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Dear Paul

23 September 2019

Variation to the Rehabilitation of the Former Rum Jungle Mine Site Notice of Intent – request for consideration under Clause 14A of the Northern Territory *Environmental Assessment Administrative Procedures*

1 Context

Pursuant to clause 14A of the *Environmental Assessment Administrative Procedures*, the Northern Territory Department of Primary Industry and Resources (DPIR) is writing to the Northern Territory Environment Protection Authority (NT EPA) to inform of altered actions to the originally proposed actions stated within the Rehabilitation of the Former Rum Jungle Mine Site (Rum Jungle) Notice of Intent (NOI) 29 June 2016 v1.3.

On 31 July, 2019, I requested a Variation to the Project Terms of Reference. Due to a recent Aboriginal Areas Protection Authority decision, I now wish to withdraw that application and replace it with this Variation request.

During discussions (28 June 2019) between DPIR and the NT EPA, the NT EPA requested DPIR submit a variation under clause 14A of the *Environmental Assessment Administrative Procedures*. The aim of this document is to outline what rehabilitation works in the original NOI should be reassessed for inclusion into the Rum Jungle Environmental Impact Statement (EIS) for assessment and approval under the *Environmental Assessment Act 1982* (NT) (EA Act).

2 EIS Overview

With reference to the NOI, DPIR is seeking approval under the EA Act for the amendment of eight (8) of the original 15 key rehabilitation works (listed below). These amendments are to be considered with the intent to be included into the original EIS Terms of Reference. Table 1 provides a concise summary of the proposed variations from the original NOI. Seven (7) rehabilitation works will remain unchanged. They are:

1. Residual waste from Main Waste Rock Dump (WRD), Dysons WRD and contaminated soils (including from fluvial areas) will be consolidated to the new Waste Storage Facility (WSF).
2. Mount Burton WRD will be excavated and transported to Rum Jungle for long-term disposal in the new WSF.
3. Landform design and revegetation will be undertaken on disturbed areas following rehabilitation works, including WRD footprint areas, old tailings dam area, old borrow pits, haul roads etc.

4. Weed and fire management programs will be implemented to assist in the successful establishment of native vegetation.
5. Important cultural aspects of the landscape will continue to be taken into account and where possible, actions to protect or reinstate them will be incorporated into final design.
6. The small overburden heap at Mount Fitch, located directly south of the pit and some surface disturbance is evident to the west, will be relocated into the Mount Fitch Pit.
7. Access tracks will be upgraded to ensure the rehabilitation works are implemented in a safe and timely manner, this includes construction of haul roads and a culvert crossing to provide all weather access during construction.

Eight (8) rehabilitation components will require change (variations). As stated in the NOI, they are:

1. Dewatering of Main Pit during the wet season. Surface and groundwater flows and quality will be monitored closely during dewatering. It is anticipated that contaminated water will be encountered at depth and this water will be treated through a water treatment system and released during the wet season when the river is flowing to provide maximum dilution.
2. Dredging of historic tailings currently located at the base of Main Pit. Tailings will be filter pressed, temporarily (short term) stockpiled and consolidated to a new purpose built WSF in the northern location on site.
3. Waste material from Dysons backfilled Pit (to grade), Intermediate WRD and a portion of Main WRD (most reactive waste) will be relocated to Main Pit following dewatering and dredging of tailings.
4. All waste will be mixed with lime prior to being relocated to the either Main Pit or new WSF.
5. Leading practice cover and landform designs will be utilised in the construction of covers over Main Pit, Dysons backfilled Pit and the new WSF. This will comprise clays, soils and growth mediums and be revegetated with locally collected native tree species. The design of Main Pit cover will include the reinstatement of the East Branch of the Finnis River (EBFR) to, as far as practicable, its pre-mining course.
6. A seepage collection system will be constructed to collect any seepage encountered beneath the new WSF. This seepage will be directed to Intermediate Pit to be passively treated.
7. Borrow pits will be excavated to extract necessary material for the cover construction. Borrow pits have been carefully selected and a fauna and flora assessment of the area has been carried out.
8. Intermediate Pit will remain as a water filled void for use as a passive water treatment system. Intermediate Pit will act as a flow through system, similar to the current site configuration, to provide annual flushing of the pit during the wet season in order to meet water quality guidelines.

These varied rehabilitation components are described in detail in Section 4 of this letter.

3 Overview and Key Features

Figure 1 below provides an overview of key features of the proposed concept rehabilitation strategy, including previous borrow and haul road locations.

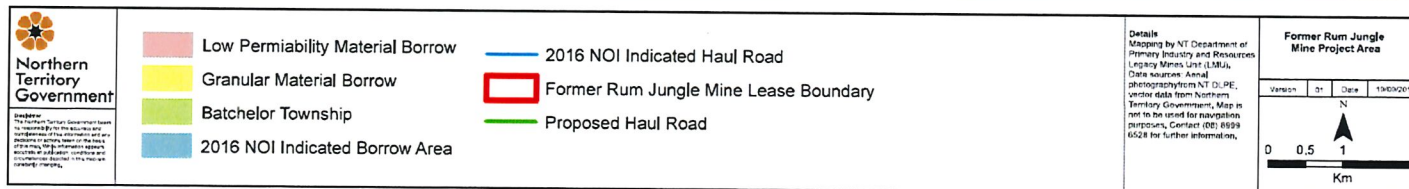
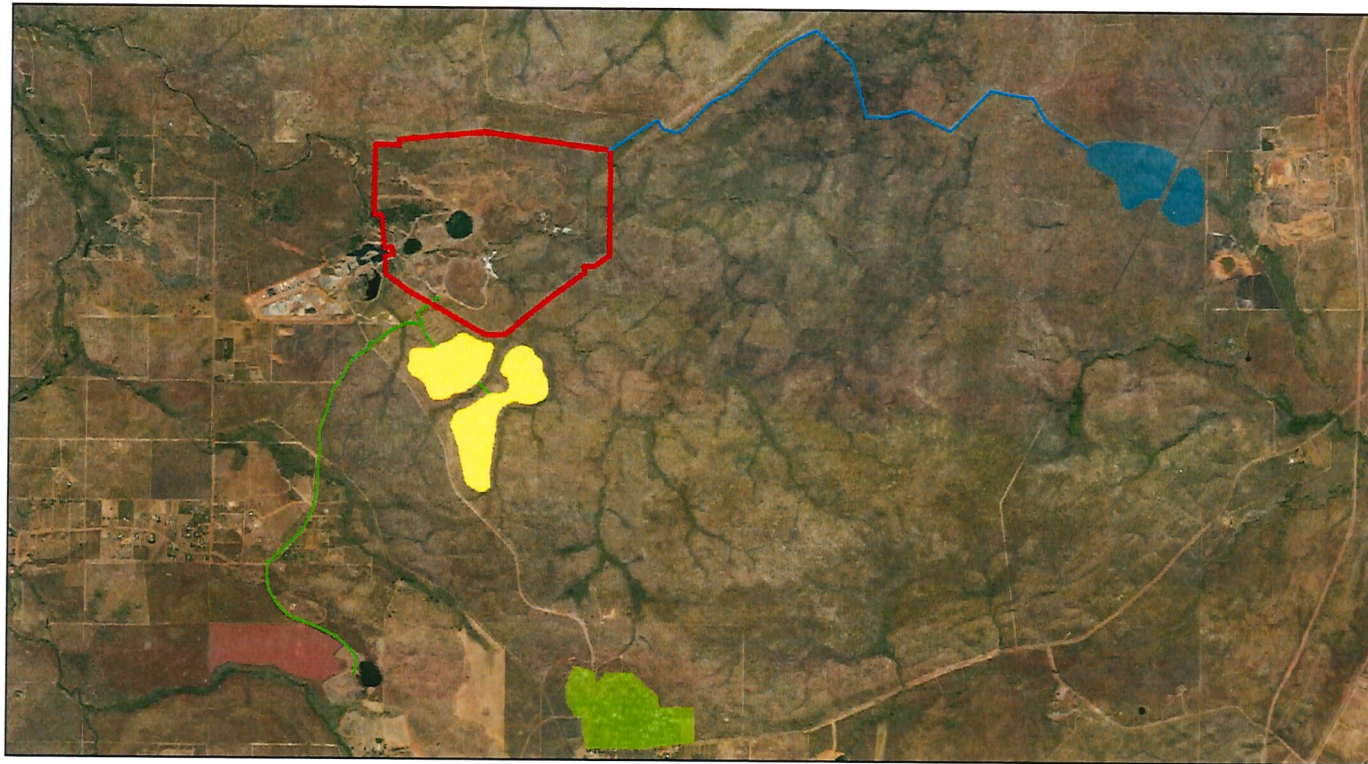


Figure 1: Overview and Key Features

4 Summary of proposed variations to the 2016 Notice of Intent (NOI)

A summary of variations to the original NOI rehabilitation components is presented here in Table 1.

Table 1

| Variation Ref # | NOI section | Original Reference | Proposed Variation | Impact change |
|-----------------|-----------------------------|---|--|---|
| 1 | P. 41 - first bullet point | Dewatering of Main Pit during the wet season. Surface and groundwater flows and quality will be monitored closely during dewatering. It is anticipated that contaminated water will be encountered at depth and this water will be treated through a water treatment system and released during the wet season when the river is flowing to provide maximum dilution. | Dewatering of Main Pit is still required however the volume is significantly reduced due to tailings remaining in the bottom of Main Pit (see Variation Ref #2). Pit will only be dewatered enough to allow for pit backfilling. | As the tailings will remain in Main Pit the need to totally dewater Main Pit has been removed. The only dewatering that should occur will be the progressive removal of pit water to allow for the volume offset during placement of waste rock material. Water treatment and release methodology to treat the removed water is still being investigated. No impact change from original scope of work. |
| 2 | P. 41 - second bullet point | Dredging of historic tailings currently located at the base of Main Pit. Tailings will be filter pressed, temporarily (short term) stockpiled and consolidated to a new purpose built WSF in the northern location on site. | Dredging of the tailings will no longer be required. It is proposed that the tailings will remain <i>in situ</i> and covered via a sub-aqueously discharged cover system. Tailings in the main pit will be covered with waste rock material from existing surface facilities. The waste rock will then be capped with a clean cover system that will prevent erosion, entrainment and redistribution of waste rock from through-pit water flow and provide a sufficient barrier to reduce solute diffusion rates. This entire system will be submerged below the dry season groundwater level to eliminate oxygen influx and create a pit lake. The clean cap thickness and depth of submergence will be determined by expert guidance, hydraulic modelling, ecosystem restoration principles and consider, in order of priority: | Dredging of tailings has been assessed as high environmental and human health safety risk (both radiation exposure and pit wall geotechnical failure). Dredging the historic uranium tailings, filter pressing and stockpiling significantly increases exposure to the tailings (dust, ingestion, dermal exposure etc.). Leaving the tailings <i>in situ</i> will minimise their potential for impact on human health and the environment. The WSF that was proposed in the northern location of site had several major risks associated with it. The main identified risks were: <ul style="list-style-type: none"> • Clearing of residual (uncleared) vegetation (44 ha) – The vegetation in that particular area remains mostly untouched. It is a natural composition of flora species representative of the greater surrounding area and should be left undisturbed as far as possible. The clearing of undisturbed vegetation is counter to the rehabilitation philosophy of this Project. Also, the area is considered culturally important to both Traditional Owner groups. • Geology – The geology underlying the proposed Northern WSF has characteristics which could cause significant stability risks within the WSF. The Coomalie Dolostone which forms a majority of the underlying rock has characteristics of cavernous voids (Figure 3). These voids have potential for longer term collapse if loaded and for foundation failure/seepage mechanism. • Flooding – Historical hydrological modelling (1:100 average reoccurrence interval (ARI) and 1:1000 ARI) indicates the Northern WSF location would result in toe |

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| | | | <ol style="list-style-type: none"> 1. Minimise acid generation from Potentially Acid Forming (PAF) waste rock. 2. Maximise submerged volume of PAF waste rock. 3. Minimise solute diffusion from the waste rock into the pit lake. 4. Minimise cap erosion and sediment entrainment, particularly at the EBFR inlet point. 5. Maximise the proportion of EBFR flow that can be accommodated in the original EBFR course (via the Pit Lake). 6. Allow sufficient geomorphic design principles to restore aquatic and riparian ecology. <p>The location of the WSF that was proposed in the north of the site has been moved. The proposed northern WSF has been moved into a more central location on site. The central location will require the construction of two smaller WSFs.</p> | <p>inundation in 1:100 ARI. The stability, leaching potential and performance of the WSF improves without periodic toe inundation.</p> <p>The major benefits of the Central WSF locations are:</p> <ul style="list-style-type: none"> • Disturbed location – The majority of the two Central WSFs locations are located over land historically cleared during mining. The foot print area is still being finalised and there may be the need to clear a small amount of bushland. • Geology – The proposed Central WSF locations are located on Geolsec Formation which is a more stable foundation for WSF construction. • Flooding – The Central WSFs are located in an area that is identified as above 1:1000 ARI flood level. <p>By leaving the tailings submerged in Main Pit the total volume of material that needs to be stored in the Central WSF decreases by ~800,000m³ of tailings. This volume would comprise ~7% of the total volume of waste stored in the Central WSF.</p> <p>This scope change represents a significant reduction in impact to biodiversity, terrestrial ecology, human health and safety and protection of groundwater and surface water values. This scope change represents an improvement in geotechnical risk and long term stability.</p> |
| 3 | P. 41 - third bullet point | Waste material from Dysons backfilled Pit (to grade), Intermediate WRD and a portion of Main WRD (most reactive waste) will be relocated to Main Pit following dewatering and dredging of tailings. | Select waste material from Dysons backfilled Pit, Intermediate WRD and Main WRD will still be placed into the Main Pit. This will be placed via a sub-aqueously discharged cover system and will not require significant dewatering and dredging of tailings. | <p>Approximately 1.6Mm³ of select waste rock material from Dysons backfilled Pit, the Intermediate WRD, Main WRD and other impacted soil areas will be used to backfill the main pit as previously proposed.</p> <p>Total dewatering of Main Pit to allow for tailings dredging possess a significant risk to human life due to pit wall instability arising from long term saturation. There is a very high risk of significant wall slumping or collapse.</p> <p>Dredging of tailings has been assessed as high potential environmental and human health safety risk (both radiation, pit wall failure and contamination). Dredging the historic uranium tailings, filter pressing and stockpiling significantly increases exposure to the concentrated tailings (dust, ingestion, dermal exposure). Leaving the tailings <i>in situ</i> will minimise their potential for impact on human health and the environment.</p> <p>The new scope of work is a reduced impact to human health and safety and environmental receptors.</p> |
| 4 | P. 41- fifth bullet point | All waste rock will be mixed with lime prior to being relocated to either Main pit or the new WSF. | Lime treatment will remain for PAF material being relocated to either Main Pit or new WSF. Lime treatment will however not occur for | No impact change from original scope of work. |

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| | | | Radiological soils that will be deposited in designated cells within new WSFs. | |
| 5 | P. 41 - sixth bullet point | Leading practice cover and landform designs will be utilised in the construction of covers over Main Pit, Dysons Pit and the new WSF. This will comprise clays, soils and growth mediums and be revegetated with locally collected native tree species. The design of Main pit cover will include the reinstatement of the East Branch of the Finnis River to, as far as practicable, its pre-mining course. | The diversion of the EBFR to the north of the Main Pit is no longer planned as the Main Pit will no longer be backfilled to an above grade design. A portion of the EBFR flow regime will continue to flow through the Main Pit Lake. The existing diversion channel south of the Main Pit may remain and may receive the net portion of EBFR flow the Main Pit. See Variation Ref#2 of this table for details of the Main Pit cover system. | <p>The EBFR will now be diverted through Main pit lake instead of diverted to the north of the Main Pit. This was a cultural requirement of Custodians as the EBFR holds cultural significance and was requested to interact with Main Pit. Modelling is required to determine safe flow volumes to the Main Pit to eliminate risk of capping degradation. On determining Pit Lake flow regime an assessment will be made on the need of the current diversion to remain.</p> <p>This scope change is more likely to deliver a safe, stable Main Pit and EBFR landform over the long term and deliver on cultural expectations of Custodians and Traditional Owners. There is no scope change for the new waste storage facility landforms.</p> |
| 6 | P. 41 - seventh bullet point | A seepage collection system will be constructed to collect any seepage encountered beneath the new WSF. This seepage will be directed to Intermediate Pit to be passively treated. | Seepage will no longer be collected at the WSF or directed to the Intermediate Pit. The focus will be on eliminating seepage volume as far as possible through WSF cover design and improving seepage quality through WSF construction methodology (compaction, lime application and cellular construction methodology). A basal reactive barrier is also being investigated and will be included in design if modelling finds it is required. Managed Natural Attenuation is being modelled and is very likely to ensure the project achieves Locally Derived Water Quality Trigger Values (LDWQTVs). | <p>Designing for seepage collection sets up the long term future of the site requiring a water treatment methodology in some form. Efforts are being focused on engineering out this need. Seepage and Managed Natural Attenuation modelling is being carried out.</p> <p>Natural attenuation of Copper within the WSF and within the WSF footprint is considered as a more reliable and scientifically robust solution as there is no potential of future failure of a seepage piping or treatment system. Saline drainage (sulphate) may yet emanate from the WSF though modelling indicates that the total load of sulphate to the EBFR will be reduced by approximately 50% of current loading. Current water quality achieves LDWQTVs for sulphate except in first flush events. Further attenuation and dilution is likely as the new WSFs sit within the Main Pit catchment which eventually discharges through the Intermediate Pit and off-site.</p> <p>The validity of this approach will be tested using seepage modelling, the groundwater fate and transport model, and GoldSim (surface water and groundwater interaction model). Modelled concentrations will be compared to the LDWQTVs.</p> <p>This scope change is more likely to deliver a stable long term engineering solution to new WSF future seepage and achievement of LDWQTVs in the long term without the need for a treatment system that may represent a liability for future land managers.</p> |
| 7 | P. 41 - eighth bullet point | Borrow pits will be excavated to extract necessary material for the cover construction. Borrow pits have been carefully selected and a fauna and flora assessment of the area has been carried out. | Alternate borrow locations with suitable materials have been identified in more accessible locations that will have significantly decreased impacts on existing environment. Proposed borrow locations and haul roads are provided on Figure 1. | <p>The 2016 borrow area was located within an undisturbed vegetation community with pockets of Rainforest and Paperbark swamp and large mature Eucalypts. In addition, it was identified that there may be a potential for the borrow pits to draw water away from the Paperbark swamp during the dry season.</p> <p>The 2016 borrow option would have required establishment of approx. 14km of haul road. This haul road had the potential to impact on culturally significant locations/objects/flora and sites of archaeological significance.</p> <p>The 2019 proposed borrow locations have been extensively impacted by buffalo farming and sand mining. The old buffalo farm on council land is infested with Gamba Grass and the old sand mining location has not recovered from the mining. Overall impact on the existing</p> |

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| | | | | <p>environment will be minimal. Post rehabilitation of these areas should result in a net positive gain to either environment or community.</p> <p>Haul roads will consist of a combination of public roads and short hauls.</p> <p>The potential use of the clay borrow pits is currently being consulted with Coomalie Community Government Council. The potential use of the sand borrow pits is currently being discussed with Northern Land Council.</p> <p>This scope change represents a substantial impact reduction to existing biodiversity, known Sacred Sites, greenhouse gas emissions, dust and air quality impacts. This scope change represents an opportunity for Coomalie Community Government Council to realise financial gain from the Project.</p> |
| 8 | P. 41 – thirteenth bullet point | Intermediate Pit will remain as a water filled void for use as a passive water treatment system. Intermediate Pit will act as a flow through system, similar to the current site configuration, to provide annual flushing of the pit during the wet season in order to meet water quality guidelines. | The Intermediate Pit will remain a water filled void but will not be used as a passive water treatment system. The only treatment of water that will occur in the void will be sediment settlement. | <p>The 2016 NOI had a summary note indicating that seepage from the WSF would be captured and directed to the Intermediate Pit after the construction phase. Seepage from the WSF is no longer proposed to be directed to the Intermediate Pit.</p> <p>The Intermediate Pit may still be used during the Construction phase to manage waters from the Main Pit backfilling process.</p> <p>This scope change represents minimal impact variation from the 2016 NOI scope.</p> |

5 Figures

In addition to Figure 1 included above, four figures have been attached that provide further detail on the proposed rehabilitation concept design. These are summarised below:

- Figure 2: Two cross-sections of Main Pit are provided on this figure. The first provides an indication of the current state of Main Pit while the second provides details on how the tailings capping will be sub-aqueously placed. Notes are included to provide additional details.
- Figure 3: Central WSF footprints.
- Figure 4: Geology map of the former Rum Jungle Mine site, including proposed location of the Central WSF.
- Figure 5: Plan overview of works associated with Main Pit, including haul roads. Photograph examples of key plant and facilities are also included

6 Assessment

DPIR has reviewed the listed changes and consider the proposed variations to the NOI will have a positive impact on the project, while still achieving environmental and cultural objectives. Based on the information detailed within Table 1, the proposed variation is considered to result in a net reduction in impacts while also better managing technical risks. The reduction in impacts are summarised below:

1. Reduced ecological impact (both flora and fauna): the revised concept rehabilitation design requires much less vegetation clearance due to the revised WSF location, the revised borrow locations having lower ecological value and the fact that it uses existing roads, rather than the previously proposed 14km haul road.
2. Reduced risk of foundation instability and seepage impact on surface water quality: relocation of the WSFs not only improves ecological performance but also reduces technical risk. The varied concept rehabilitation design also reduces the impact of flooding from high rainfall events on the WSFs, should improve long-term stability and reduce seepage risks.
3. Reduced impact on areas of cultural significance and Sacred Sites: Not clearing vegetation along the northern project boundary for the northern WSF and not constructing the previously proposed haul road for borrow location reduce impact to areas of cultural significance and the environment. Flow of the EBFR through its natural course rather than to the north of the proposed backfilled Main pit also reduces the cultural impact of the proposed concept rehabilitation design.

Note: the varied concept rehabilitation design is based on the legal Aboriginal Areas Protection Authority (AAPA) process and free prior and informed consent with Custodians. The varied design will meet the requirements listed in the *Northern Territory Aboriginal Sacred Sites Act 1984*.

4. Reduced greenhouse gas emissions: the reduction of haulage distance to the sand and borrow locations will result in lower greenhouse gas emissions than the previous proposed rehabilitation design.
5. Reduced human health and safety impact: as the varied concept rehabilitation design does not require dewatering and work in Main Pit void, and does not require dredging and filter pressing contaminated tailings, the human health and safety impacts are much less than the original proposed design.
6. Reduced technical risk: by far the most complicated and highest technical risk component of the project was Main Pit dewatering, backfill and capping. Key technical risk components include:

- a. **Dewatering strategy:** potentially high levels of groundwater ingress especially in high yielding Coomalie Dolostone. This also adds complexity to the groundwater regime beneath the Copper Extraction Area and may increase water related risks.
- b. **Pit wall instability:** due to softening, which will be exacerbated by dewatering. This technical risk is especially relevant in a rapid drawdown scenario, which would have been required to backfill the pit.
- c. **Backfill and capping:** the previous approach of a dome cover and diverting the EBFR to the north of Main Pit introduced erosion and flooding risks.

The majority of these high technical risk components have been eliminated or significantly lowered in the varied concept rehabilitation design. With consideration of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth), the proposed varied concept rehabilitation design will also reduce the impact on the relevant controlling provisions - listed threatened species and communities, and nuclear action (see EPBC 2016/7730). This is due to the reduced vegetation clearance and the decision not to dredge tailings.

While the varied concept rehabilitation design significantly reduces overall impacts, it should be noted that the change of borrow locations and the increased use of public roads, is likely to negatively impact on traffic, specifically the likelihood of traffic interactions along the Litchfield Park Road. As the design advances, DPIR will attempt to either eliminate, reduce or mitigate this increased impact through a Traffic Management Plan.

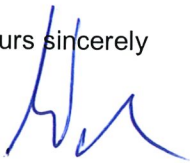
7 Closing

The development of the proposed concept rehabilitation design as presented in this document has involved significant collaboration with technical experts but also ongoing consultation with Traditional Owners and Custodians, with guidance from the Northern Land Council and AAPA.

While DPIR appreciates that there are further studies to complete, and ongoing iterations of design to further mitigate impacts, we believe that overall the proposed variations improve environmental, cultural and social outcomes. In addition, the proposed variation to the concept rehabilitation design is likely to meet legal requirements, reduce long-term maintenance of the WSF, improve stability and performance and reduce the overall contaminant load to the EBFR.

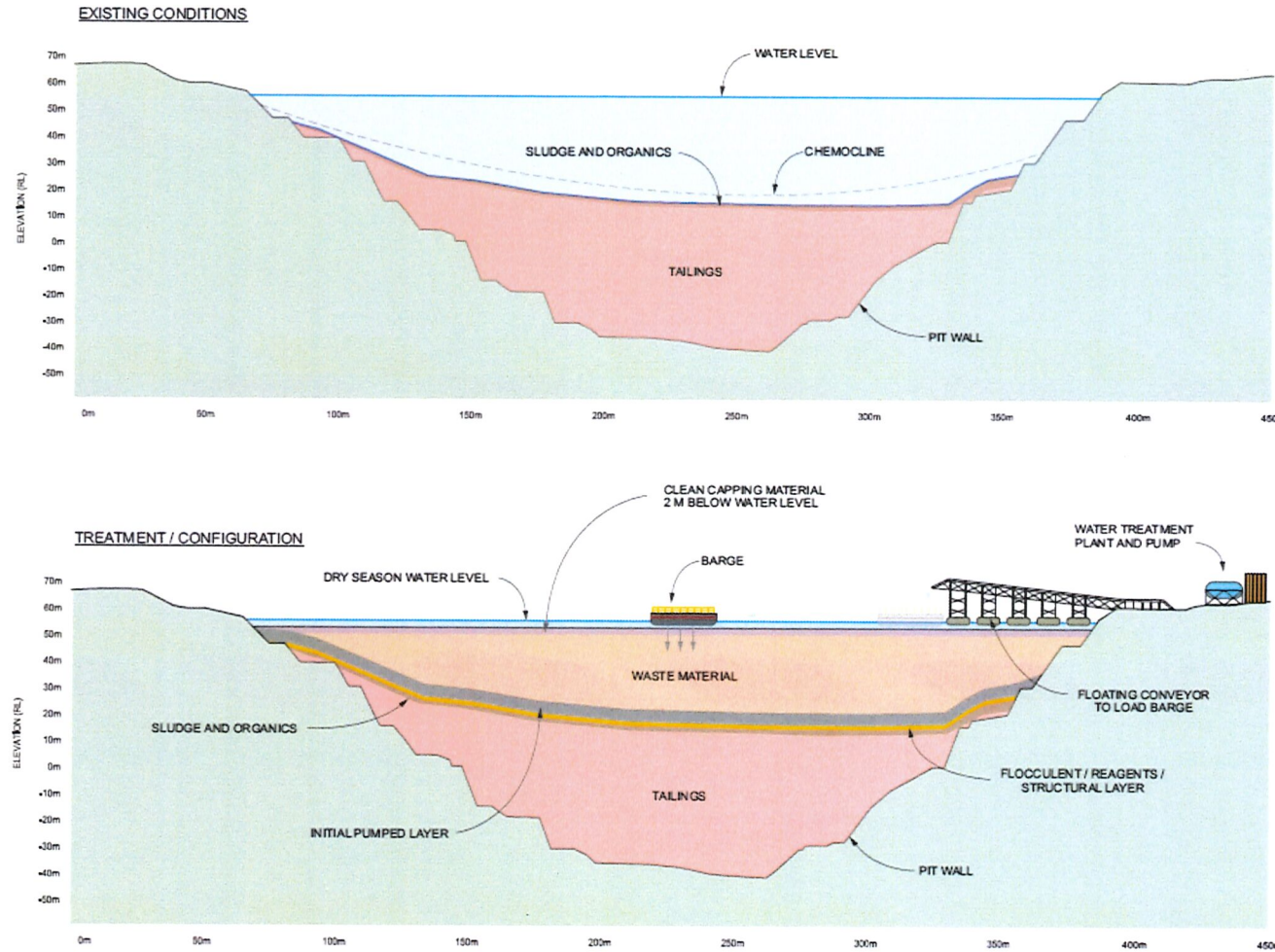
Should you have any questions or require further information, please do not hesitate to contact Jackie Hartnett on 8999 5433, 0488 015 944 or jackie.hartnett@nt.gov.au.

Yours sincerely



Armando Padovan
Executive Director Mines
23 September 2019

Figure 2: Main Pit Tailings Cap Methodology



NOTES

1. PRIMARY WATER TREATMENT

CHEMOCLINE, SLUDGE AND ORGANICS TREATED WITH GRANULAR REAGENTS

IMPORTED REAGENTS TO ALSO ACT AS STRUCTURAL LAYER FOR PLACEMENT OF INITIAL PUMPED LAYER OF WASTE ROCK

IMPORTED REAGENTS TO BE PUMPED AND DELIVERED BY BARGE

2. BARGE AND PLANT SETUP

BARGE CONTROLLED BY CABLES, ANCHORED TO THE SHORELINE

WATER TREATMENT PLANT AND PUMP LOCATED AT CONTROLLED LAYDOWN AREA

MATERIAL SUPPLY TO BARGE BY PIPE, SUPPORTED BY BUOYANCY AIDS (FOR INITIAL PUMPED LAYER OF WASTE ROCK)

EMPLACEMENT OF MATERIAL BY SUBMERGED DELIVERY LINE AND FREE FALL (SEE SK300)

FLOATING CONVEYOR AND BARGE USED FOR EMPLACEMENT OF REMAINDER OF WASTE ROCK

3. WATER TREATMENT

WATER PUMPED OUT BY FLOATING SUBMERSIBLE PUMP, TREATED AND DISCHARGED TO INTERMEDIATE PIT

4. GENERAL WORKS CRITERIA

WASTE ROCK TO BE PLACED IN LAYERS TO MINIMISE EXCESSIVE LOADING IN LOCALISED AREAS, COMPROMISING STRUCTURAL INTEGRITY OF THE TAILINGS

WASTE ROCK TO BE PLACED INITIALLY AS A PUMPED SLURRY, THEN AS FREE MATERIAL

CAPPING LAYER TO BE LOCALLY SOURCED CLEAN MATERIAL WHERE POSSIBLE

Figure 3: WSF Footprints

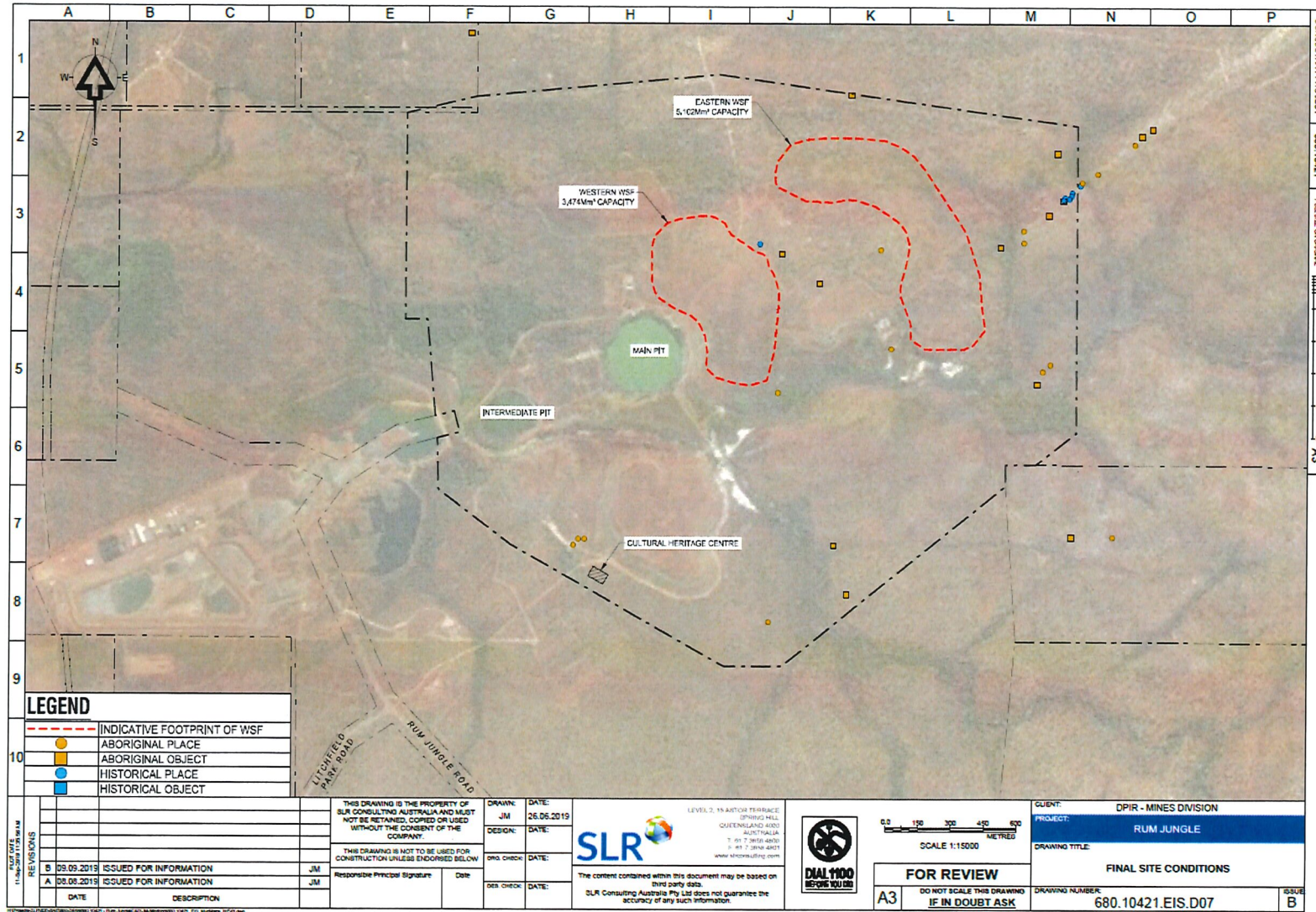


Figure 4: Geology map of the former Rum Jungle Mine site

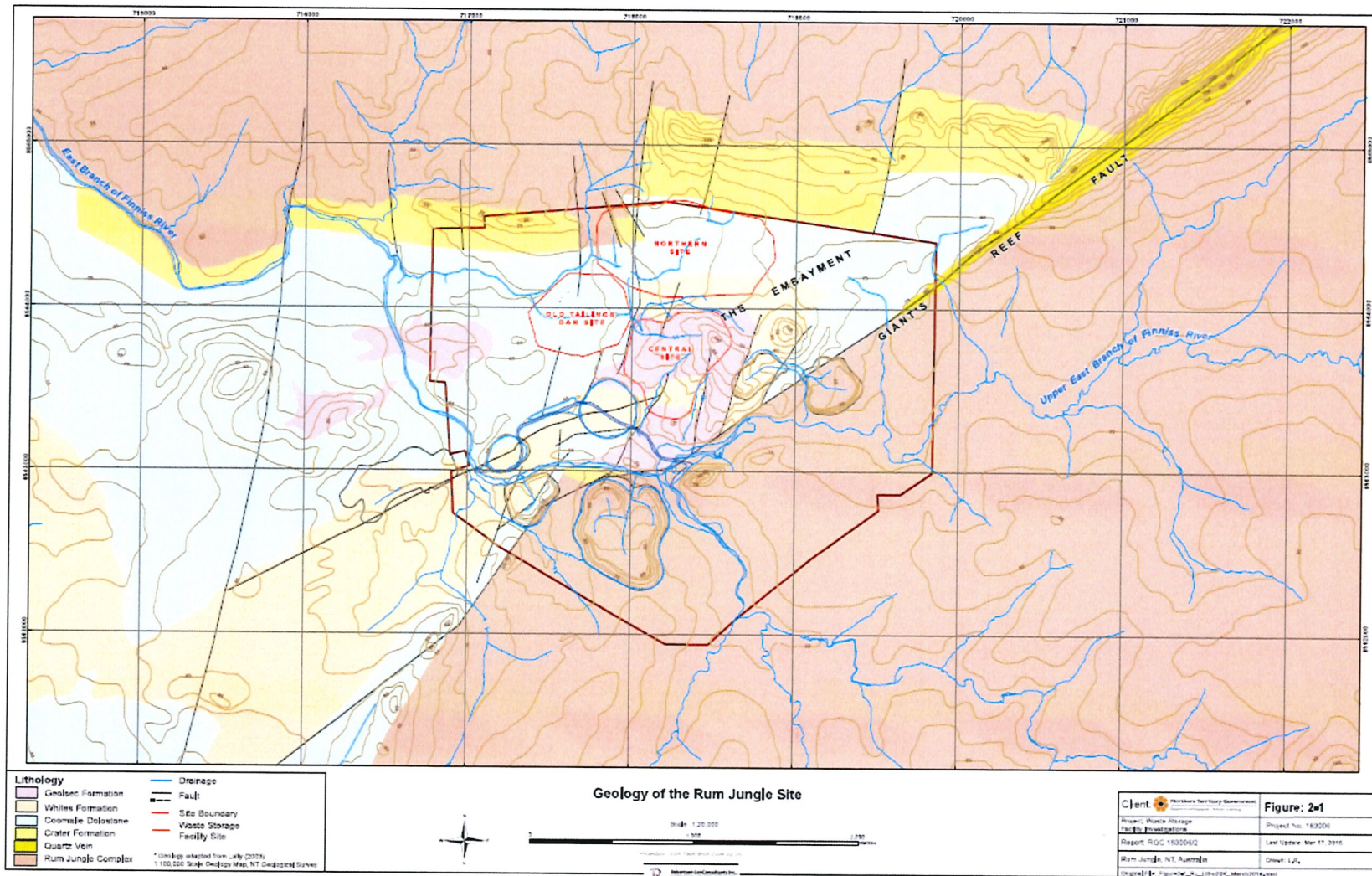
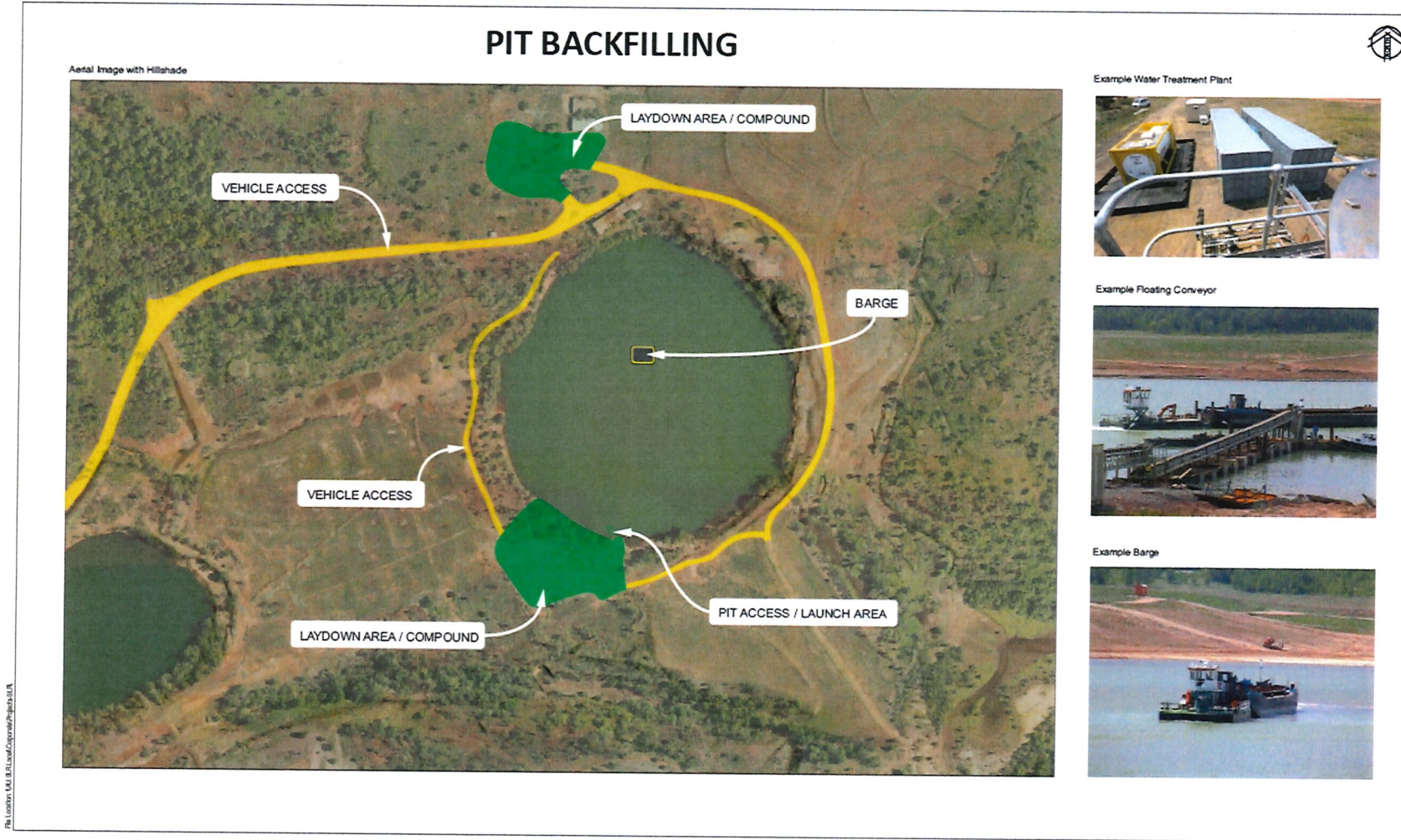


Figure 5: Plan overview of works associated with Main Pit, including haul roads.



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| Title: | Rehabilitation Works Areas | Drawn: | CDM |
| Client: | DPIR - Mines Division | Reviewed: | DOT |
| Project: | Rum Jungle | Size: | A3 |
| Project No.: | 680.10421.SK400 | Datum: | None |
| Status: | Draft for Comment | Version: | 1.0 |
| Date: | 23/05/2019 | | |

- MAIN ACCESS ROADS - HEAVY VEHICLES
- LAYDOWN AREAS / COMPOUND - FOR STORAGE OF EQUIPMENT AND MATERIALS



SK400