of the Supplementary Report.

Main Pit Wall Stability

SLR have conducted a qualitative risk assessment to assess the potential risk of pit slope instability during construction works (SLR, 2020l) and have made recommendations to the Proponent to manage and mitigate risk during this period. The assessment found that the current Main Pit walls and side slopes were marginally stable; however, following the backfilling of the Main Pit, the waste rock and capping material

will buttress the walls and side slopes increase the overall stability. Typical section views of the reconstructed pit edges with the existing survey profile and the design profile are included in Appendix 25 of the Supplementary Report (SLR 2020p).

Climate Change Assessment

It was noted in the Draft EIS that accounting for inter-annual change in rainfall levels and/or changes in rainfall regime that may occur as a result of climate change was not made. Specific information on the impacts of climate change were not requested in the 2019 Terms of Reference issued to the Proponent and therefore were not the primary focus of investigations for the preparation of the EIS. The Proponent acknowledges, however, that it is a significant consideration, and is committed to developing a more comprehensive climate change assessment during Stage 3 works to better inform final pit outlet design. Several decisions regarding elements of the final remediation design cannot be made at this point in time as an adaptive management approach is required to achieve the best possible environmental outcomes. The climate change assessment will also help inform these future adaptive management decisions.

3.9. Post Rehabilitation Flow Regime

Comment	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, especially in the drier years, which could impact aquatic ecosystems downstream.
Further Information Request	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.

Response

The Proponent has not committed to reinstating 100% of flow of the EBFR through the Main and Intermediate pits however remains committed to reinstating the maximum proportion of flow that can be safely accommodated along the original flow path, with a goal of 100%. While full reinstatement of the original path of the EBFR has been highlighted throughout the EIS and Supplementary Report as the preferred option due to important cultural values, the Proponent will consider options for continuing a flow 'split' between the diversion channel and the original pathway.

A period of up to 10 years is likely to be required for trees, shrubs and grasses to establish in the riparian zone to withstand large flood flows (White, *et al* 2014). For this reason, the return of the EBFR to its original alignment may be performed progressively over approximately 5-8 years followed by an intensive monitoring period to ensure stability. However, this timeframe may vary according to the development of vegetation. The flow from the EBFR may therefore be split between the existing diversion and the realignment for some time or permanently (worst case scenario). The final flow split between the pits and the diversion channel is a decision that will be made during Stage 3 of the Project, once performance of the Main Pit cap and revegetation system is established, and with consideration for cultural requirements, land form stability, downstream users and regulatory requirements.

Flow Delays

The 24 to 81 days to meet storage deficit in the Main and Intermediate pits as indicated by the graphs included in the Supplementary EIS Report (response 20) assumed a diversion of flow through the existing

diversion channel of approximately 25% of the total volume, with the remaining 75% reporting to the pits pathway. The 24 to 81 days is the length of time it would take for the pits to meet deficit and "overtop", resulting in the additional flow from the pits into the EBFR confluence with the existing diversion channel. In this period, flow through the diversion channel would still report to the EBFR and would not be detained within the Main or Intermediate pits. In other words, the 24-81 days flow delay is how long the pit pathway would take to fill and overflow to the EBFR whilst the EBFR continues to receive 25% flow from the diversion channel. In this scenario, there is a 24-81 day delay of 75% of the flow volume reporting to the EBFR.

For this Request for Further Information, additional flow delay calculations have been carried out and consider the implementation of 100% diversion of flow through the proposed pit pathway channel via the Main Pit. Results indicate that, in an average year, the proportion of annual run-off from the upper catchment required to meet storage deficit is around 0.7%, up to 4.3% in a 1-in-50 dry year. As the current hydrological system on site is modified from its natural state, there is currently a requirement of 1.1% and 6.9% of annual upstream run-off to fill the pits to overtop. The present altered condition of the Main and Intermediate pits alter the hydrology of the EBFR downstream which results in reduced flows (as compared to the natural state) at the beginning of the wet season. The implementation of the proposed remediation plan will reduce the cumulative flow delay impacts of the pits (as compared to the natural state) on the EBFR rather than significantly increase it.

3.10. Post Rehabilitation Flow Regime – Weeds

Comment	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. 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. 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.
Further Information Request	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 both pits on the integrity of landforms and infrastructure.

Response

<u>Olive Hymenachne</u>

As detailed previously, the drawings in Appendix 25 relate to the works phase of project only and do not indicate the final water level in the main pit once EBFR realignment work have been completed. The potential for the establishment or proliferation of Olive Hymenachne or Para Grass in the inlet or spillway is low, for the following reasons:

- **Insufficient moisture.** There will be several months in the dry season of no flow through the inlet and spillway, during which the time the substrate will likely dry out. Those species require subsoil that remains moist during the dry season, and can only withstand short periods of drought.

- **Non-preferred substrate.** The flow paths will be comprised of a sand and gravel base; whereas the species of concern prefer silt and mud.
- **Current situation at Rum Jungle.** Control of Olive Hymenachne at the Rum Jungle site is not part of the current care and maintenance weed control program. Despite this, there is no evidence that the existing infestation has significantly altered flows in the EBFR.

In the unlikely event that Olive Hymenachne or Para Grass do become established, the infestation may not have a detrimental impact on flow or clog up the watercourses. Those species are known to clog up flows in wetlands; however, these watercourses are channels with steeper topography and higher flow rates than a wetland. There are sites in the NT – including Palmerston – where Olive Hymenachne is prolific in stormwater channels, with no negative effect on flows.

In the highly unlikely situation that the species do become so established as to clog up the watercourse, the channels have been designed – and will be constructed – to 1% AEP. Backed-up water can therefore flow around the clogged watercourse without compromising remediation integrity.

3.11. Water Balance

Comment	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). 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. 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.
Further Information Request	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. 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. Provide further information on the estimated discharges to the EBFR over all stages of rehabilitation.

Response

<u>Water Balance Modelling</u>

The Goldsim model and SLR water balance model have been developed independently, with different objectives and applications, and are not intended to be integrated. While aspects of the SLR water balance have feed into to the Goldsim model to attain operational discharge volumes during the construction stage, the time scale of each model is significantly different, and therefore so is the application for each model. The Goldsim model provides a long-term simulation of rehabilitation efforts in regards to contamination transport and reporting to the EBFR, while in contrast, the SLR water balance only relates to the operational water needs during the construction period.

While the Goldsim model is not 100% consistent with the MCA 2014 Water Accounting Framework it was prepared in consideration of the framework and has been developed to support decision-making and design development with a focus on understanding contamination transport across the site. The modelling objectives for the Goldsim software were to:

- Validate the simulated SO_4 and Cu loads from the "current conditions" groundwater model to the EBFR from 2010 to 2018;
- Simulate groundwater and pit water flows to the Intermediate Pit and WPT to minimise potential spillage (overtopping) to the EBFR during the construction phase; and
- Predict daily SO_4 and Cu concentrations in the EBFR to illustrate the timing and degree of future improvement in the EBFR water quality once rehabilitation is complete

Continuous ground and surface water monitoring programs throughout Stages 2B and 3 will be used to continually update, inform and refine the Goldsim model. This will ensure that the predicted outcomes for the site are being met and that the treatment of impacted groundwater is effective. In comparison to the SLR water balance, the Goldsim model is a long-term predictive tool.

The SLR water balance establishes the requirements of the site water treatment and management regime during the Stage 3 construction period and has been built around the core element of the Stage 3 work package of treating currently impacted groundwater and surface water. In contrast to the Goldsim model, the SLR water balance model is only applicable over the short time period of the construction phase of Stage 3 and during the operation of the WTP. The SLR water balance model will be used to inform the final design for the WTP and has provided the necessary data to predict the volume of water that will pass through the WTP during the construction phase only.

Estimated Discharges

Modelled estimates on discharge to the EBFR have been provided in Chapter 11 of the EIS and section 3.13 of the Supplementary Report, however once the operation of the groundwater recovery system, the Main pit backfill, and WSF construction are underway the Proponent will have a better understanding of the production and demand sides of the water balance. Until such time, there is little value or improvement that can be added beyond what has already been provided.

3.12. Flooding

Comment	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. The Proponent has not examined the erosive potential of stream flows during extreme events, or runoff from earthworks with leachable solutes (preferential transportation of sediments and contaminants downstream)
Further Information Request	Provide a sensitivity analysis for the flood assessment that addresses likely impacts of more severe rainfall events on the risk of pit dams overtopping. Examine the erosive potential of stream flows during extreme events, or runoff from earthworks with leachable solutes (preferential transportation of sediments and contaminants downstream).

Response

The control of untreated water onsite during the construction phase will be monitored. A reduced operating water level as described in Appendix 25 of the Supplementary Report, and close monitoring of water levels within the pit during the backfill process, are key to the management of uncontrolled discharge. Risks associated with flood events have been captured within the original Stage 3 Rum Jungle Risk Register (main considerations are captured at ref. 1 and 6 of the register) and planned controls have been outlined for each assessed risk. Risks associated with flooding for Stage 3 and 4, following the implementation of planned controls, have been assessed as medium low.

Storage will be required to regulate the inflows to the water treatment system. The groundwater system will effectively act as the storage for the SIS, allowing for the temporary interruption of bore extractions during upset conditions at the WTP or during extreme flooding events. Additional storage (400,000 m^3) will be provided by maintaining minimum operating levels in the Main Pit and Intermediate Pit at 58 m AHD and 49 m AHD, respectively. These levels are roughly 2 m and 8 m below the spill elevations of the respective pit's outlet culvert. With the pit ponds drawn down to these target levels, the Main Pit would provide a live storage of about 160,000 m^3 while the Intermediate Pit would provide a larger storage of 240,000 m^3. Further details on the water management strategy are included in the Draft Water Management Plan (DPIR 2019, included in the Draft EIS Appendix).

Post-rehabilitation, the Main Pit will be converted into a permanent shallow lake with EBFR realignment through both the Main and Intermediate Pits. This has been designed to allow water to flow through the pits and into the EBFR. A flood assessment with design specifications to pass a 1% AEP event without bed scour have been undertaken and included in Appendix 17 of the Supplementary Report. A key consideration in the SLR 2020h report is that, while key steps for realignment of the EBFR have been outlined, the decision-making for this process is planned to occur post-backfill and with an adaptive management approach.

Further consideration of extreme events, such as flooding due to climate change will be incorporated into the Proponents commitment to conduct a Climate Change Assessment, see section 3.6.

3.13. Current Water Quality/LDWQO's

Comment	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 • the protection levels proposed for each zone • the final proposed LDWQOs and trigger values for ALL parameters of interest in ALL zones of the Finniss River • current water quality of the Finniss River (Zones 1 to 9) • current groundwater quality in the Proposal area • trends in water quality over time Such a summary has not been provided in the Draft EIS or the Supplement. 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.
Further Information Request	Provide: • a summary of current water quality data, specifying LDWOQs and trigger values in the format provided in **Error! Reference source not found.**. In providing the data, t he proponent should include data collected between 2010-2020, or specify the data collection period. • Provide a one summary table for each Finniss River zone (1-9). • Provide equivalent summaries for groundwater data, grouped by aquifer type and impact/non impact locations depending on data availability (please specify). The groundwater monitoring data to include the full suite of analytes, including metals and the metalloids arsenic and selenium. • Provide a summary of trends in water quality over time as graphs. This should include the monitoring of first flush events. • Provide any raw data in Excel format. 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.

Response

<u>Summary Data</u>

As requested, additional summary data has been included (Appendix 3) – including temporal trend graphs and statistical summaries for data collected between 2010 and 2020 from zones 1 to 7. The development of the LDWQOs pre-dated the release of ANZG (2018), but their development was entirely consistent with the Water Quality Management Framework of ANZG (2018). Further discussion on the process for LDWQO development is included in the attached report.

Further work has been carried out by the Proponent in relation to LDWQOs Appendix 4. The consultant (Hydrobiology Pty Ltd) have recalculated values based on additional data and propose LDWQO values for zones 6 and 7 rather than the previously proposed default guideline values. The proposed LDWQO's in the

EBFR represent a substantial improvement to the current condition. A review of historical data indicates that in zones not impacted by the Rum Jungle site (zones 1, 5, 6, and 7) default guideline values were not always met. In these zones investigations found that default guideline values were not suitable as they do not align with local water quality conditions (in un-impacted zones). For the purpose of compliance LDWOQ's have now be proposed for the zones downstream of the East Branch which reflect the natural water quality conditions of the Finniss River system.

Dry Season Discharge

Dry season discharge is crucial to the groundwater decontamination and Main Pit backfill processes; however, the Proponent will limit dry season discharge to the extent practical through use of treated water in construction and dust suppression activities on site. Discharge to the EBFR during the construction period will be restricted to treated water from the WTP.

The pathway for contaminants currently migrating from site is via contaminated interflow and groundwater around the waste rock dumps. The installation of a groundwater and interflow recovery system is the cornerstone of rapidly intercepting the contamination pathway to start reduction of contaminant load as early as possible in the construction phase. Once contaminated water is captured and prevented from reaching the East Branch, it will be directed to the WTP for treatment prior to release to the East Branch. In essence, contaminated waters are to be intercepted along the East Branch reporting pathway for treatment prior to be released to the East Branch. The groundwater capture system is expected to be in place for several years after construction is complete and operational 365 days per year to maximise remediation of the impacted groundwaters around the current WSFs.

For the Main Pit Backfill process, this is a 3 year program of works where by waste rock and cover materials are placed into the Pit from a barge. The method is well described in the Draft EIS and associated design documentation. The volume of placed amended waste rock and cover displaces the same volume of contaminated water from the Pit and as such, the water must be treated prior to release to the East Branch. During the dry season, it is expected that a substantial proportion of this treated water will support the construction of the WSFs and dust suppression for haulage roads. Additionally, it may be further treated to supply potable water to the project. Excess water is to be discharged to the East Branch.

Alternatives to dry season discharge include the construction of a substantial water storage facility onsite, or the further drawdown of Intermediate Pit during the East Branch flow period. The substantial additional costs (public funds) and risks of both alternatives are not commensurate with the low environmental impact risk of proposed dry season discharge.

The project acknowledges that dry season discharge in an ephemeral system is an unusual proposal however there are several mitigating factors that must be considered. These are noted here:

1. The East Branch is a highly impacted water course to the point that at this time, the species protection value in the East Branch is **less than 1%**. It is difficult to suppose a detrimental ecological impact from dry season discharge in a system that is at present highly impacted.
2. The capture of contaminated groundwater and discharge of treated water is preferred over the continued release of contaminated groundwater and interflow to the East Branch.
3. The Pit Backfill task is of short duration and after that time, only the treated groundwater is proposed to report to the East Branch. This will be mitigated by a greater use of treated groundwater to complete construction works.
4. The Finniss River proper is a large permanent watercourse, therefore impacts of a minor increase to flow in this section of River can be expected to be absorbed during this short timeframe

Therefore, at worst, any detrimental impact would be felt at the East Branch section of the river from site at Gauge Station 8150200 to 8 km downstream of site as this is the point of confluence with the permanent watercourse. This is the section of the river that is already most heavily impacted by historic and ongoing AMD contamination.

It is also important to highlight the environmental risks of not permitting dry season discharge for the backfilling process, namely that heavy discharge restrictions during the dry season would extend the overall project timeline significantly and would more than double the time needed for the backfill process to be completed. This increases both the risks of site safety and, importantly, environmental impacts and risks to downstream due to WRD faces left exposed to the elements over a much longer period. In the long-term the increased risk of environmental damage due to a long and drawn-out Main Pit backfill process far outweighs the risk of damage due to dry season discharge over the short-term.

3.14. Contaminant Transport

Comment	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
Further Information Request	Provide an uncertainty analysis that considers: • all plausible ranges of parameters • 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. • potential pathways of faults for contaminant transport pathways • Modelling of the potential risks associated with aquifer contamination due to the groundwater extraction near the main pit should be also considered and provided. This should include the potential risk of contaminant transport pathways from the Main Pit leachate, including radionuclides, during groundwater extraction and backfilling of the Main Pit. Provide an outline of how the identified risks will be addressed and managed following the mitigation hierarchy.

Response

Uncertainty Analysis – Parameters and Environmental Conditions

Robertson GeoConsultants (RGC) used two attenuation extremes for contaminant transport modelling, rather than an entire suite, Copper (Cu) and Sulphate (SO_4). SO_4 is assumed to behave conservatively (non-reactive) in groundwater and so no geochemical reactions were assumed to influence the flow path, while Cu is assumed to have hindered mobility due to geochemical reactions such as sorption and precipitation. While site-specific information on copper sorption/desorption rates are not available at present, a range of rates (sensitivity analysis) were represented within the transport model as seen at Figure 4-19 of RGC 2019 (Appendix to the Draft EIS). A range of "attenuation scenarios" were also considered ranging from "no", "moderate", and "high attenuation" scenarios, and modelling indicated that only the "moderate attenuation" scenario was consistent with estimated loads in the EBFR.

More detail on the geochemical considerations of the groundwater modelling can be found in section 4.5.6 of the 2019 RGC report. This section includes consideration of environmental conditions that affect metal transport behaviour. Additional information has also been provided in Groundwater Flow Transport Model for Current Conditions report (RGC, 2016).

At this time, further modelling of attenuation scenarios will not add value to current knowledge as the scenarios have already been run. At the time of commencing groundwater extraction and treatment, site specific copper desorption behaviour data will be gathered. This information is critical to understanding an estimated duration for the groundwater extraction and water treatment process to decontaminate the existing groundwater plumes.

Model Calibration

Due to the uncertainty in key model input parameters RGC performed a sensitivity analysis as outlined in the Groundwater Flow Transport Model for Current Conditions report (RGC, 2016). The analysis aimed to evaluate the sensitivity of the calibrated model to variations in parameter values and was performed by systematically changing parameters from the calibrated value to values within the plausible range. Calibration statistics are available at 6-4 and 6-5 of RGC 2016.

Contamination Transport Pathways

As noted within the RGC 2019 report there are several structural controls on groundwater flow including faults, cavities and karst features, other controls include groundwater recharge, and evapotranspiration. These features and controls on groundwater flow were considered during the development of the groundwater model as a potential source of influence, including the major fault running between the Main and Intermediate Pit.

The RGC 2016 Report (Supplementary Appendix 28, Page 50-51) states:

> *The fault that runs between the Main and the Intermediate Pits is thought to represent a preferential pathway for groundwater and hence, impacted groundwater may flow south-west along the fault towards the Intermediate Pit. Note, however, that the presence of carbonaceous, highly-weathered shale of the Whites Formation may limit preferential movement of (highly-contaminated) ground water in this area to greater depths (say >15-30 m) where the bedrock is less weathered and more competent. The persistence of high copper concentrations in this area after several decades suggests that groundwater flows are not significantly higher than areas outside of this fault zone.*

A description of cavities and karst feature impacts can also be found at page 51 of this report.

The hydraulic control provided by surface water levels within the Intermediate and Main Pits (RGC, 2016 p.56-57) also influences groundwater flow rates in this area. Backfilling of the Main Pit requires alteration to the current site hydraulic regime which may impact on the hydraulic control in the area.

Main Pit Backfill Groundwater Impacts

Operational Phase

Risks related to the extraction of groundwater have been considered in the Rum Jungle Stage 3 Risk Register (GHD, 2019f), this register is a living document that will be continually updated as the project progresses. The Project has identified that during Pit Backfill Operations when the water level of the Intermediate Pit is reduced the hydraulic control exerted by the pits water level will also be reduced and a hydraulic gradient between the two pits is likely to exist. During this period it is likely that impacted waters from the Main Pit may enter surrounding groundwater.

The primary control for this is to reduce the Main Pit operational water level to discourage a hydraulic gradient from the Main Pit to surrounding groundwater. A secondary control is to monitor the surrounding groundwater quality during Operations as noted within the Draft Monitoring Plan (DPIR, 2020a Page 7). The Trigger Action Response Plan included in the Draft Monitoring Plan aims to rapidly identify potential movement of impacted Pit waters into the surrounding groundwater during the Operational Phase.

The likely pathway for migration of Main Pit waters to groundwater is towards the Intermediate Pit or towards the Intermediate WRD in which case, under worst case scenario, this water can be captured within the SIS and treated. The Operation of the SIS within the fault zone between the two Pits is likely to be of short duration to capture currently contaminated groundwater under the old Copper Extraction Pad. These bores shall remain in place during the Main Pit Backfill in the event they are required to be used to capture impacted waters from the Main Pit during the Backfill process. It is very unlikely that groundwater extraction from the SIS will cause a gradient due to relatively low pumping volumes, however impacts will be monitored as part of routine monitoring programs.

The consequence of impacted waters moving into the surrounding groundwater during Operations is low to moderate as it is likely to be temporary in nature and the impacted waters can be captured and treated if needed.

Stabilisation Phase

During the Stabilisation Phase monitoring will focus on identifying any potential new impacts to groundwater from the newly backfilled main pit and verifying the improving groundwater conditions to establish the decommissioning of the groundwater abstraction system. The details around the Stabilisation Phase will be established and updates to the Trigger Action Response Plan made prior to that phase commencing based on an Adaptive Management approach from data collected in the Operational Phase.

3.15. Toe Seepage from WSF

Comment	The SLR report outlines the potential risk of toes seepage from the WSF
Further Information Request	Provide further information on how DPIR estimated the assimilative capacity to mitigate the impacts of toe seepage in SLR (2020d). 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 (2020l).

Response

Toe Seepage

As noted in SLR (2020d) the central site for the WSF has less copper attenuation ability than that of dolostone in the northern and central east sites, however modelling work completed by RGC, as outlined in the Groundwater and Surface Water Modelling Report (RGC 2019) indicated that the attenuation will be sufficient to reduce contamination risks. The assimilative capacity was estimated by simulating a range of "attenuation scenarios" for copper, this process was also documented in the RGC 2016 and 2019 modelling reports.

Pit Wall Stability

As discussed in the Appendix 22 (SLR 2020d) of the Supplementary Report, the central site was identified as the preferred location; however, in the report it was noted that the WSF be set back an appropriate distance from the Main Pit to ensure no impact to pit wall stability. The location of the central WSF was considered during the detailed design of the Main Pit backfill as seen in Appendix 25 of the Supplementary Report, page 3, Main Pit rehabilitation Plan. The Main Pit backfill will also exert hydrostatic pressure, aiding in the stabilisation of the final landform. SLR (2020l) (Appendix 21 of the Supplementary) also highlighted that instability of backfilled pit wall sections is not expected to present an un-acceptable level of risk to the remediation objective. The highest risk for pit wall stability is related to the construction works during the backfill process and the overall wall stability will be improved through the process of backfilling.

3.16. Traffic

Comment	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). 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.
Further Information Request	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 responsible for any required road upgrades.

Response

The Proponent is committed to implementing all recommended actions as outlined by the Traffic Impact Assessment (SLR 2020) including measures to mitigate potential impacts to the public in relation to road safety and undertake intersection upgrade works for the Rum Jungle/Litchfield Park road zone. The Proponent will also consult with the Department of Infrastructure, Planning and Logistics (DIPL) for the development and approval of a Road Use Management Plan and a Traffic Management Plan to support works undertaken within the public road reserve. The Project includes upgrade of intersections and public roads and this will be the responsibility of the Project to implement.

3.17. Sacred Sites

Comment	The Proponent provided an Authority Certificate under *Northern Territory Aboriginal Sacred Sites Act 1989* for Section 2968 Hundred of Goyder (the main Rum Jungle site), and committed to comply with the conditions of this certificate (commitment 9; Supplement). 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.
Further Information Request	For each of the proposed borrow areas, Mt Fitch, Mt Burton and related haul and access routes: EITHER: 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.

Response

The Proponent is committed to continuing consultation with the Kungarakan and Warai peoples regarding sacred site matters. The Project will obtain AAPA Authority Certificates for work areas where Certificate have not already been obtained such as borrow areas and access routes and as outlined in the Supplementary report will conform to all requirements of the Certificates.

3.18. Sensitive Receptors – Air Quality

Comment	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).
Further Information Request	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).

Response

The sensitive receptors outlined in GHD Air Noise and Vibration Air Quality Impact Assessment (2019a) Figure 3-1 Sensitive Receptor Locations, are the closest sensitive receptors to the project from an air quality impact perspective. Impacts and mitigation measures are discussed within the GHD Report (GHD 2019a) Sections 4.6 Discussion of Predicted Impacts and Section 5 Mitigation of Predicted effects. Additionally, the GHD Noise and Vibration Impact Assessment Report (2019c) maps the Sensitive Receptors (Figure 3-1) and discusses Impact Assessment (Section 6) and Mitigation Measures (Section 7).

The Project has committed to an Air and Dust Management Plan (Commitment 18) that will be implemented and an implemented Stakeholder Communication Engagement Strategy (Commitment 41) to address required monitoring and mitigation measures with those sensitive receptors identified within the EIS. At any time, there may be changes in land occupancy and ownership and as such, the Project will ensure that the Stakeholder Communication Engagement Strategy actions include a contact and complaints mechanism to capture new land occupiers should they seek contact. For the completion of mine rock removal works at the Mt Burton site, it may be requested of the resident to temporarily relocate from their dwelling for a period of time to allow for safe removal of the mine waste rock as dust generation is possible within close proximity to that dwelling. This is a worst case scenario and will be avoided as far as possible through implementation of further controls such as wetting down of the excavator working face and use of mist cannons to drop dust from the air within close proximity of the working face. As no night shift will take place for the earthworks at that location, it may be possible to relocate the resident during the day only. These mitigation measures are to be worked through with the landholder and work

will only take place on agreement of the landholder. Preliminary discussions have been held with that landholder however no commitments made between parties as the project is still subject to federal funding approval and commitment between parties would be premature at this stage.

3.19. Sensitive Receptors – Water Quality

Comment	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.
Further Information Request	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).

Response

There are three downstream dwellings with access to EBFR within Zones 3 and 4. These are shown as Receptors 1, 2 and 3 in Figure 3.

- Receptor 1 - Does not use water in the EBFR for any purposes, the property is supplied via bore water and the land owner is aware of the water quality within zone 3. This owner is in regular contact with the Project's monitoring team regarding access and water quality monitoring on that section of the EBFR.
- Receptor 2 - Does not use water in the EBFR for any purposes, the property is supplied via bore water and the land owner is aware of the water quality within zone 3. This owner is in regular contact with the Project's monitoring team regarding access and water quality monitoring on that section of the EBFR.
- Receptor 3 - Is well aware of the EBFR water quality and allows access for the Project's monitoring team. This land owner is not known to utilise the EBFR water for any purpose and relies on rain and bore water. There are no cattle on this property.

Additional access to Zones 3 and 4 are through Finniss River ALT and NT Crown Land portions with no occupation. The project is committed to the development and implementation of a Stakeholder

Communication and Engagement Strategy (Commitment 41) which will include downstream landholders. Privacy must also be respected as some landholders do not wish to engage with the Project or NTG.

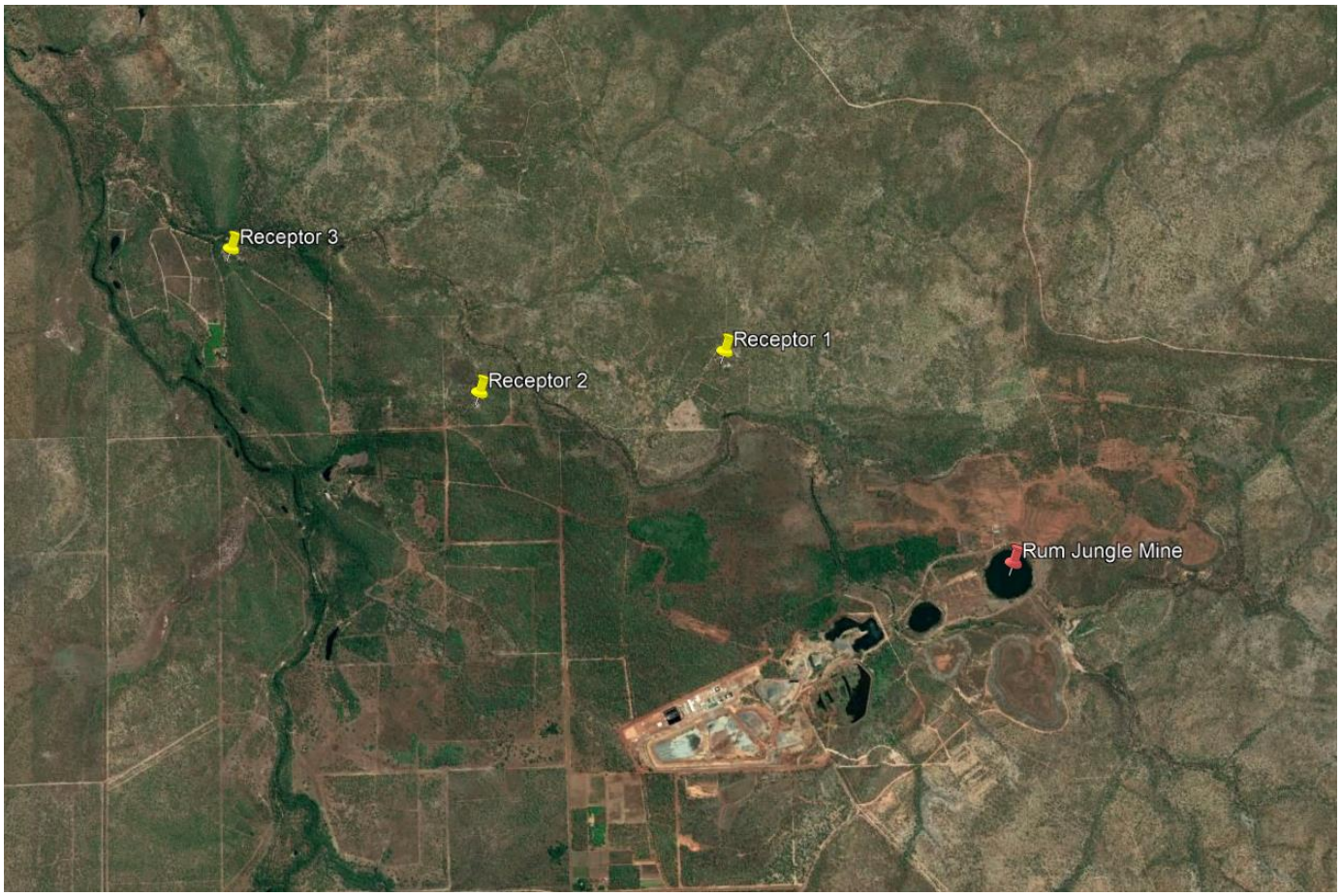

Figure 3: Zones 3 and 4 Potential Sensitive Receptors.

3.20. Radiation

Comment	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 requirement for exposure and doses to be as low as reasonably achievable (ALARA).
Further Information Request	Provide a site specific dose limit and 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.

Response

As highlighted by the TOR, a predictive dose assessment is required under national and international standards. In line with this, the Rum Jungle Radiological Hazard Assessment report (EcOz 2019b) is available at Appendix 5. Key findings of this report include the dose assessments for site post-construction; Traditional Owners (Critical Group 2) are estimated to receive a total above background dose of 5 mS/y and general members of the public (Critical Group 4) have been calculated as less than 1mS/y. As the calculated annual dose post-rehabilitation is calculated to be above 1mS/y for Critical Group 2 there will be a restriction on land use across site. This will be reflected in a Land Use Management Plan to be developed in line with the recommendations of a Contaminated Sites Auditor to ensure that the preferred limit of 1mS/y is not exceeded.

At this point in time, the dose assessment does not take into account ingestion of radionuclides via food items as there is limited ingestion pathway data available for the Rum Jungle site. While this information has not previously been assessed, the Proponent is in the process of completing a bush foods study to inform further ingestion pathways for both metals and radionuclides. This includes foods from both the immediate surrounding area and downstream of the site. It is important to note that due to the certain cultural values and traditions surrounding the area prior to mining, bush food items from the Rum Jungle site are not considered safe to consume by Traditional Owners.

Recommendations of the report include additional studies of aquatic food items to aid in a more comprehensive dose assessment; this recommendation has been adopted by the Proponent. Findings of any additional studies will be utilised to further refine the predictive dose assessments for critical groups and the development of a Land Use Management Plan for post-rehabilitation.

It is highly likely that there will be a restriction on the consumption of bush foods in certain areas on site. This has been noted already and planned controls for this include the selective planting of native vegetation in sensitive areas such as the WSF's and Dyson's backfilled pit to exclude bush tucker species as noted in Appendix 27 of the EIS (Rum Jungle Draft Revegetation Strategy Framework).

Additional recommendations for the development of a Radiation Management Plan (RMP) were also adopted – see attached RMP at Appendix 6. The RMP has been developed in line with the objectives of the ARPANSA *Code of Practice for Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing* (2005) and covers the potential radiological risks and necessary mitigation measures associated with the excavation, transport and placement of radiologically-contaminated materials. The Proponent is committed to keeping radiation dose rates as low as reasonably achievable (ALARA) through the implementation of the RMP and Land Use Management Plans. Dose limits and reference levels within the RMP relate only to the construction and excavation stages of the Project and do not reflect post construction dose limits or predicted doses to the public.

4. References

Department of Primary Industry and Resources (2020a) *Draft Monitoring Plan – Rum Jungle Stage 3 Rehabilitation Project*. (Appendix 1 of the Supplementary Report).

Department of Primary Industry and Resources (2019) *Draft Water Management Plan – Rum Jungle Stage 3 Rehabilitation Project*. (Submitted with the Draft EIS).

EcOz (2019) *Radiation Management Plan – Rum Jungle Mine Rehabilitation*, issued to the Department of Primary Industry and Resources. (Appendix 4 of this Report).

GHD (2019f) *Rum Jungle Stage 3 EIS Risk Register* – Rum Jungle Project Team. (Submitted with the Draft EIS).

Robertson GeoConsultants and Jones D. (2019) *Rum Jungle Minesite Physical and Geochemical Characteristics of Waste Rock and Contaminated Materials (Rev 2)*, RGC Report 183008/2, November 2019. (Submitted with the Draft EIS).

SLR Consulting Australia (2020b) *Rum Jungle Rehabilitation – Stage 2A Detailed Design – Waste Storage Facilities (WSF) Cover Options Analysis.* Report to the Department of Primary Industry and Resources, Northern Territory Government. (Appendix 11 of the Supplementary Report).

SLR Consulting Australia (2020d) *WSF Technical Memo on Site Selection*. Memorandum from SLR Consulting Australia to the Department of Primary Industry and Resources, Northern Territory Government, February 2020. (Appendix 13 of the Supplementary Report).

SLR Consulting Australia (2020e) *Rum Jungle Rehabilitation – Stage 2A Detailed Engineering Design, Growth Medium for WSF Capping*. Memorandum from SLR Consulting Australia to the Department of Primary Industry and Resources, Northern Territory Government, March 2020. (Appendix 14 of the Supplementary Report).

SLR Consulting Australia (2020h) *Rum Jungle Mine Closure Remediation – East Branch Finniss River – River Reinstatement and Flooding Report*. Report to the Department of Primary Industry and Resources, Northern Territory. (Appendix 17 of the Supplementary Report).

SLR Consulting Australia (2020i) *Rum Jungle Rehabilitation – Stage 2A Engineering Design – Site Erosion and Sediment Control Measures*. Report to the Department of Primary Industry and Resources, Northern Territory. (Appendix 18 of the Supplementary Report).

SLR Consulting Australia (2020k) *Rum Jungle Rehabilitation – Stage 2A Detailed Engineering Design – Waste Storage Facilities and General Site Civil Works, Detailed Design and Construction Methodology Report*. Report to the Department of Primary Industry and Resources, Northern Territory. (Appendix 20 of the Supplementary Report).

SLR Consulting Australia (2020m) *Waste Storage Facilities Design Drawings*. Issued to the Department of Primary Industry and Resources, Northern Territory. (Appendix 22 of the Supplementary Report).

SLR Consulting Australia (2020o) *Reinstatement of EBFR Design Drawings*. Issued to the Department of Primary Industry and Resources, Northern Territory. (Appendix 24 of the Supplementary Report).

SLR Consulting Australia (2020p) *Main Pit Design Drawings*. Issued to the Department of Primary Industry and Resources, Northern Territory. (Appendix 25 of the Supplementary Report).

The International Association for Public Participant's (IAP2, 2015) *Quality Assurance Standard - For Community and Stakeholder Engagement*.

Top End Seeds (2020) *Rum Jungle Stage 3 Draft Revegetation Strategy Framework*. Report to the Department of Primary Industry and Resources, Northern Territory. (Appendix 27 of the Supplementary Report).

White. K, Moar. D, Hardie, R, D. B. & R. L. (2014) *Criteria for Functioning River Landscape Units in Mining and Post Mining Landscapes.* Accessed via: https://www.acarp.com.au/abstracts.aspx?repId=C20017

5. Legislation

Environment Protection and Biodiversity Conservation Act 1999 (Cth). Retrieved from: https://www.legislation.gov.au/Details/C2021C00182

Environmental Protection Act 2019 (Northern Territory of Australia). Retrieved from: https://legislation.nt.gov.au/en/Legislation/ENVIRONMENT-PROTECTION-ACT-2019

Water Act 1992 (Northern Territory of Australia). Retrieved from: https://legislation.nt.gov.au/Legislation/WATER-ACT-1992

6. Appendices

Appendix 1: NT EPA (2020) *Clarification about Further Information Required*, issued to the Department of Primary Industry and Resources.

Appendix 2: AECOM (2020) *Environmental Impact Statement – Contaminated Land Auditor's Assessment Report*, Issued to the Department of Primary Industry and Resources.

Appendix 3: Hydrobiology (2020) *Summary Data – Rum Jungle Rehabilitation Project*, prepared for the Department of Primary Industry and Resources.

Appendix 4: Hydrobiology (2021) – *Compliance LDWQ's*, prepared for the Department of Primary Industry and Resources.

Appendix 5: EcOz (2019b), *Rum Jungle Radiological Hazard Assessment Report*, issued to the Department of Primary Industry and Resources.

Appendix 6: EcOz (2019), *Radiation Management Plan – Rum Jungle Mine Rehabilitation*, issued to the Department of Primary Industry and Resources.