

Date : 15/10/2018 1:09:47 PM

From : "GIBBS Teale"

To : "FOMIATTI MINNESMA Ingrid"

Subject : FW: Kidston update from AECOM/Genex

Attachment : OCG Comments - AECOM Response_Master - issued 12 October 18.xlsx;image001.png;image002.png;image005.png;image003.png;image007.png;

FYI



Teale Gibbs
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From: BOOY Caitlin

Sent: Friday, 12 October 2018 10:03 AM

To: GIBBS Teale

Subject: FW: Kidston update from AECOM/Genex

Hi Teale,

FYI

From: Melanie Harris [<mailto:Melanie.Harris@coordinatorgeneral.qld.gov.au>]

Sent: Friday, October 12, 2018 9:58 AM

To: BOOY Caitlin <caitlin.booy@des.qld.gov.au>; SHARPE Dean <Dean.Sharpe@des.qld.gov.au>; FARKAS Renee <Renee.Farkas@des.qld.gov.au>; PAGE Cathie <Cathie.Page@des.qld.gov.au>; CLAUS Sonia <Sonia.Claus@des.qld.gov.au>; RIGBY Siobhan <siobhan.rigby@des.qld.gov.au>

Cc: Steven Tarte <Steven.Tarte@coordinatorgeneral.qld.gov.au>

Subject: Kidston update from AECOM/Genex

Good morning everyone,

I have just finished a teleconference with Rouven from AECOM and Craig from Genex. Attached is the response spreadsheet to our comments on the IAR. (Sonia, I sent your additional comments following the teleconference to Rouven separately, so they may not be reflected in the spreadsheet.)

Rouven also noted that AECOM:

- have undertaken additional modelling to identify any potential water holes
- have looked into increasing the post release flush timing for construction to better manage any residual impacts on water holes
- are awaiting lab results from additional water sampling
- are in the process of finalising modelling for the IAR

AECOM and Genex acknowledge that when the IAR is submitted it needs to address all of our issues and be final to achieve Genex's preferred timeframes.

Can you please review the attached and identify any areas where you consider that Genex/AECOM's response is deficient?

Caitlin – will give you a call at 11 to discuss further.

Cheers Mel



Melanie Harris
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Working Monday, Tuesday, Thursday, Friday

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#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
1	General overall comments			
2	General comment	Throughout document	Some highlights on text, references to be confirmed and 'TBC' points identified throughout.	Address errors/outstanding material in revised draft IAR.
3		Past compliance with EA conditions - link with 2.3.1 below	Little/no detail on past compliance with EA conditions.	Provide detail on historic compliance of the site with the EA provisions, particularly regarding tailings management and seepage.
4		Document accessibility/navigability	Difficult to navigate within the document	Suggest an updated draft includes a hyperlinked table of contents to enable easier navigation.
5		Overall comments	In general, the document presented is of a reasonable standard, although many methodological errors and inconsistencies within the document are noted. Overall, based on the information provided, the proposal appears to be relatively high risk during the construction phase for discharges to Copperfield River, and the impact assessment is lacking necessary detail and clarification for this component of the IAR.	
6		Some topics not yet covered - must consider whole K2H project as declared.	As per preliminary feedback provided by OCG, some topics are not covered by the IAR	An updated draft IAR should describe the whole project and include (but not limited to) the consideration of: - terrestrial ecology (including reference to any protected species (inc habitat values), riparian vegetation, possibility for groundwater dependence, The Oaks Nature Refuge 3.3km downstream from release, the Gorge). - air quality, noise and amenity - cultural heritage - traffic and transport - social impacts, socioeconomic benefits and costs, results of community engagement to date - Native Title - waste management Where the above matters have been considered as part of another approval process, that material should be provided in an updated draft IAR.

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
7			It is difficult to determine the key aspects of the project which the CG will need to condition.	<p>Within the introduction or within an executive summary the key items need to be made obvious (with cross referencing where necessary). For instance:</p> <ul style="list-style-type: none"> - Median discharge frequency - Median discharge volume - Median discharge quality (including a sensitivity assessment. this is discussed further in the row below) - Discharge trigger (i.e. minimum flow trigger in Copperfield River) - Discharge location, diffuser dimensions, mixing zone location and dimensions
8			The sensitivity of the assessment needs to be made clear in the introduction/executive summary. i.e. the assessment is based on a composite sample, how well does this account for potential change?	<p>Half of this information can be found at the end of Section 2.3.4. It seems to show the composite sample is conservative enough to account for historical results in both pits. This should be cross referenced to or summarised in the intro/exec summary.</p> <p>The other half of the information isn't available in the document. It needs to explain how high the key contaminants of concern in the pits can go until the WQO can no longer be achieved under this diffuser/release rate arrangement. These will likely form tolerance limits in the conditions.</p>
9			The IAR discusses seepage from waste rock etc into Eldridge Pit, and seepage from the greater mine site into site W2 (TSF, Dam, Butchers Creek Dam and Managers Creek Dam?). These topics are discussed in sporadic locations, leaving the reader poorly informed of the situation. As a result it is difficult for the reader to be convinced that these interferences have all been accounted for in the assessment.	<p>These seepages are important for the reader to understand in a simple manner. They are a source of interference in the assessment and may interfere with any conditions and compliance monitoring in the future. Recommend dedicating a section of the report to "mine drainage". Provide a simplistic (and possibly visual/diagram/mapped) understanding to the reader of these interferences. Also include any other possible interferences (i.e. at one point in the IAR it is suggested that East Creek, which drains into the study area, might have historical contamination issues)</p>

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10			IAR does not report, assess or manage the quantity, timing and quality of discharges from the TSF under an Environmental Authority to discharge to the Copperfield River.	<p>The IAR reports on discharges which have historically occurred to a different waterway (Charles Creek) and yet does not outline the recent/historical discharges which have occurred to Copperfield River via the Tailings Storage discharge location not far upstream of the new proposed discharge. A reliable cumulative assessment would investigate how these cumulative discharges may impact on the near-, mid- and far-field receiving environments.</p> <p>If impacts are unacceptable, the proposal should be revised and management/licensing options suggested to ensure that concurrent impacts from both discharges do not co-occur during the release influence period. It is understood that an attempt of this has been made using background water quality at W2 (impacted site) within this IAR. While this is an important line of evidence, which is certainly a precautionary approach when assessing the operational discharges (which may co-occur with TSF discharges over a 50 year mine life); this approach is not supported as the main line of evidence to assess the construction phase discharges. This is because there is the option to potentially control construction phase discharges so as to not co-occur with TSF discharges, which may be recommended. The proposal as it currently stands, is to discharge at 1:25, and with this level of minimal dilution of pit water, there is no assimilative capacity for dissolved zinc, cadmium, total manganese, and potentially EC, and sulphate etc. Construction phase discharges should ideally not co-occur with TSF discharges. If this is confirmed, the median water quality data from WB should also be used in the assessment of construction based discharges and dilution studies, for comparison to the precautionary W2 approach.</p>
11			Continued from above.	<p>Using W2 water quality as the assumed water quality for all catchment run-off in the Cormix model is likely to vastly underestimate the assimilative capacity available and potentially skew the contaminant of most concern based on W2 data applying to all catchment run-off, rather than the pit water quality itself. This would also have the impact of underestimating the dilution capacity within the Copperfield River stretches and creek inputs.</p>

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
12			Ensure that acronyms are all spelt out the first time they are used	
13			Inconsistent numbering	Please check consistency of numbering - mostly inconsistency with volume numbers
14			Is the release (during construction) from combined pits or just Eldridge? all calculations should be based on maximum concentrations proposed to be released (currently based on a mixed scenario).	
15			It is unclear whether discharges from the TSF and the pits will occur concurrently? If they are then may not be acceptable to use median values for certain calculations. Use of median values is acceptable, but can not then state that this is the worst case scenario.	
16			Generally, numbers included in tables contain errors, e.g. Table 16 "Comparison of WQOs" long term irrigation value for arsenic is 0.1mg/L not 0.5mg/L; EC should be 250 not 500; beryllium aquatic ecosystem value is given in ug/L not mg/L as stated in the table; Aquatic ecosystem value for nitrate should be closer to 0.7mg/L rather than 7.2mg/L. Multiple calculations have been made from these errors, as such there are numeric errors made throughout the document	Recommended checking every table for errors and recalculating anything that was originally calculated with incorrect numbers
17	1	Introduction		
18	1.1	Overview of the Project	Ensure the whole K2H is discussed and then specify the project components subject to IAR assessment	Project not just limited to water releases - however, need to make clear exactly which project components will be subject to approval and conditions under the SDPWOA.
19	1.2	Community and Stakeholder Consultation	Last sentence refers to wider project	What is the wider project? K2H, entire hub?
20	1.3	Assessment Approach	Not enough provided to set final conditions	
21	1.4	IAR Structure	The document would benefit from an executive summary.	
22	2	Activity Description		
23	2.1	Project Description	Eldridge Pit section 2.2.1	Quantify elevation portal is proposed to be in Eldridge pit
24	2.1.4	Timeframe for the Project	Table 1: H2 2018	Table 1: Q2 2018?

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
25	2.2	Project Need, Justification and Alternatives Considered	Alternative assessment lacks discussions regarding land based disposal	Provide justification as to why land based disposal is not feasible during operation or construction
26	2.2.1	Project objectives	2.2.1.1 Job numbers - are there specific job numbers for K2H for construction and operation?	
27	2.2.2	Design refinement and assessment of alternatives	27.5GL not mentioned earlier	The information in this section should be mentioned earlier on
28	2.3	Pit Water Quality		
29	2.3.1	History of Pit Development	<p>The history isn't thorough enough to be convinced all potential contaminants have been identified and accounted for.</p> <p>Metamorphic breccia is identified as a potential source of contaminant generating material if exposed to oxygen; location of this material is not identified.</p>	<p>The mineralogy records of the site will indicate all of the known or potential metal/metalloid contaminants. Also describe the refining processes which took place on the site, and whether those contaminants have potential to exist in the Elridge/Wises Pits. Describe how explosives were used, what these consisted of (i.e. ammonia nitrate + diesel). Is there potential for hydrocarbon contamination to exist as a result of all the explosives used?</p> <p>Discuss whether the proposed construction and operations will expose potentially contaminant generating geologies. If it does please detail how it will be managed.</p>

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
30			It would be useful to have some water quality indicators (other than EC) and estimated volumes for the seepage from the waste rock dumps and seepage collection dams. Even just worst case scenario. Need to understand for ongoing pit water quality.	
31	2.3.2	Pit Water Quality Assessment	Table 5: Nitrate Water Quality Objective. Appears to be an error. 7mg/L looks to be too high	Clarify a WQO for nitrate. 0.7 mg/L is the toxicity WQO. Physico/Chemical stressor WQO will need to be adopted from either the appropriate default figure from an adjacent scheduled catchment, or site specific figure will need to be adopted. The 2 available background readings from Copperfield River are substantially different from each other and insufficient to establish a site specific target.
32	2.3.3	Representative Release Water Quality		
33	2.3.3.1	Methods	<p>This section is quite hard to follow. The mixing of pore water in the tailings is particularly complex.</p> <p>Methods of what?</p> <p>This section describes the basis for calculating the ratio of Wises and Eldridge Pit water to be released into the Copperfield Dam as a controlled release. However, the ratio described is only relevant to operational releases and it is unclear what ratio of pit water will be released during construction.</p>	<p>Recommend clarifying and simplifying this information for the reader. Diagrams/pictures etc may be useful.</p> <p>Clarify heading</p> <p>Include the methodology for calculating the ratio of Wises to Eldridge Pit water to be released during construction, based on the relative volumes of water from each pit to be mixed prior to the construction release.</p>
34	2.3.4	Comparison to Historical Water Quality Ranges in the Pits		
35	2.4	Proposed Water Releases		
36	2.4.1	Project Water Balance	Please clarify 'water budget' means in this context	
37	2.4.2	Water Balance Metrics		
38	2.5	Base Case – Estimated Water Excess and Deficit		
39	2.6	Unmitigated Case – Estimated Uncontrolled Releases	The reader can be misled into interpreting this section is discussing a Type 2 uncontrolled releases. Is this section is actually meant to represent what would happen if Type 1 controlled releases were not allowed?	Suggest making this obvious and clear to the reader
40	2.7	Project Water Balance Summary		
41	2.8	Requirement for Water Releases		

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
42	2.8.1	Construction Phase Water Release Objectives		
43	2.8.2	Operational Phase Water Release Objectives		
44	2.9	Proposed Water Release Approach	<p>The release point into the Copperfield river of each release type is not clearly identified. It is understood that the exaction location of releases may not be identified until future detail design is complete, however the IAR should include a constraints analysis and a discussion of the potential impacts of the most likely release locations, to allow the regulator to assess the likely impacts and appropriateness of releases from these locations.</p> <p>To demonstrate feasibility, this section should describe how the construction and operational releases are proposed to occur (spillway/ pump etc)</p>	<p>Include a constraints analysis and indicative potential release points for each release type. Outline the advantages, disadvantages and potential impacts of each release location option.</p> <p>Please provide details of how dewatering release will be achieved prior to construction of the Wise Pit Dam/Spillway, and during operations (if these differ)</p>
45	2.9.1	Release Event Type 1 - Controlled Discharges to Maintain Water Levels	<p>This section states that: "during the construction phase as the pump turbines would not be available to raise the water level in the Wises upper reservoir to the spillway elevation preceding the event". It is unclear if this means that construction phase releases will occur from the Wises dam?</p> <p>Given the substantial differences between operational and construction release, these should be split into two different sections.</p>	Clarify the location of all release types, as requested above.
46	2.9.2	Release Event Type 2 – Pass-Through Discharge	<p>Releases from Eldridge lower reservoir mentioned</p> <p>"rapidity of any potential mixing has not been estimated it is likely that the incident rainfall will remain at least partially separated from the higher density pit water during a pass through discharge event."</p> <p>IAR data shows homogeneity within the pits, no stratification, how long does it take for fresh and salt water to mix, if they propose that they need to detail that - has not included in further assessment</p>	<p>Please clarify how this would be achieved.</p> <p>If approval is sought relating to a pass through discharge, risk assessment and verification of assumptions should be undertaken.</p>

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
47			During earlier discussions between proponent, consultants, regulator and WS, there has been no discussion about a regular overflow discharge (during rainfall events), which is based on the assumption of full stratification of rainfall and pit water before overtopping and yet this document proposes such with very limited assessment of potential impacts.	This type of discharge requires more assessment in terms of impacts, frequency, water quality, con-currency with other discharges, limits, conditions etc.
48	2.1	Unexpected Water Quality Changes	<p>The limits at which such a release would be required are not provided and such a release is not assessed. As a result it can not be conditioned or approved.</p> <p>It may be necessary to release additional water from the Project over and above that gained through inflow of rainfall. What impacts will this have on the receiving environment?</p>	Please provide details of possible impacts should this occur or remove this section from the report.
49	2.11	Replenishment of Freshwater	Please clarify who the water allocation agreement is with (DNRME) and if necessary, more water is available	Include information in the IAR.
50	3	Baseline Receiving Environment		
51	3.1	Overview		
52	3.2	Copperfield River Catchment Overview		
53	3.2.1	Climate		
54	3.2.2	Geology and Soils	The minerals, and subsequent metals/metalloids etc common in the site and surrounds cannot be determined from this section	Recommend discussing mineralogy or cross referencing where relevant
55	3.2.3	Land use	<p>Error regarding North and South in first paragraph.</p> <p><i>"Cattle grazing occupies almost all land uses between the mine site and the Copperfield Dam to the north (isn't Dam south of site?) and extends to Einasleigh in the south (isn't this north of site?)."</i></p>	Please review and update
56	3.2.4	Water users	Controlled releases are made from the Cooperfield dam in August to supplement the water hole in Einasleigh.	Will these releases have any impact on the project in terms of timing to release water from the reservoirs? Will environmental flow releases have cumulative impacts with the proposed construction and operations releases?
57	3.2.5	Historical releases		
58	3.3	Environmental Values	On going monitoring beyond Einasleigh to demonstrate this is a correct assumption? Before Copperfield River Gorge	
59	3.3.1	Site Specific Environmental Values		
60	3.3.1.1	Literature and Internet Review		

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
61	3.3.1.2	Search of the Queensland Entitlements Database		
62	3.3.1.3	Aerial Imagery Mapping	Has there been consultation with homestead?	Should note that Copperfield Dam also supplies water to homestead
63	3.3.2	Site Specific Environmental Values Applicable to the Release Regime	Table 15 (pg. 60) states that "The ephemeral nature of the Copperfield River catchment means that future use for aquaculture is highly unlikely" and section 3.4.2 states that "the WQOs for Aquaculture (specifically referring to commercial aquaculture operations) have not been incorporated into the assessment of the lowest WQO from all EVs". However, both Table 16 and section 3.5 include aquaculture values.	If it is not relevant it should be removed from various tables and graphs and the tick in column two of table 15 should be altered to a cross.
64	3.3.3	Management Intent		
65	3.4	Default Water Quality Objectives		
66	3.4.1	Copperfield River Classification		
67	3.4.2	Default Water Quality Objectives	<p>Nitrate WQO is incorrect.</p> <p>Table 16, pg. 65 - values in table need to be checked as per comment in Row 5 and 49</p> <p>Given that WQO are applied to both Total and filtered concentrations later in the document, it may be preferable to nominate WQO for both Filtered and Total for each relevant parameter</p>	<p><u>Toxicity</u> value for nitrate is 0.7mg/L</p> <p>No scheduled default <u>physico/chem stressor</u> value for nitrate exists in Gulf Rivers. Either justify an appropriate default figure which can be taken from an adjacent scheduled catchment, or apply a site specific figure. The 2 widely varying nitrate values from Copperfield River are not sufficient to establish a site specific figure.</p>

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
68			<p>Nitrate needs to be assessed in relation to its potential for toxicity but also in relation to its potential impacts as a physical chemical stressor. In terms of toxicity, 95% species protection toxicity guideline is currently under review for Nitrate as N however, the draft number is nominated at 2.1 mg/L at this stage. The current water quality in the Eldridge Pit (Nitrate approximately 5 mg/L) is not anticipated to elicit toxicity under either the 1:25 or 1:200 minimum dilution proposals for construction or operational phases, respectively.</p> <p>Within the IAR, a Total Nitrogen (TN) WQO of 0.15 mg is incorrectly attributed to a toxicity based WQO from ANZECC 95% species protection. This may have been based on ANZECC risk measure which is used to assess the risk of a cyanobacteria bloom (see Case Study 1, page 3.3 28 of ANZECC 2000). This is used as a trigger in the ANZECC decision tree as well as an understanding of the important role which turbidity and stream flow have on risk of algae blooms.</p>	<p>It is recommended that a risk assessment of the potential risks of discharging Eldridge Pit water at 1:25 in terms the potential for algae blooms within the receiving environment is quantitatively assessed and presented as part of the IAR. Depending on the results of this risk assessment, the proposal may require revision. Based on the current water quality from Eldridge Pit, the resultant TN concentration may be approximately 0.27 mg/L, which triggers further investigation under ANZECC. As a minimum, receiving monitoring conditions for nutrients as well as Chlorophyll a may be needed within semi-permanent and permanent waterways downstream during this discharge type.</p>
69	3.4.3	Sample Sites and Frequency		
70	3.4.4	Water Quality Data Protocols	(pg. 71) Pit samples dot point 2 total nickel was erroneously low, was this in both pits or just one? Which one?	Clarify where samples were taken from in relation to pits, i.e. samples in both pits or a sample from Eldridge, etc.
71	3.4.4.1	Data Requirements for Background Data		
72	3.4.4.2	Water Quality Data Controls and Checks		
73	3.4.4.3	Requirements for comparison with WQOs for Aquatic Ecosystems		
74	3.5	Surface Water Quality and Site Specific WQOs	<p>TSF Dam Spillway</p> <p>(pg. 74) total arsenic exceeds the default WQO, but does not specify which WQO</p> <p>250ug/L for EC</p> <p>"pH lies outside the default WQO range" - for what?</p>	<p>Does this enable an estimate of quality of water going into Copperfield River from TSF. Where is this spillway located/where does it run in to?</p> <p>change sentence to include drinking water - health</p> <p>EC is measured in uS/cm</p> <p>pH default WQO for aquatic ecosystems</p>

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75	3.5.1	Hardness Modification	Table 18 is missing units	add in units.
76	3.5.2	pH	This section refers to Appendix B for values. However, when cross-references with Appendix B, values are different. For example this section states that WB has a median value of 7.66 but Appendix B reports the median value as 7.73 for WB.	Please update IAR with consistent values.
77	3.5.3	Sulfate	Please include generic name for Corella sp. as well.	
78	3.5.4	Aluminium	Increasing aluminium in receiving environment.	Any idea of source of aluminium?
79	3.5.5	Cadmium		
80	3.5.6	Chromium	Details that LOR is <0.0001 mg/L	Should this be <0.001 mg/L?
81	3.5.7	Copper	Site WB sources of Copper - Is this due to local geology?	Please state in IAR.
82	3.5.8	Manganese		
83	3.5.9	Zinc		
84	3.5.10	Iron		
85	3.5.11	Nitrogen	Clarify the WQO for nitrate	As per comments made above in regard to nitrate
86	3.6	Comparison of Water Quality and Stream Flow		
87	3.6.1	pH		
88	3.6.2	Electrical Conductivity		
89	3.6.3	Zinc		
90	3.6.4	Other Parameters		
91	3.7	Representative Water Quality Baseline Site (WB)	...complex groundwater processes could be occurring that result in the transport of seepage to the Copperfield River in the vicinity of the WB monitoring site or further upstream.	Is this from existing activities e.g. TSF?
92	3.8	Hydrology		
93	3.8.1	Development of Water Resource Model		
94	3.8.2	Model Validation		
95	3.8.3	Streamflow Assessment		
96	3.9	Hydraulics and Fluvial Geomorphology		
97	3.9.1	Stream Hydraulics		
98	3.9.1.1	Model Development		

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
99	3.9.1.2	Baseline Results		
100	3.9.2	Fluvial Geomorphology		
101	3.1	Hydrogeology	This section is based on former studies. Some of the key details from these studies is not presented (i.e. where in relation to the project these boreholes were located etc).	Summarise, or reference to key information/assumptions in these studies
102	3.10.1	Regional Geology		
103	3.10.2	Local Geology		
104	3.10.3	Structural Geology		
105	3.10.4	Hydrogeological Setting		
106	3.10.5	Hydraulic Properties	The location of bores are not identified.	Include a map of bore locations relative to project site, proposed discharge point(s) and the river.
107	3.10.6	Groundwater Levels		
108	3.10.7	Groundwater Flow	Would like to know the location of semi-permanent waterholes found within the floodplain of the Copperfield River (especially if near release point). May be relevant for any groundwater interaction with surface water, and associated water quality impacts. Section concludes with (based on 2001 AGE study): <i>"it is considered that in the instance a hydraulic connection between the fault system and the river is present, there is potential for migration between the former mine area and the Copperfield River."</i>	Please provided locations of semi-permanent waterholes within the floodplain of the Copperfield River, particularly near proposed release point(s). Provided assessment of any potential impact on these due to project water releases.
109			No further conceptualisation was performed by AGE; however, it is considered that in the instance a hydraulic connection between the fault system and the river is present, there is potential for migration between the former mine area and the Copperfield River.	Is this of concern or not? Is there a hydraulic connection?

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
110	3.10.8	Recharge and Discharge		
111	3.10.9	Groundwater Quality	Bore BA06 and BA07	How do the suggested seepages recorded at the 2 bores affect water releases?
112	3.10.10	Registered Groundwater Bores		
113	3.10.11	Groundwater Dependant Ecosystems	<p>It is possible the riparian vegetation/ecosystems which fringe the Copperfield River are dependant on groundwater?</p> <p>Ephemeral surface water streams can often be referred to as "losing streams", as they tend to lose water to surrounding alluvial aquifers. This is as opposed to streams with long baseflow periods, which tend to gain water from surrounding alluvial aquifers. This means that any impacts to the water quality in an ephemeral surface water body, can make its way into the adjoining alluvial aquifer. As a result it can impact on ecosystems dependant on this groundwater.</p>	This section of the document needs to discuss if such a groundwater regime exists at this site and if the vegetation/ecosystems in the alluvium would be dependant on groundwater (i.e. are the regional ecosystems identified in Section 3.12.2 dependant on groundwater which may originate from the Copperfield River?).
114	3.11	Sediment Quality	The median results from Figure 40 seem to suggest an increase in metal concentrations between WB and W1. Perhaps this suggests that metals are falling out and accumulating at W1. This may be representative of what may happen when discharges occur from the Eldridge/Wises Pit (i.e. dissolved contaminants may flush downstream, sediment bound contaminants may fall out and accumulate?)	There is no further assessment of sediment within the remainder of the report. This needs to be addressed. During current stable weather conditions it is possible there are minimal suspended sediment concentrations within the water column. However, once the water is pumped and moved more frequently, and turbulent weather conditions are in play (when discharges are planned) there might be more suspended sediment in the water. The assessment needs to consider the potential for sediment releases and their potential fate in the Copperfield River.
115	3.12	Aquatic Ecology		
116	3.12.1	Approach		
117	3.12.2	Riparian Vegetation	<p>No linkage to groundwater</p> <p>Sub dominant Of Concern RE identified along river banks (9.3.3.a). As per above general comment, no other discussion on terrestrial ecology aside from RE identification.</p>	<p>refer to groundwater dependant ecosystems row above</p> <p>updated draft IAR should include material on terrestrial ecology, including riparian veg, and the potential for groundwater dependence.</p>

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
118			Italise latin names of species. No table number	
119	3.12.3	Aquatic Habitat Characteristics and Condition		
120	3.12.4	Physico-chemical Water Quality Parameters		
121	3.12.5	Macroinvertebrates		
122	3.12.5.1	Historical Survey Results		
123	3.12.5.2	Survey Results 2018		
124	3.12.6	Fish Communities		
125	3.12.7	Turtles		
126	3.12.8	Macroinvertebrate Findings		
127	3.13	Summary		
128	4	Impact Assessment		
129	4.1	Overview	As a whole the Impact Assessment fails to identify what the impacts are which could result from the proposed activity if not controlled/managed appropriately.	<p>This section needs to list out the consequences if things go wrong, i.e, releases could have potential to (including but not limited to):</p> <ul style="list-style-type: none"> - overload the Copperfield River with toxicants (metals/metalloids) rendering it acutely or chronically toxic to ecosystems and humans - overload the Copperfield River with chemical stressors, causing it to become too salty, full of sulphate, or ridden with algae blooms (which can release toxins of their own) - alter the hydrology (availability and flow) of water in the Copperfield River - release contaminated sediments which may deposit and accumulate in some parts of the river - release aquatic species/fish from the dam which may contain elevated concentrations of metals? <p>The above summarise the major limitation of the remainder of the IAR, it is all focused on dot point 1, and 3, with minimal/no consideration of the other points.</p>

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
130			<p>(pg. 127) details that where WQOs were available for more than one EV, the highest value was applied. Should this be lowest? If required, please change "highest" to "lowest".</p> <p>Due to differences in assessment methods, WQO exceedances in the receiving environment identified in Chapter 3 (existing environment) are inconsistent with those identified in chapter 4 (following a release).</p> <p>Chapter 3 -- receiving environment (prior to release) exceedance of:</p> <ul style="list-style-type: none"> - dissolved aluminium, total arsenic, dissolved chromium, dissolved copper, total manganese, total iron and dissolved zinc <p>o Chapter 4 – receiving environment (post releases) exceedance of:</p> <ul style="list-style-type: none"> -Section 4.3.6 identifies zinc and total manganese as the parameters of most concern. - Section 4.6.2 identifies WQO exceedance of total nitrogen (1:200 – Operational phase) - Section 4.6.1 identifies WQO exceedance of dissolved cadmium, dissolved cobalt, dissolved zinc, total arsenic, total cobalt, total manganese and total nitrogen (1:25 – construction phase). 	<p>Review entire document to ensure consistency of methodologies and to support development of conclusions. Releasing the construction water direct from Eldridge Pit should be identified as an option if this is feasible (rather than mixing with poorer quality water in Wises Pit).</p>
131	4.2	Release Water Toxicity Assessment		
132	4.2.1	Overview	<p>It is quite difficult for the reader to understand the purpose of a DTA in the assessment</p>	<p>Recommend clarifying the purpose of the DTA to the reader. i.e. The DTA is used to assess if the mixture of toxicants + inhibitors (hardness etc) is toxic within the mixing zone? Water Quality Objectives are used to ensure protection from toxicants after mixing/dilution has removed any protection from inhibitors?</p>
133	4.2.2	Release Water (Composite Samples)	<p>(pg. 129-132) – Water quality of samples submitted for DTA analysis</p> <ul style="list-style-type: none"> - Parameters compared to default WQO regardless of sample type (e.g. dissolved sample being compared to total WQO) 	<p>It may be preferable to nominate WQO for both Filtered and Total for each relevant parameter.</p>
134	4.2.3	Dilution Water		
135	4.2.4	Ecotoxicology Tests		

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
136	4.2.5	Results	Reader can be confused/mislead by the DTA findings. Reader needs to understand why the dilution rates from the DTA are not all that is required to protect ecosystems in Copperfield River.	Clarify to the reader why diluting the 90/10% pit water by only 1.6 Copperfield River is not actually sufficient to protect the Copperfield River (in the 1.6 dilution, most of the toxicity is still being cloaked by the high level of hardness in the mixture?) Make the reader understand the relevance of the DTA and the 1.6 dilution rate (i.e. 1.6 dilution will be immediately achieved, therefore the mixing zone wont be highly toxic?)
137	4.3	Assessment of Assimilative Capacity	Throughout the document dilutions are presented as both ratios and percentages. A dilution ratio of 1:25 is equal of a 4% dilution but is reported as 4.696 or 4.70%.	Review document for accuracy and consistency of terminology.
138	4.3.1	Dilution Ratio and Constituents of Concern		
139	4.3.2	Hardness Incorporation		
140	4.3.3	Parameters with Limited Historic Data		
141	4.3.4	Construction Phase Releases	- Construction release assumes full mixing of the pits, however it is unclear how this mixing would occur operationally. - Assuming release of water during construction phase is to be from Wises pit, calculated maximum concentrations should be based on the ratio of water in Wises pit during the construction phase. IE: assumed volume of Wises pit is 3GL (section 2.3.3.1); Stage 1 & 2 of construction requires dewatering of 7.58 GL from Eldridge to Wises pit (section 4.5.6.9). Therefore, mixing of the two pits prior to discharge would closer 70% Eldridge to 30% Wises, rather than the 90% Eldridge and 10% Wises mixing used.	The proposed mixing for the construction dewatering should be properly defined and used in the risk assessment
142	4.3.5	Sensitivity Analysis for Operational Phase Releases	This section erroneous refers to “assumptive capacity” rather than “assimilative capacity”.	Replace “assumptive” with “assimilative”.

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
143	4.3.6	Dilution Ratio for Adoption	<p>The last two dot points introduce a lot of new complex hydraulic/flow information to the reader and is confusing to follow.</p> <p>This section describes the use of 67% of the receiving environments assimilative capacity during operational releases. During the wet season some assimilative capacity may be required to account for overtopping of the Kidston tailing dams and other inputs of runoff from the Kidston site. The assimilative capacity of the receiving environment used by the current development should be described in this section.</p>	<p>Recommend either simplifying this information, or not introducing it until after the reader has been educated on the proposed release volumes and ratios (these items are introduced in Section 4.5.4)</p> <p>This section should include an analysis of the assimilative capacity of the receiving environment already used by the current Kidston Development, including stormwater runoff and tailing dams overtopping during the wet season.</p>
144			Second dot point difficult to understand	Please clarify

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
145			<p>This IAR section attempts to address the issues relating to the cumulative impacts of the other nearby discharges by using 67% of the assimilative capacity for Total Manganese. Total Manganese is not the limiting contaminant based on minimum dilution required to meet local water quality objectives (WQOs) based on recent Eldridge Pit data (which contains the vast majority of water currently stored on the site). Dissolved zinc remains the contaminant of most concern for the largest volume of water stored on the site, even when corrected for predicted hardness at proposed discharge ratio 1:25 (Construction phase) but also for the operational phase discharge ratio (1:200). Table 39 of the draft IAR highlights that dissolved zinc rather than total manganese is the contaminant of most concern. It is unclear why total manganese has been selected as the contaminant of most concern, and then utilised in further modelling, discussion and justification.</p>	<p>Please note that many errors are noted in the W2 median background numbers presented in Table 63 of the IAR. The hardness modification of trigger values appears to have been undertaken using the maximum hardness ever recorded, and this does not reflect the current hardness on the Eldridge Pit profiling (and this approach is likely to underestimate the toxicity from discharges). Given the overall lack of detailed impact assessment for the construction phase proposal, WS recommends that the IAR is revised. The IAR should present the resultant worse case and median instream concentrations of every contaminant of concern from the proposed discharge/s during construction phase proposed ratio (1:25) and an assessment of potential impacts from the resultant concentrations. The modelling, calculations and comparisons should be undertaken on worst case pit water quality (ever), worst case current pit water (from latest sampling round) and median scenarios for datasets (while median hardness and upstream water quality should be applied).</p> <p>An understanding of the spatial extent or mixing zone until dilution returns the concentrations of contaminants of concern to 95% species protection or other environmental value (EV) objectives needs to be presented (comparison for all relevant indicators against all WQOs and guidelines, including 95%, 90% and 80% species protection). These spatial impact extents need to be assessed alongside the identified spatial locations of EVs which have been identified within the IAR, REMPs (or are identified in the future) – for example the nature refuge 3.3 km d/s, the Oaks homestead 11.3 km d/s and the Einsleigh Gorge 46 km d/s (as well as any semi-permanent or permanent water holes downstream).</p>

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
146			Continued from above.	<p>The IAR doesn't adequately identify all of the EVs nor include the Aquatic Conservation Assessment which assesses the Copperfield River as High.</p> <p>The Inland waters regional NRM Assessment 2015 also provides as assessment of the aquatic ecosystems that should be protected - http://plan.northerngulf.com.au/wp-content/uploads/2015/11/Inland-Waters-Assessment-FINAL-.pdf</p> <p>The magnitude and duration, of possible exceedances should also be clearly presented and should reflect a realistic and comprehensive understanding of the planned construction discharge quality, quantity and timing/s (i.e. recovery opportunities). This is necessary to assess in terms of whether the proposal is acceptable based on the temporary nature of the proposed construction discharge.</p>
147	4.4	Mixing Zone Modelling	<p>It is hard to tell whether this section relates to operation or construction or both. Is it proposed to use some sort of difuser for construction? The text reads as though it does.</p> <p>This section should consider a range of construction releases based on the potential range of water quality and quantity that may be required to be released for construction. The construction mixing model should also take into the account the influence of the release location, if this is different to the release location for operational releases.</p> <p>Are there potential impacts on Einasleigh Gorge due to release during construction phase (insufficient modelling)</p>	<p>Include mixing modelling for potential water releases required for construction, taking into account at least the predicted maximum water quantity and contamination levels. Take into account any difference in the release location for the construction release, if it is different from the operational release location.</p> <p>These impacts should be explored and appropriately assessed.</p>
148	4.4.1	Model Limitations		

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
149	4.4.1.1	Model Scenario Inputs and Assumptions	How can this release rate be confirmed for construction? Is the model for operations or construction?	
150	4.4.1.2	Conceptual Diffuser Configurations Used	The last paragraph on page 143 seems to indicate there may actually be more than 1 diffuser?	Suggest clarifying this for the reader. The modelling all seems to be based on a single diffuser structure. Is the reality that there will be multiple diffusers in different locations?
151			Last two dot points in section - more information needed to understand the impacts in order to condition	
152	4.4.1.3	CORMIX Scenarios	<p>The model assumes the diffuser will be in the centre of the channel. This can create a complex challenge when obtaining a waterway barrier works approval from Fisheries QLD.</p> <p>Table 41 shows with each model the distance from the diffuser to the banks is a lot larger, leaving the reader unsure how a bank widens this much (banks are usually considered fixed structures)</p>	<p>Suggest obtaining Fisheries QLD's opinion on whether locating a structure in the centre of the channel will be acceptable. Centre channel is usually considered important for providing fish passage in low flow conditions, fisheries may be opposed to obstructing it, and may request the diffuser is located to the side. If this is the case, advise whether this impacts on the model, and re-run model if necessary.</p> <p>It is assumed "distance to banks" actually refers to "distance to edge of water line"? Each model is based on larger and larger flow events, meaning the body of water in Copperfield River will be wider? If this is correct, clarify to the reader.</p>
153	4.4.1.4	Scenario Results		
154	4.5	Assessment of Sustainable Load		
155	4.5.1	Mass Balance Modelling		
156	4.5.1.1	Initial Project Water Balance Model Development		

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
157	4.5.1.2	GoldSim Project Water Balance Model Key Assumptions and Input Data	Can be model be expanded to run past the Gorge?	It the model is extended past the Gorge it may go some way to demonstrating that there are no water quality impacts past Einasleigh.
158	4.5.1.3	Simulation Method		
159	4.5.2	Key Model Objectives		
160	4.5.2.1	Additional IQQM Model Development		
161	4.5.2.2	Model Limitations	Ongoing refinement of the Project design and operational planning will further develop these rules and may not be consistent with the rules adopted for this assessment	How will we (regulators) know this and final results?
162			Concentrations (end of pipe (EOP) and receiving environment) are assumed to be fixed and therefore not subject to any temporal variation or variation with flow.	What is the likelihood of this occurring in reality?
163	4.5.2.3	Inputs and Assumptions		
164	4.5.3	Modelled Scenarios		
165	4.5.4	Operational Phase Estimated Releases and Post-Release Flushes Operation		
166	4.5.4.1	Scenario 1 - Annual Simulation	Information repeated in 4.5.4	
167	4.5.4.2	Scenario 2 – Life of Project Simulation		

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
168	4.5.5	Mass Balance Results (Downstream Dilution) Operation		
169	4.5.5.1	Scenario 1 - Annual Simulation	In table 52 the concentration of manganese being released is stated ~0.09mg/L. It is uncertain where this figure is obtained from?	Up until this point in the document, all information has suggested manganese will be released at 3.6 mg/L. Recommend clarifying to the reader why 0.09mg/L is used in this model.
170	4.5.5.2	Scenario 2 – Life of Project Simulation	This model also uses 0.09 mg/L for manganese.	As per comment made in row above
171	4.5.6	Preliminary Construction Period Assessment	<p>Section 4.5.6 is not well structured and goes into too many subsections which cause the reader to become lost.</p> <p>Section 4.5.6 does not educate the reader in regards to where releases will occur from. Given the excess water is within Eldridge Pit, the reader may assume construction releases would occur directly from Eldridge Pit?</p>	<p>It may work better to separate into two different sections.</p> <ul style="list-style-type: none"> - Sections 4.5.6.1 to 4.5.6.5 seem to fit under a sub section of "construction release scenarios" (its here the reader learns why a certain scenario was favoured). - Section 4.5.6.6 to 4.5.6.9 seem to fit under a sub section of "chosen scenario modelling" (it is here the reader learns how the chosen scenario functions) <p>Clarify to the reader where construction releases will occur from. i.e. will they occur directly from Eldridge Pit (if so the composite pit analysis may no longer be relevant). Or will the construction water be released from the Wises Pit after the water has been pumped up from Eldridge Pit.</p>
172			Second dot point of this section	Does this mean there will be changes in SIS and TSFs? This would be useful to know as it could demonstrate that there will be an improvement of the quality of water entering the pits, which may support the argument that the water quality in the pits will improve over time.

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
173	4.5.6.1	Modelled Construction and Dewatering Schedule	Inadequate assessment of potential impacts from construction phase discharge scenario.	<p>Modelling and impact assessment for the proposed construction phase discharges are inadequate. There is also a lack of clarity in terms of the source of water for discharge and the quantity proposed to be discharged during the construction phase. Where decisions are still being made in terms of the operational requirements, the IAR should clearly assess impacts for the most likely scenarios. WS would need to see the following aspects of the project comprehensively addressed and assessed:</p> <p>1. Realistic water quality and quantity proposed for discharge during the construction phase. The IAR contains a lot of unnecessary details in relation to various pit blends. It is only necessary to investigate the median and worse case discharge impact from the pit water composition actually planned for discharge (during this phase). It is unclear why the 90% Eldridge: 10% Wises blend is the preferred blend for construction given the description of the planned discharge processes. Wises Pit current capacity is 10 GL (and 0.8 GL is estimated to be stored here currently), while Eldridge Pit is assumed to have a current storage volume of 28.5 GL. The construction phase discharge requirement is proposed as 1.5 GL (or 2.5 GLs). Is the plan that the remaining capacity of Wises Pit is filled before water is discharged during the construction phase, i.e. 9.2 GL of Eldridge Pit water is transferred to Wises Pit before any discharges for the construction phase occur. Or is there a suggestion that 100% Eldridge Pit water will be potentially pumped directly for discharge during the construction phase? Or is there a chance that a blend of pit waters similar to 1:1 may occur? If uncertainty remains as to the plan, then clearly distinct</p>

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
174			Continued from above.	<p>2. Details regarding the location and method of discharge (i.e. diffuser?)</p> <p>3. Construction phase mixing studies and downstream impact assessment for construction phase (See Issue 2 for more detail)</p> <p>4. The likely discharge durations, and spatial size of mixing zones for each contaminant of concern after the initial 1:25 dilution during the construction phase (see Issue 2 for more detail)</p> <p>5. Proposed conditions for end of pipe and within the receiving environment for the construction phase, which should be proposed in terms of the modelling predictions and protections of the receiving environment.</p>
175	4.5.6.2	Estimated Dewatering Volumes, Excess Water and Adopted Pump Rates		
176	4.5.6.3	Construction of Wises Upper Reservoir Embankment	Dot points in this section are difficult to understand. Yellow reference to staged Wises Pit construction.	Please clarify Need more info on why this is done.
177	4.5.6.4	Construction Scenarios Assessed	Construction release appears to rely (4 x 41 day events), this appears inconsistent with the modelled flow regimes.	To demonstrate feasibility of proposed construction dewatering scenario, please provide a figure or discussion of example scenarios in low, mean or high flow years detailing how the water will be removed at the appropriate dilution. Alternative dewatering options may need to be developed if a 'dry' year is encountered during the construction period.

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
178	4.5.6.5	Construction Period Modelling Results	<p>Still unclear at this point that construction releases are going from a different point to operations. Also that the water quality is different.</p> <p>The max daily limit for water licenece is cited in Section 3.2.4 as 16 ML/day; in this section it is intended to release 500ML? Confirm that 1ML per day of pit water will be used for construction and dust supression. Additional details of this level of water usage should be provided.</p>	<p>Feasibiilty of releasing 500 ML / day from Copperfield dam should be demonstrated, and any associated ecological risk should be identified. (would result in a 25% drop in water volume in the dam over the proposed 9 day release period).</p>
179	4.5.6.6	Estimated Construction Releases and Post-Release Flushes	<p>At this point the reader thinks the chosen scenario has been determined (but it is not entirely clear). Then further modelling is undertaken to determine the mass balance, and how post flushes occur?</p> <p>In the operation releases section, mixing zone modelling occured before this point. However no mixing zone modelling has occured for construction. This also adds to the readers confusion, making the reader question if they are yet looking at the chosen option.</p> <p>It is also difficult to determine what the release trigger is for the chosen option.</p>	<p>As per comment for Section 4.5.6.</p> <p>Also provide justification as to why mixing zone modelling has not occurred for construction releases.</p> <p>This section suggests the release trigger is 400ML/day from Copperfield River. Table 57 suggests 500ML/day will be released from Copperfield River Dam. Clarify how both relate to each other? (i.e. do they have to occur together, a total of 900ML/day)?</p>
180			<p>The construction phase Post Release Flush Statistics (Table 59) shows release to flush ratios approach 62% markedly higher than the operational phase. This indicates that the construction phase when compared to the operational phase have an elevated risks of lower dilution remaining in sections of the stream.</p>	<p>Additional detail around the construction phase would provide an insight into the potential impacts of proposed releases in the construction phase and assist with the assessment of the proposal.</p> <p>Two initial thoughts that would help understand the proposed releases follow:</p> <ul style="list-style-type: none"> - In the impact assessment to date has there been an assessment of the probability of elevated contaminants remaining in sections of the stream after flow has ceased? - If there has been any significant risk of the contaminants remaining in sections of the watercourse after the flow event, has there been any consideration of contingencies to dilute these sections of the stream?

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
181	4.5.6.7	Construction Phase Mass Balance (Downstream Dilution)	In table 60 the concentration of manganese being released is stated ~0.2mg/L. It is uncertain where this figure is obtained from?	The remainder of the report suggested manganese will be released at 3.6 mg/L. Recommend clarifying to the reader why 0.2mg/L is used in this model.
182	4.5.6.8	Use of Asymmetrical Release Triggers	<p>The reader cannot determine what the consequence/meaning of the findings in 4.5.6.8 are? (are the findings useful and going to be adapted?)</p> <p>(pg. 180) dot point 2 states 186 days, should this be 188 days?</p>	<p>Clarify the meaning of these results for the reader</p> <p>Review document for accuracy and consistency</p>
183	4.5.6.9	Construction Phase Assessment Summary	<p>Difficult to determine the release trigger for the chosen option.</p> <p>(pg. 181) - Dewatering will take place in two distinct phases – stages 1 and 2 which will transfer approximately 7.58 GL from Eldridge Pit into the Existing Wises Pit. How will water be pumped if nothing has been constructed yet?</p> <p>(pg. 181) - Upon completion of the proposed Wises upper reservoir embankment the remaining volume of water will be transferred from Eldridge Pit to the fully constructed Wises upper reservoir - how will water be pumped prior to completion of construction?</p> <p>- if water is somehow being pumped from Eldridge to Wises, will this not change the water quality of the pit (10% Wises and 90% Eldridge – but wises will have a significant amount of Eldridge water), as such altering the dilution ratios that will ensure WQO are met?</p> <p>This section does not sufficiently demonstrate that the required dewatering volume can be released to the Copperfield River during the construction period. Calculations provided throughout this section are inconsistent. - Table 62 (below) implies the project is proposing to release at a rate of 129.6ML per day when the trigger of 400 ML/day is reached. However this would represent a ~ 1:4 dilution.</p>	<p>Extend Table 62 include 500ML/day from Copperfield River Dam is also a release trigger?</p> <p>Provide information regarding the movement of pit water prior to pump construction</p> <p>Clarify if the dilution ratios in the document take into account additional water from Eldridge</p> <p>Provide more fully developed options for release of water during construction phase, given that releases resulting in exceedances of WQO in receiving environments may not be feasible.</p>

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
184			Inconsistent information regarding WQO and impact on Einasleigh	Figure 61 suggests P5 result for meeting WQOs at Einasleigh. Is this consistent with the text here?
185	4.6	Predicted Concentrations in the Receiving Environment	While predicted concentrations have been presented, potential impacts of the release on aquatic environments has not be fully described. There is no discussion of the potential elevation of sulphates from current low receiving environment concentration or the potential impacts.	
186	4.6.1	Construction Phase	<p>Table 63 uses only the toxicant WQO for nitrate.</p> <p>(pg. 183) 7 WQO are being exceeded, that is approx. 25% of WQO assuming use of 27 parameters outlined in Section 3.5. The impacts of this are temporary and reversible (pg. 183), is there proof to support this statement?</p> <p>(pg. 183) – dot point 2 – should be 2.5% of possible releases during the construction phase would be made at a release ratio lower than 4.70% NOT 25% - also refer to section 9.2 which does not exist</p> <p>Data inconsistencies are present between Table 63 and Table 64.</p>	<p>An appropriate physico-chemical stressor WQO for nitrate needs to be applied as per comments above.</p> <p>Provide information that there will be no cumulative effects of this release and that effects are in fact temporary and reversible</p> <p>Review document to ensure numbers are correctly reported and consistency throughout</p> <p>- Provide the data source for “release water” listed in Table 63 & 64. Review for consistency between Table 63 and Table 64 (ie Hardness in “Release Water” listed as 1809.8 in Table 63 and 1270 in Table 64; the ‘historical maximum’ in pits should not vary)</p>

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
187	4.6.2	Operational Phase	<p>Table 64 uses only the toxicant WQO for nitrate.</p> <p>(pg. 187) - Composite 2 which represents a mixture of 90% of Eldridge Pit water and 10% Wises Pit water sampled in June 2018. The second mixture shows the highest historical concentration of any parameter from the Eldridge Pit and the Wises Pit mixed together at a ratio of 9 to 1 respectively</p> <p>(pg. 187) "Nitrogen does not have many toxicological impacts on aquatic organisms; rather it is a nuisance nutrient that promotes algal growth." - This can still be a problem in aquatic environments if there is too much nitrogen in the system.</p>	<p>An appropriate physico-chemical stressor WQO for nitrate needs to be applied as per comments above.</p> <p>- 90% of Eldridge Pit water and 10% Wises Pit is the same as Eldridge Pit and the Wises Pit mixed together at a ratio of 9 to 1 – are they supposed to be? Review document to ensure accuracy and consistency.</p> <p>Please provide additional details to how excess nitrogen will not have a negative impact on the receiving environment, will there be cumulative impact associated with this?</p> <p>Review entire document to ensure numbers are correctly reported.</p>
188			Impact - algal growth	What are mitigation options?
189	4.7	Potential Hydrology Impacts		
190	4.7.1	Discharge and Flow Duration		
191	4.7.2	Flow Spells	(pg. 195) - wet season is defined as Nov – Apr, Section 4.10.1.4 states that all construction will be completed during the dry season. However Table 54 (pg.166) implies that construction will begin in Feb/Jan.	Review document for accuracy and consistency.
192	4.7.3	Conclusions		
193	4.8	Potential Hydraulics and Fluvial Geomorphology Impacts	It is uncertain if the study/modelling is applicable to the near scale (i.e. immediately downstream of the diffuser).	The reader would assume the diffuser (like many structures in a waterway) may create turbulence and increase in velocity immediately downstream. Clarify whether this is the case, and whether in stream scour protection would be required.
194	4.8.1	Hydraulic Impacts of Releases	Table 71 and 72 - useful to compare these results to wet season flow rates	
195	4.8.2	Fluvial Geomorphology	Will regulators receive results of modelling when release point has been chosen?	

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
196	4.9	Potential Hydrogeology Impacts	Hydrogeology section is very light in detail. There does not appear to be consideration of whether contaminants released into Copperfield River can move into the alluvial groundwater.	The alluvial groundwater is likely recharged by the Copperfield River during flows (often referred to as a losing stream). Recommend assessing whether elevated contaminant levels (particularly during construction releases) can make their way into the alluvial groundwater.
197	4.1	Potential Aquatic Ecology Impacts		
198	4.10.1	Water Discharges		
199	4.10.1.1	Water quality	This section draws no clear conclusion of the impact.	<p>Recommend splitting into 3 sections.</p> <p>Firstly there is the assessment within the mixing zone. The DTA can only be used to conclude the release won't cause immediate toxicity in the mixing zone. (i.e. the toxicants are still there in elevated concentrations but being cloaked by hardness).</p> <p>Secondly: by the end of the mixing zone, the cloaking hardness has been diluted away, but so have the toxicants. At these concentrations they are low enough to meet standard Water Quality Objectives and should be adequate to protect most species.</p> <p>Thirdly: by the end of the mixing zone it needs to be recognised that some of the contaminants - while meeting WQO's will be significantly higher than the baseline/background receiving environment (i.e. sulphate, and likely nitrate being 2 such examples amongst others). There needs to be some recognition this will occur, and recognition if this may result in favourable conditions for species more tolerant of these parameters and detrimental conditions for those which have low</p>

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
200	4.10.1.2	Hydrology	This section does not adequately discuss impacts on fish passage	<p>This section needs to address whether fish passage will be impeded by the diffuser structure in low flow conditions. The modelling assumes the diffuser is placed in the low flow channel and this is generally not accepted by Fisheries QLD as it inhibits the passage of fish in low flow conditions.</p> <p>Fisheries QLD also tend to assess impacts on fish passage during flow conditions. Their intent is usually to ensure fish can move upstream along the edges of the channel. Fisheries should be consulted as to what the acceptable hydrological/velocity outcomes are expected during high flows and whether the proposed diffuser arrangement can meet these targets.</p>
201	4.10.1.3	Erosion and sedimentation	This section does not address the complexities which arise from the nature of a braided stream	<p>This section needs to discuss whether this section of the Copperfield River has the potential to naturally shift/meander. Braided streams constantly shift in alignment and dimensions (low flow channels and banks move quickly over time).</p> <p>Address whether this is a risk for the diffuser and if any natural shift could impede upon adequate mixing/dispersion. i.e. will the low flow channel and bed/banks need to be "locked in" via retaining structures, scour protection etc?</p> <p>If there are no impacts to fish passageway please provide reasons</p>
202			Further, photographic monitoring of the release point over time will document and monitor the rate of erosion and deposition occurring at and downstream of the release point.	And if erosion is caused by release? What are the options / mitigations strategies?
203	4.10.1.4	Development of the release point	Riparian zone will be rehabilitated?	To what standard?
204	4.11	Risk Assessment	<p>What about likelihood?</p> <p>Insufficient identification of risks associated with proposed exceedance of WQO for several parameters during construction phase release.</p>	

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
205	4.12	Summary	While approval is sought for releases which are predicted to result in exceedances of water quality objects, potential impacts of these proposed exceedances have only been minimally discussed.	The summary will need to incorporate changes outlined above. The document is lacking in its description of potential real impacts associated with proposed exceedances of WQO.
206	5	Release Criteria and MonitoringCriteria and Monitoring		
207	5.1	Summary of Proposed Release Criteria	Statement made that "real time monitoring in the receiving environment and the pits for key contaminants is not practical.", with no further explanation. This section lacks end of pipe release limits. Such limits will likely be conditioned.	Firstly: Define what is meant by real time monitoring Secondly : Need further discussion on why this is not practical, and why it would not be warranted. It is suggested that the last two sub points from this section are translated into release limits and placed into Table 79.
208			The minimum stream flow requirement and release volume should not be listed as a daily rate rather than instantaneous within the proposed conditions	In order that altering stream flow conditions can be rapidly responded to, an instantaneous stream flow condition and release flow condition should be utilised rather than a daily rate.
209	5.1.1	Indicative Approach to Releases	Not enough provided to set final conditions	
210	5.2	Monitoring	Monitoring does not include sediment	Some form of sediment monitoring should be included, particularly in locations where released sediment may settle and accumulate (possibly nearby bridge/culvert crossings etc)
211	6	References		
212	7	Standard Limitations		
213	Appendix A			
214	Appendix B			
215	Appendix C			
216	Appendix D			
217	Appendix E			
218	Appendix F			
219	Appendix G			
220	Appendix H			
221	Appendix I			

Date : 15/10/2018 3:04:38 PM

From : "RIGBY Siobhan"

To : "Melanie Harris" , "BOOY Caitlin" , "SHARPE Dean" , "FARKAS Renee" , "PAGE Cathie" , "CLAUS Sonia"

Cc : "Steven Tarte" , "WorkRequests Water" , "FOMIATTI MINNESMA Ingrid" , "SHARPE Dean"

Subject : RE: Kidston update from AECOM/Genex

Attachment : Copy of OCG Comments_AECOM Response_Master_Water Sciences.xlsx;EPML00817013 - 4 Oct 2013.pdf;image003.png;image005.png;image004.png;image006.png;

Hi Mel,

I have added comments within highlighted cells in relation to your request, please see attached. Also attached a copy of the approval that I discuss in my comments (have not verified if it is the latest approval recently).

Thanks,
Siobhan



Dr Siobhan Rigby

Senior Scientist

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PART TIME (Monday, Tuesday and Thursday)

From: Melanie Harris <Melanie.Harris@coordinatorgeneral.qld.gov.au>

Sent: Friday, 12 October 2018 9:58 AM

To: BOOY Caitlin; SHARPE Dean; FARKAS Renee; PAGE Cathie; CLAUS Sonia; RIGBY Siobhan

Cc: Steven Tarte

Subject: Kidston update from AECOM/Genex

Good morning everyone,

I have just finished a teleconference with Rouven from AECOM and Craig from Genex. Attached is the response spreadsheet to our comments on the IAR. (Sonia, I sent your additional comments following the teleconference to Rouven separately, so they may not be reflected in the spreadsheet.)

Rouven also noted that AECOM:

- have undertaken additional modelling to identify any potential water holes
- have looked into increasing the post release flush timing for construction to better manage any residual impacts on water holes
- are awaiting lab results from additional water sampling
- are in the process of finalising modelling for the IAR

AECOM and Genex acknowledge that when the IAR is submitted it needs to address all of our issues and be final to achieve Genex's preferred timeframes.

Can you please review the attached and identify any areas where you consider that Genex/AECOM's response is deficient?

Caitlin – will give you a call at 11 to discuss further.

Cheers Mel



Melanie Harris

Project Manager

Office of the Coordinator-General

Department of State Development,
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#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
1	General overall comments			
2	General comment	Throughout document	Some highlights on text, references to be confirmed and 'TBC' points identified throughout.	Address errors/outstanding material in revised draft IAR.
3		Past compliance with EA conditions - link with 2.3.1 below	Little/no detail on past compliance with EA conditions.	Provide detail on historic compliance of the site with the EA provisions, particularly regarding tailings management and seepage.
4		Document accessibility/navigability	Difficult to navigate within the document	Suggest an updated draft includes a hyperlinked table of contents to enable easier navigation.
5		Overall comments	In general, the document presented is of a reasonable standard, although many methodological errors and inconsistencies within the document are noted. Overall, based on the information provided, the proposal appears to be relatively high risk during the construction phase for discharges to Copperfield River, and the impact assessment is lacking necessary detail and clarification for this component of the IAR.	
6		Some topics not yet covered - must consider whole K2H project as declared.	As per preliminary feedback provided by OCG, some topics are not covered by the IAR	An updated draft IAR should describe the whole project and include (but not limited to) the consideration of: <ul style="list-style-type: none"> - terrestrial ecology (including reference to any protected species (inc habitat values), riparian vegetation, possibility for groundwater dependence, The Oaks Nature Refuge 3.3km downstream from release, the Gorge). - air quality, noise and amenity - cultural heritage - traffic and transport - social impacts, socioeconomic benefits and costs, results of community engagement to date - Native Title - waste management Where the above matters have been considered as part of another approval process, that material should be provided in an updated draft IAR.

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
7			It is difficult to determine the key aspects of the project which the CG will need to condition.	<p>Within the introduction or within an executive summary the key items need to be made obvious (with cross referencing where necessary). For instance:</p> <ul style="list-style-type: none"> - Median discharge frequency - Median discharge volume - Median discharge quality (including a sensitivity assessment. this is discussed further in the row below) - Discharge trigger (i.e. minimum flow trigger in Copperfield River) - Discharge location, diffuser dimensions, mixing zone location and dimensions
8			The sensitivity of the assessment needs to be made clear in the introduction/executive summary. i.e. the assessment is based on a composite sample, how well does this account for potential change?	<p>Half of this information can be found at the end of Section 2.3.4. It seems to show the composite sample is conservative enough to account for historical results in both pits. This should be cross referenced to or summarised in the intro/exec summary.</p> <p>The other half of the information isn't available in the document. It needs to explain how high the key contaminants of concern in the pits can go until the WQO can no longer be achieved under this diffuser/release rate arrangement. These will likely form tolerance limits in the conditions.</p>
9			The IAR discusses seepage from waste rock etc into Eldridge Pit, and seepage from the greater mine site into site W2 (TSF, Dam, Butchers Creek Dam and Managers Creek Dam?). These topics are discussed in sporadic locations, leaving the reader poorly informed of the situation. As a result it is difficult for the reader to be convinced that these interferences have all been accounted for in the assessment.	<p>These seepages are important for the reader to understand in a simple manner. They are a source of interference in the assessment and may interfere with any conditions and compliance monitoring in the future. Recommend dedicating a section of the report to "mine drainage". Provide a simplistic (and possibly visual/diagram/mapped) understanding to the reader of these interferences. Also include any other possible interferences (i.e. at one point in the IAR it is suggested that East Creek, which drains into the study area, might have historical contamination issues)</p>

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
10			IAR does not report, assess or manage the quantity, timing and quality of discharges from the TSF under an Environmental Authority to discharge to the Copperfield River.	<p>The IAR reports on discharges which have historically occurred to a different waterway (Charles Creek) and yet does not outline the recent/historical discharges which have occurred to Copperfield River via the Tailings Storage discharge location not far upstream of the new proposed discharge. A reliable cumulative assessment would investigate how these cumulative discharges may impact on the near-, mid- and far-field receiving environments.</p> <p>If impacts are unacceptable, the proposal should be revised and management/licensing options suggested to ensure that concurrent impacts from both discharges do not co-occur during the release influence period. It is understood that an attempt of this has been made using background water quality at W2 (impacted site) within this IAR. While this is an important line of evidence, which is certainly a precautionary approach when assessing the operational discharges (which may co-occur with TSF discharges over a 50 year mine life); this approach is not supported as the main line of evidence to assess the construction phase discharges. This is because there is the option to potentially control construction phase discharges so as to not co-occur with TSF discharges, which may be recommended. The proposal as it currently stands, is to discharge at 1:25, and with this level of minimal dilution of pit water, there is no assimilative capacity for dissolved zinc, cadmium, total manganese, and potentially EC, and sulphate etc. Construction phase discharges should ideally not co-occur with TSF discharges. If this is confirmed, the median water quality data from WB should also be used in the assessment of construction based discharges and dilution studies, for comparison to the precautionary W2 approach.</p>
11			Continued from above.	<p>Using W2 water quality as the assumed water quality for all catchment run-off in the Cormix model is likely to vastly underestimate the assimilative capacity available and potentially skew the contaminant of most concern based on W2 data applying to all catchment run-off, rather than the pit water quality itself. This would also have the impact of underestimating the dilution capacity within the Copperfield River stretches and creek inputs.</p>

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
12			Ensure that acronyms are all spelt out the first time they are used	
13			Inconsistent numbering	Please check consistency of numbering - mostly inconsistency with volume numbers
14			Is the release (during construction) from combined pits or just Eldridge? all calculations should be based on maximum concentrations proposed to be released (currently based on a mixed scenario).	
15			It is unclear whether discharges from the TSF and the pits will occur concurrently? If they are then may not be acceptable to use median values for certain calculations. Use of median values is acceptable, but can not then state that this is the worst case scenario.	
16			Generally, numbers included in tables contain errors, e.g. Table 16 "Comparison of WQOs" long term irrigation value for arsenic is 0.1mg/L not 0.5mg/L; EC should be 250 not 500; beryllium aquatic ecosystem value is given in ug/L not mg/L as stated in the table; Aquatic ecosystem value for nitrate should be closer to 0.7mg/L rather than 7.2mg/L. Multiple calculations have been made from these errors, as such there are numeric errors made throughout the document	Recommended checking every table for errors and recalculating anything that was originally calculated with incorrect numbers
17	1	Introduction		
18	1.1	Overview of the Project	Ensure the whole K2H is discussed and then specify the project components subject to IAR assessment	Project not just limited to water releases - however, need to make clear exactly which project components will be subject to approval and conditions under the SDPWOA.
19	1.2	Community and Stakeholder Consultation	Last sentence refers to wider project	What is the wider project? K2H, entire hub?
20	1.3	Assessment Approach	Not enough provided to set final conditions	
21	1.4	IAR Structure	The document would benefit from an executive summary.	
22	2	Activity Description		
23	2.1	Project Description	Eldridge Pit section 2.2.1	Quantify elevation portal is proposed to be in Eldridge pit
24	2.1.4	Timeframe for the Project	Table 1: H2 2018	Table 1: Q2 2018?

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
25	2.2	Project Need, Justification and Alternatives Considered	Alternative assessment lacks discussions regarding land based disposal	Provide justification as to why land based disposal is not feasible during operation or construction
26	2.2.1	Project objectives	2.2.1.1 Job numbers - are there specific job numbers for K2H for construction and operation?	
27	2.2.2	Design refinement and assessment of alternatives	27.5GL not mentioned earlier	The information in this section should be mentioned earlier on
28	2.3	Pit Water Quality		
29	2.3.1	History of Pit Development	<p>The history isnt thorough enough to be convinced all potential contaminants have been identified and accounted for.</p> <p>Metamorphic breccia is identified as a potential source of contaminant generating material if exposed to oxygen; location of this material is not identified.</p>	<p>The mineralogy records of the site will indicate all of the known or potential metal/metalloid contaminants. Also describe the refining processes which took place on the site, and whether those contaminants have potential to exist in the Elridge/Wises Pits. Describe how explosives were used, what these consisted of (i.e. ammonia nitrate + diesel). Is there potential for hydrocarbon contamination to exist as a result of all the explosives used?</p> <p>Discuss whether the proposed construction and operations will expose potentially contaminant generating geologies. If it does please detail how it will be managed.</p>

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
30			It would be useful to have some water quality indicators (other than EC) and estimated volumes for the seepage from the waste rock dumps and seepage collection dams. Even just worst case scenario. Need to understand for ongoing pit water quality.	
31	2.3.2	Pit Water Quality Assessment	Table 5: Nitrate Water Quality Objective. Appears to be an error. 7mg/L looks to be too high	Clarify a WQO for nitrate. 0.7 mg/L is the toxicity WQO. Physico/Chemical stressor WQO will need to be adopted from either the appropriate default figure from an adjacent scheduled catchment, or site specific figure will need to be adopted. The 2 available background readings from Copperfield River are substantially different from each other and insufficient to establish a site specific target.
32	2.3.3	Representative Release Water Quality		
33	2.3.3.1	Methods	<p>This section is quite hard to follow. The mixing of pore water in the tailings is particularly complex.</p> <p>Methods of what?</p> <p>This section describes the basis for calculating the ratio of Wises and Eldridge Pit water to be released into the Copperfield Dam as a controlled release. However, the ratio described is only relevant to operational releases and it is unclear what ratio of pit water will be released during construction.</p>	<p>Recommend clarifying and simplifying this information for the reader. Diagrams/pictures etc may be useful.</p> <p>Clarify heading</p> <p>Include the methodology for calculating the ratio of Wises to Eldridge Pit water to be released during construction, based on the relative volumes of water from each pit to be mixed prior to the construction release.</p>
34	2.3.4	Comparison to Historical Water Quality Ranges in the Pits		
35	2.4	Proposed Water Releases		
36	2.4.1	Project Water Balance	Please clarify 'water budget' means in this context	
37	2.4.2	Water Balance Metrics		
38	2.5	Base Case – Estimated Water Excess and Deficit		
39	2.6	Unmitigated Case – Estimated Uncontrolled Releases	The reader can be misled into interpreting this section is discussing a Type 2 uncontrolled releases. Is this section is actually meant to represent what would happen if Type 1 controlled releases were not allowed?	Suggest making this obvious and clear to the reader

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
40	2.7	Project Water Balance Summary		
41	2.8	Requirement for Water Releases		
42	2.8.1	Construction Phase Water Release Objectives		
43	2.8.2	Operational Phase Water Release Objectives		
44	2.9	Proposed Water Release Approach	<p>The release point into the Copperfield river of each release type is not clearly identified. It is understood that the exaction location of releases may not be identified until future detail design is complete, however the IAR should include a constraints analysis and a discussion of the potential impacts of the most likely release locations, to allow the regulator to assess the likely impacts and appropriateness of releases from these locations.</p> <p>To demonstrate feasibility, this section should describe how the construction and operational releases are proposed to occur (spillway/ pump etc)</p>	<p>Include a constraints analysis and indicative potential release points for each release type. Outline the advantages, disadvantages and potential impacts of each release location option.</p> <p>Please provide details of how dewatering release will be achieved prior to construction of the Wise Pit Dam/Spillway, and during operations (if these differ)</p>
45	2.9.1	Release Event Type 1 - Controlled Discharges to Maintain Water Levels	<p>This section states that: "during the construction phase as the pump turbines would not be available to raise the water level in the Wises upper reservoir to the spillway elevation preceding the event". It is unclear if this means that construction phase releases will occur from the Wises dam?</p> <p>Given the substantial differences between operational and construction release, these should be split into two different sections.</p>	Clarify the location of all release types, as requested above.

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
46	2.9.2	Release Event Type 2 – Pass-Through Discharge	<p>Releases from Eldridge lower reservoir mentioned</p> <p>"rapidity of any potential mixing has not been estimated it is likely that the incident rainfall will remain at least partially separated from the higher density pit water during a pass through discharge event."</p> <p>IAR data shows homogeneity within the pits, no stratification, how long does it take for fresh and salt water to mix, if they propose that they need to detail that - has not included in further assessment</p>	<p>Please clarify how this would be achieved.</p> <p>If approval is sought relating to a pass through discharge, risk assessment and verification of assumptions should be undertaken.</p>
47			<p>During earlier discussions between proponent, consultants, regulator and WS, there has been no discussion about a regular overflow discharge (during rainfall events), which is based on the assumption of full stratification of rainfall and pit water before overtopping and yet this document proposes such with very limited assessment of potential impacts.</p>	<p>This type of discharge requires more assessment in terms of impacts, frequency, water quality, con-currency with other discharges, limits, conditions etc.</p>
48	2.1	Unexpected Water Quality Changes	<p>The limits at which such a release would be required are not provided and such a release is not assessed. As a result it can not be conditioned or approved.</p> <p>It may be necessary to release additional water from the Project over and above that gained through inflow of rainfall. What impacts will this have on the receiving environment?</p>	<p>Please provide details of possible impacts should this occur or remove this section from the report.</p>
49	2.11	Replenishment of Freshwater	<p>Please clarify who the water allocation agreement is with (DNRME) and if necessary, more water is available</p>	<p>Include information in the IAR.</p>
50	3	Baseline Receiving Environment		
51	3.1	Overview		
52	3.2	Copperfield River Catchment Overview		
53	3.2.1	Climate		
54	3.2.2	Geology and Soils	<p>The minerals, and subsequent metals/metalloids etc common in the site and surrounds cannot be determined from this section</p>	<p>Recommend discussing mineralogy or cross referencing where relevant</p>

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
55	3.2.3	Land use	Error regarding North and South in first paragraph. <i>"Cattle grazing occupies almost all land uses between the mine site and the Copperfield Dam to the north (isn't Dam south of site?) and extends to Einasleigh in the south (isn't this north of site?)."</i>	Please review and update
56	3.2.4	Water users	Controlled releases are made from the Cooperfield dam in August to supplement the water hole in Einasleigh.	Will these releases have any impact on the project in terms of timing to release water from the reservoirs? Will environmental flow releases have cumulative impacts with the proposed construction and operations releases?
57	3.2.5	Historical releases		
58	3.3	Environmental Values	On going monitoring beyond Einasleigh to demonstrate this is a correct assumption? Before Copperfield River Gorge	
59	3.3.1	Site Specific Environmental Values		
60	3.3.1.1	Literature and Internet Review		
61	3.3.1.2	Search of the Queensland Entitlements Database		
62	3.3.1.3	Aerial Imagery Mapping	Has there been consultation with homestead?	Should note that Copperfield Dam also supplies water to homestead
63	3.3.2	Site Specific Environmental Values Applicable to the Release Regime	Table 15 (pg. 60) states that "The ephemeral nature of the Copperfield River catchment means that future use for aquaculture is highly unlikely" and section 3.4.2 states that "the WQOs for Aquaculture (specifically referring to commercial aquaculture operations) have not been incorporated into the assessment of the lowest WQO from all EVs". However, both Table 16 and section 3.5 include aquaculture values.	If it is not relevant it should be removed from various tables and graphs and the tick in column two of table 15 should be altered to a cross.
64	3.3.3	Management Intent		
65	3.4	Default Water Quality Objectives		
66	3.4.1	Copperfield River Classification		

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
67	3.4.2	Default Water Quality Objectives	<p>Nitrate WQO is incorrect.</p> <p>Table 16, pg. 65 - values in table need to be checked as per comment in Row 5 and 49</p> <p>Given that WQO are applied to both Total and filtered concentrations later in the document, it may be preferable to nominate WQO for both Filtered and Total for each relevant parameter</p>	<p>Toxicity value for nitrate is 0.7mg/L</p> <p>No scheduled default <u>physico/chem stressor</u> value for nitrate exists in Gulf Rivers. Either justify an appropriate default figure which can be taken from an adjacent scheduled catchment, or apply a site specific figure. The 2 widely varying nitrate values from Copperfield River are not sufficient to establish a site specific figure.</p>
68			<p>Nitrate needs to be assessed in relation to its potential for toxicity but also in relation to its potential impacts as a physical chemical stressor. In terms of toxicity, 95% species protection toxicity guideline is currently under review for Nitrate as N however, the draft number is nominated at 2.1 mg/L at this stage. The current water quality in the Eldridge Pit (Nitrate approximately 5 mg/L) is not anticipated to elicit toxicity under either the 1:25 or 1:200 minimum dilution proposals for construction or operational phases, respectively.</p> <p>Within the IAR, a Total Nitrogen (TN) WQO of 0.15 mg is incorrectly attributed to a toxicity based WQO from ANZECC 95% species protection. This may have been based on ANZECC risk measure which is used to assess the risk of a cyanobacteria bloom (see Case Study 1, page 3.3 28 of ANZECC 2000). This is used as a trigger in the ANZECC decision tree as well as an understanding of the important role which turbidity and stream flow have on risk of algae blooms.</p>	<p>It is recommended that a risk assessment of the potential risks of discharging Eldridge Pit water at 1:25 in terms the potential for algae blooms within the receiving environment is quantitatively assessed and presented as part of the IAR. Depending on the results of this risk assessment, the proposal may require revision. Based on the current water quality from Eldridge Pit, the resultant TN concentration may be approximately 0.27 mg/L, which triggers further investigation under ANZECC. As a minimum, receiving monitoring conditions for nutrients as well as Chlorophyll a may be needed within semi-permanent and permanent waterways downstream during this discharge type.</p>
69	3.4.3	Sample Sites and Frequency		
70	3.4.4	Water Quality Data Protocols	(pg. 71) Pit samples dot point 2 total nickel was erroneously low, was this in both pits or just one? Which one?	Clarify where samples were taken from in relation to pits, i.e. samples in both pits or a sample from Eldridge, etc.
71	3.4.4.1	Data Requirements for Background Data		
72	3.4.4.2	Water Quality Data Controls and Checks		

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
73	3.4.4.3	Requirements for comparison with WQOs for Aquatic Ecosystems		
74	3.5	Surface Water Quality and Site Specific WQOs	<p>TSF Dam Spillway</p> <p>(pg. 74) total arsenic exceeds the default WQO, but does not specify which WQO</p> <p>250ug/L for EC</p> <p>"pH lies outside the default WQO range" - for what?</p>	<p>Does this enable an estimate of quality of water going into Copperfield River from TSF. Where is this spillway located/where does it run in to?</p> <p>change sentence to include drinking water - health</p> <p>EC is measured in uS/cm</p> <p>pH default WQO for aquatic ecosystems</p>
75	3.5.1	Hardness Modification	Table 18 is missing units	add in units.
76	3.5.2	pH	This section refers to Appendix B for values. However, when cross-references with Appendix B, values are different. For example this section states that WB has a median value of 7.66 but Appendix B reports the median value as 7.73 for WB.	Please update IAR with consistent values.
77	3.5.3	Sulfate	Please include generic name for Corella sp. as well.	
78	3.5.4	Aluminium	Increasing aluminium in receiving environment.	Any idea of source of aluminium?
79	3.5.5	Cadmium		
80	3.5.6	Chromium	Details that LOR is <0.0001 mg/L	Should this be <0.001 mg/L?
81	3.5.7	Copper	Site WB sources of Copper - Is this due to local geology?	Please state in IAR.
82	3.5.8	Manganese		
83	3.5.9	Zinc		
84	3.5.10	Iron		
85	3.5.11	Nitrogen	Clarify the WQO for nitrate	As per comments made above in regard to nitrate
86	3.6	Comparison of Water Quality and Stream Flow		
87	3.6.1	pH		
88	3.6.2	Electrical Conductivity		
89	3.6.3	Zinc		

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
90	3.6.4	Other Parameters		
91	3.7	Representative Water Quality Baseline Site (WB)	...complex groundwater processes could be occurring that result in the transport of seepage to the Copperfield River in the vicinity of the WB monitoring site or further upstream.	Is this from existing activities e.g. TSF?
92	3.8	Hydrology		
93	3.8.1	Development of Water Resource Model		
94	3.8.2	Model Validation		
95	3.8.3	Streamflow Assessment		
96	3.9	Hydraulics and Fluvial Geomorphology		
97	3.9.1	Stream Hydraulics		
98	3.9.1.1	Model Development		
99	3.9.1.2	Baseline Results		
100	3.9.2	Fluvial Geomorphology		
101	3.1	Hydrogeology	This section is based on former studies. Some of the key details from these studies is not presented (i.e. where in relation to the project these boreholes were located etc).	Summarise, or reference to key information/assumptions in these studies
102	3.10.1	Regional Geology		
103	3.10.2	Local Geology		
104	3.10.3	Structural Geology		
105	3.10.4	Hydrogeological Setting		
106	3.10.5	Hydraulic Properties	The location of bores are not identified.	Include a map of bore locations relative to project site, proposed discharge point(s) and the river.
107	3.10.6	Groundwater Levels		
108	3.10.7	Groundwater Flow	Would like to know the location of semi-permanent waterholes found within the floodplain of the Copperfield River (especially if near release point). May be relevant for any groundwater interaction with surface water, and associated water quality impacts. Section concludes with (based on 2001 AGE study): <i>"it is considered that in the instance a hydraulic connection between the fault system and the river is present, there is potential for migration between the former mine area and the Copperfield River."</i>	Please provided locations of semi-permanent waterholes within the floodplain of the Copperfield River, particularly near proposed release point(s). Provided assessment of any potential impact on these due to project water releases.

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
109			No further conceptualisation was performed by AGE; however, it is considered that in the instance a hydraulic connection between the fault system and the river is present, there is potential for migration between the former mine area and the Copperfield River.	Is this of concern or not? Is there a hydraulic connection?
110	3.10.8	Recharge and Discharge		
111	3.10.9	Groundwater Quality	Bore BA06 and BA07	How do the suggested seepages recorded at the 2 bores affect water releases?
112	3.10.10	Registered Groundwater Bores		
113	3.10.11	Groundwater Dependant Ecosystems	<p>It is possible the riparian vegetation/ecosystems which fringe the Copperfield River are dependant on groundwater?</p> <p>Ephemeral surface water streams can often be referred to as "losing streams", as they tend to lose water to surrounding alluvial aquifers. This is as opposed to streams with long baseflow periods, which tend to gain water from surrounding alluvial aquifers. This means that any impacts to the water quality in an ephemeral surface water body, can make its way into the adjoining alluvial aquifer. As a result it can impact on ecosystems dependant on this groundwater.</p>	This section of the document needs to discuss if such a groundwater regime exists at this site and if the vegetation/ecosystems in the alluvium would be dependant on groundwater (i.e. are the regional ecosystems identified in Section 3.12.2 dependant on groundwater which may originate from the Copperfield River?).

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
114	3.11	Sediment Quality	The median results from Figure 40 seem to suggest an increase in metal concentrations between WB and W1. Perhaps this suggests that metals are falling out and accumulating at W1. This may be representative of what may happen when discharges occur from the Eldridge/Wises Pit (i.e. dissolved contaminants may flush downstream, sediment bound contaminants may fall out and accumulate?)	There is no further assessment of sediment within the remainder of the report. This needs to be addressed. During current stable weather conditions it is possible there are minimal suspended sediment concentrations within the water column. However, once the water is pumped and moved more frequently, and turbulent weather conditions are in play (when discharges are planned) there might be more suspended sediment in the water. The assessment needs to consider the potential for sediment releases and their potential fate in the Copperfield River.
115	3.12	Aquatic Ecology		
116	3.12.1	Approach		
117	3.12.2	Riparian Vegetation	No linkage to groundwater Sub dominant Of Concern RE identified along river banks (9.3.3.a). As per above general comment, no other discussion on terrestrial ecology aside from RE identification.	refer to groundwater dependant ecosystems row above updated draft IAR should include material on terrestrial ecology, including riparian veg, and the potential for groundwater dependence.
118			Italicise latin names of species. No table number	
119	3.12.3	Aquatic Habitat Characteristics and Condition		
120	3.12.4	Physico-chemical Water Quality Parameters		
121	3.12.5	Macroinvertebrates		
122	3.12.5.1	Historical Survey Results		
123	3.12.5.2	Survey Results 2018		
124	3.12.6	Fish Communities		
125	3.12.7	Turtles		
126	3.12.8	Macroinvertebrate Findings		
127	3.13	Summary		
128	4	Impact Assessment		

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
129	4.1	Overview	As a whole the Impact Assessment fails to identify what the impacts are which could result from the proposed activity if not controlled/managed appropriately.	<p>This section needs to list out the consequences if things go wrong, i.e, releases could have potential to (including but not limited to):</p> <ul style="list-style-type: none"> - overload the Copperfield River with toxicants (metals/metalloids) rendering it acutely or chronically toxic to ecosystems and humans - overload the Copperfield River with chemical stressors, causing it to become too salty, full of sulphate, or ridden with algae blooms (which can release toxins of their own) - alter the hydrology (availability and flow) of water in the Copperfield River - release contaminated sediments which may deposit and accumulate in some parts of the river - release aquatic species/fish from the dam which may contain elevated concentrations of metals? <p>The above summarise the major limitation of the remainder of the IAR, it is all focused on dot point 1, and 3, with minimal/no consideration of the other points.</p>

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
130			<p>(pg. 127) details that where WQOs were available for more than one EV, the highest value was applied. Should this be lowest? If required, please change "highest" to "lowest".</p> <p>Due to differences in assessment methods, WQO exceedances in the receiving environment identified in Chapter 3 (existing environment) are inconsistent with those identified in chapter 4 (following a release).</p> <p>Chapter 3 -- receiving environment (prior to release) exceedance of:</p> <ul style="list-style-type: none"> - dissolved aluminium, total arsenic, dissolved chromium, dissolved copper, total manganese, total iron and dissolved zinc <p>o Chapter 4 – receiving environment (post releases) exceedance of:</p> <ul style="list-style-type: none"> -Section 4.3.6 identifies zinc and total manganese as the parameters of most concern. - Section 4.6.2 identifies WQO exceedance of total nitrogen (1:200 – Operational phase) - Section 4.6.1 identifies WQO exceedance of dissolved cadmium, dissolved cobalt, dissolved zinc, total arsenic, total cobalt, total manganese and total nitrogen (1:25 – construction phase). 	<p>Review entire document to ensure consistency of methodologies and to support development of conclusions. Releasing the construction water direct from Eldridge Pit should be identified as an option if this is feasible (rather than mixing with poorer quality water in Wises Pit).</p>
131	4.2	Release Water Toxicity Assessment		
132	4.2.1	Overview	<p>It is quite difficult for the reader to understand the purpose of a DTA in the assessment</p>	<p>Recommend clarifying the purpose of the DTA to the reader. i.e. The DTA is used to assess if the mixture of toxicants + inhibitors (hardness etc) is toxic within the mixing zone? Water Quality Objectives are used to ensure protection from toxicants after mixing/dilution has removed any protection from inhibitors?</p>
133	4.2.2	Release Water (Composite Samples)	<p>(pg. 129-132) – Water quality of samples submitted for DTA analysis</p> <ul style="list-style-type: none"> - Parameters compared to default WQO regardless of sample type (e.g. dissolved sample being compared to total WQO) 	<p>It may be preferable to nominate WQO for both Filtered and Total for each relevant parameter.</p>
134	4.2.3	Dilution Water		
135	4.2.4	Ecotoxicology Tests		

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
136	4.2.5	Results	Reader can be confused/mislead by the DTA findings. Reader needs to understand why the dilution rates from the DTA are not all that is required to protect ecosystems in Copperfield River.	Clarify to the reader why diluting the 90/10% pit water by only 1.6 Copperfield River is not actually sufficient to protect the Copperfield River (in the 1.6 dilution, most of the toxicity is still being cloaked by the high level of hardness in the mixture?) Make the reader understand the relevance of the DTA and the 1.6 dilution rate (i.e. 1.6 dilution will be immediately achieved, therefore the mixing zone wont be highly toxic?)
137	4.3	Assessment of Assimilative Capacity	Throughout the document dilutions are presented as both ratios and percentages. A dilution ratio of 1:25 is equal of a 4% dilution but is reported as 4.696 or 4.70%.	Review document for accuracy and consistency of terminology.
138	4.3.1	Dilution Ratio and Constituents of Concern		
139	4.3.2	Hardness Incorporation		
140	4.3.3	Parameters with Limited Historic Data		
141	4.3.4	Construction Phase Releases	- Construction release assumes full mixing of the pits, however it is unclear how this mixing would occur operationally. - Assuming release of water during construction phase is to be from Wises pit, calculated maximum concentrations should be based on the ratio of water in Wises pit during the construction phase. IE: assumed volume of Wises pit is 3GL (section 2.3.3.1); Stage 1 & 2 of construction requires dewatering of 7.58 GL from Eldridge to Wises pit (section 4.5.6.9). Therefore, mixing of the two pits prior to discharge would closer 70% Eldridge to 30% Wises, rather than the 90% Eldridge and 10% Wises mixing used.	The proposed mixing for the construction dewatering should be properly defined and used in the risk assessment
142	4.3.5	Sensitivity Analysis for Operational Phase Releases	This section erroneous refers to “assumptive capacity” rather than “assimilative capacity”.	Replace “assumptive” with “assimilative”.

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
143	4.3.6	Dilution Ratio for Adoption	<p>The last two dot points introduce a lot of new complex hydraulic/flow information to the reader and is confusing to follow.</p> <p>This section describes the use of 67% of the receiving environments assimilative capacity during operational releases. During the wet season some assimilative capacity may be required to account for overtopping of the Kidston tailing dams and other inputs of runoff from the Kidston site. The assimilative capacity of the receiving environment used by the current development should be described in this section.</p>	<p>Recommend either simplifying this information, or not introducing it until after the reader has been educated on the proposed release volumes and ratios (these items are introduced in Section 4.5.4)</p> <p>This section should include an analysis of the assimilative capacity of the receiving environment already used by the current Kidston Development, including stormwater runoff and tailing dams overtopping during the wet season.</p>
144			Second dot point difficult to understand	Please clarify

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
145			<p>This IAR section attempts to address the issues relating to the cumulative impacts of the other nearby discharges by using 67% of the assimilative capacity for Total Manganese. Total Manganese is not the limiting contaminant based on minimum dilution required to meet local water quality objectives (WQOs) based on recent Eldridge Pit data (which contains the vast majority of water currently stored on the site). Dissolved zinc remains the contaminant of most concern for the largest volume of water stored on the site, even when corrected for predicted hardness at proposed discharge ratio 1:25 (Construction phase) but also for the operational phase discharge ratio (1:200). Table 39 of the draft IAR highlights that dissolved zinc rather than total manganese is the contaminant of most concern. It is unclear why total manganese has been selected as the contaminant of most concern, and then utilised in further modelling, discussion and justification.</p>	<p>Please note that many errors are noted in the W2 median background numbers presented in Table 63 of the IAR. The hardness modification of trigger values appears to have been undertaken using the maximum hardness ever recorded, and this does not reflect the current hardness on the Eldridge Pit profiling (and this approach is likely to underestimate the toxicity from discharges). Given the overall lack of detailed impact assessment for the construction phase proposal, WS recommends that the IAR is revised. The IAR should present the resultant worse case and median instream concentrations of every contaminant of concern from the proposed discharge/s during construction phase proposed ratio (1:25) and an assessment of potential impacts from the resultant concentrations. The modelling, calculations and comparisons should be undertaken on worst case pit water quality (ever), worst case current pit water (from latest sampling round) and median scenarios for datasets (while median hardness and upstream water quality should be applied).</p> <p>An understanding of the spatial extent or mixing zone until dilution returns the concentrations of contaminants of concern to 95% species protection or other environmental value (EV) objectives needs to be presented (comparison for all relevant indicators against all WQOs and guidelines, including 95%, 90% and 80% species protection, drinking water etc). These spatial impact extents need to be assessed alongside the identified spatial locations of EVs which have been identified within the IAR, REMPs (or are identified in the future) – for example the nature refuge 3.3 km d/s, the Oaks homestead 11.3 km d/s and the Einsleigh Gorge 46 km d/s (as well as any semi-permanent or permanent water holes downstream).</p>

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
146			Continued from above.	<p>The IAR doesn't adequately identify all of the EVs nor include the Aquatic Conservation Assessment which assesses the Copperfield River as High.</p> <p>The Inland waters regional NRM Assessment 2015 also provides as assessment of the aquatic ecosystems that should be protected - http://plan.northerngulf.com.au/wp-content/uploads/2015/11/Inland-Waters-Assessment-FINAL-.pdf</p> <p>The magnitude and duration, of possible exceedances should also be clearly presented and should reflect a realistic and comprehensive understanding of the planned construction discharge quality, quantity and timing/s (i.e. recovery opportunities). This is necessary to assess in terms of whether the proposal is acceptable based on the temporary nature of the proposed construction discharge.</p>
147	4.4	Mixing Zone Modelling	<p>It is hard to tell whether this section relates to operation or construction or both. Is it proposed to use some sort of difuser for construction? The text reads as though it does.</p> <p>This section should consider a range of construction releases based on the potential range of water quality and quantity that may be required to be released for construction. The construction mixing model should also take into the account the influence of the release location, if this is different to the release location for operational releases.</p> <p>Are there potential impacts on Einasleigh Gorge due to release during construction phase (insufficient modelling)</p>	<p>Include mixing modelling for potential water releases required for construction, taking into account at least the predicted maximum water quantity and contamination levels. Take into account any difference in the release location for the construction release, if it is different from the operational release location.</p> <p>These impacts should be explored and appropriately assessed.</p>
148	4.4.1	Model Limitations		

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
149	4.4.1.1	Model Scenario Inputs and Assumptions	How can this release rate be confirmed for construction? Is the model for operations or construction?	
150	4.4.1.2	Conceptual Diffuser Configurations Used	The last paragraph on page 143 seems to indicate there may actually be more than 1 diffuser?	Suggest clarifying this for the reader. The modelling all seems to be based on a single diffuser structure. Is the reality that there will be multiple diffusers in different locations?
151			Last two dot points in section - more information needed to understand the impacts in order to condition	
152	4.4.1.3	CORMIX Scenarios	<p>The model assumes the diffuser will be in the centre of the channel. This can create a complex challenge when obtaining a waterway barrier works approval from Fisheries QLD.</p> <p>Table 41 shows with each model the distance from the diffuser to the banks is a lot larger, leaving the reader unsure how a bank widens this much (banks are usually considered fixed structures)</p>	<p>Suggest obtaining Fisheries QLD's opinion on whether locating a structure in the centre of the channel will be acceptable. Centre channel is usually considered important for providing fish passage in low flow conditions, fisheries may be opposed to obstructing it, and may request the diffuser is located to the side. If this is the case, advise whether this impacts on the model, and re-run model if necessary.</p> <p>It is assumed "distance to banks" actually refers to "distance to edge of water line"? Each model is based on larger and larger flow events, meaning the body of water in Copperfield River will be wider? If this is correct, clarify to the reader.</p>
153	4.4.1.4	Scenario Results		
154	4.5	Assessment of Sustainable Load		
155	4.5.1	Mass Balance Modelling		
156	4.5.1.1	Initial Project Water Balance Model Development		

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
157	4.5.1.2	GoldSim Project Water Balance Model Key Assumptions and Input Data	Can be model be expanded to run past the Gorge?	It the model is extended past the Gorge it may go some way to demonstrating that there are no water quality impacts past Einasleigh.
158	4.5.1.3	Simulation Method		
159	4.5.2	Key Model Objectives		
160	4.5.2.1	Additional IQQM Model Development		
161	4.5.2.2	Model Limitations	Ongoing refinement of the Project design and operational planning will further develop these rules and may not be consistent with the rules adopted for this assessment	How will we (regulators) know this and final results?
162			Concentrations (end of pipe (EOP) and receiving environment) are assumed to be fixed and therefore not subject to any temporal variation or variation with flow.	What is the likelihood of this occurring in reality?
163	4.5.2.3	Inputs and Assumptions		
164	4.5.3	Modelled Scenarios		
165	4.5.4	Operational Phase Estimated Releases and Post-Release Flushes Operation		
166	4.5.4.1	Scenario 1 - Annual Simulation	Information repeated in 4.5.4	
167	4.5.4.2	Scenario 2 – Life of Project Simulation		

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
168	4.5.5	Mass Balance Results (Downstream Dilution) Operation		
169	4.5.5.1	Scenario 1 - Annual Simulation	In table 52 the concentration of manganese being released is stated ~0.09mg/L. It is uncertain where this figure is obtained from?	Up until this point in the document, all information has suggested manganese will be released at 3.6 mg/L. Recommend clarifying to the reader why 0.09mg/L is used in this model.
170	4.5.5.2	Scenario 2 – Life of Project Simulation	This model also uses 0.09 mg/L for manganese.	As per comment made in row above
171	4.5.6	Preliminary Construction Period Assessment	<p>Section 4.5.6 is not well structured and goes into too many subsections which cause the reader to become lost.</p> <p>Section 4.5.6 does not educate the reader in regards to where releases will occur from. Given the excess water is within Eldridge Pit, the reader may assume construction releases would occur directly from Eldridge Pit?</p>	<p>It may work better to separate into two different sections.</p> <ul style="list-style-type: none"> - Sections 4.5.6.1 to 4.5.6.5 seem to fit under a sub section of "construction release scenarios" (its here the reader learns why a certain scenario was favoured). - Section 4.5.6.6 to 4.5.6.9 seem to fit under a sub section of "chosen scenario modelling" (it is here the reader learns how the chosen scenario functions) <p>Clarify to the reader where construction releases will occur from. i.e. will they occur directly from Eldridge Pit (if so the composite pit analysis may no longer be relevant). Or will the construction water be released from the Wises Pit after the water has been pumped up from Eldridge Pit.</p>
172			Second dot point of this section	Does this mean there will be changes in SIS and TSFs? This would be useful to know as it could demonstrate that there will be an improvement of the quality of water entering the pits, which may support the argument that the water quality in the pits will improve over time.

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
173	4.5.6.1	Modelled Construction and Dewatering Schedule	Inadequate assessment of potential impacts from construction phase discharge scenario.	<p>Modelling and impact assessment for the proposed construction phase discharges are inadequate. There is also a lack of clarity in terms of the source of water for discharge and the quantity proposed to be discharged during the construction phase. Where decisions are still being made in terms of the operational requirements, the IAR should clearly assess impacts for the most likely scenarios. WS would need to see the following aspects of the project comprehensively addressed and assessed:</p> <p>1. Realistic water quality and quantity proposed for discharge during the construction phase. The IAR contains a lot of unnecessary details in relation to various pit blends. It is only necessary to investigate the median and worse case discharge impact from the pit water composition actually planned for discharge (during this phase). It is unclear why the 90% Eldridge: 10% Wises blend is the preferred blend for construction given the description of the planned discharge processes. Wises Pit current capacity is 10 GL (and 0.8 GL is estimated to be stored here currently), while Eldridge Pit is assumed to have a current storage volume of 28.5 GL. The construction phase discharge requirement is proposed as 1.5 GL (or 2.5 GLs). Is the plan that the remaining capacity of Wises Pit is filled before water is discharged during the construction phase, i.e. 9.2 GL of Eldridge Pit water is transferred to Wises Pit before any discharges for the construction phase occur. Or is there a suggestion that 100% Eldridge Pit water will be potentially pumped directly for discharge during the construction phase? Or is there a chance that a blend of pit waters similar to 1:1 may occur? If uncertainty remains as to the plan, then clearly distinct</p>

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
174			Continued from above.	<p>2. Details regarding the location and method of discharge (i.e. diffuser?)</p> <p>3. Construction phase mixing studies and downstream impact assessment for construction phase (See Issue 2 for more detail)</p> <p>4. The likely discharge durations, and spatial size of mixing zones for each contaminant of concern after the initial 1:25 dilution during the construction phase (see Issue 2 for more detail)</p> <p>5. Proposed conditions for end of pipe and within the receiving environment for the construction phase, which should be proposed in terms of the modelling predictions and protections of the receiving environment.</p>
175	4.5.6.2	Estimated Dewatering Volumes, Excess Water and Adopted Pump Rates		
176	4.5.6.3	Construction of Wises Upper Reservoir Embankment	Dot points in this section are difficult to understand. Yellow reference to staged Wises Pit construction.	Please clarify Need more info on why this is done.
177	4.5.6.4	Construction Scenarios Assessed	Construction release appears to rely (4 x 41 day events), this appears inconsistent with the modelled flow regimes.	To demonstrate feasibility of proposed construction dewatering scenario, please provide a figure or discussion of example scenarios in low, mean or high flow years detailing how the water will be removed at the appropriate dilution. Alternative dewatering options may need to be developed if a 'dry' year is encountered during the construction period.

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
178	4.5.6.5	Construction Period Modelling Results	<p>Still unclear at this point that construction releases are going from a different point to operations. Also that the water quality is different.</p> <p>The max daily limit for water licenece is cited in Section 3.2.4 as 16 ML/day; in this section it is intended to release 500ML? Confirm that 1ML per day of pit water will be used for construction and dust supression. Additional details of this level of water usage should be provided.</p>	<p>Feasibiilty of releasing 500 ML / day from Copperfield dam should be demonstrated, and any associated ecological risk should be identified. (would result in a 25% drop in water volume in the dam over the proposed 9 day release period).</p>
179	4.5.6.6	Estimated Construction Releases and Post-Release Flushes	<p>At this point the reader thinks the chosen scenario has been determined (but it is not entirely clear). Then further modelling is undertaken to determine the mass balance, and how post flushes occur?</p> <p>In the operation releases section, mixing zone modelling occured before this point. However no mixing zone modelling has occurred for construction. This also adds to the readers confusion, making the reader question if they are yet looking at the chosen option.</p> <p>It is also difficult to determine what the release trigger is for the chosen option.</p>	<p>As per comment for Section 4.5.6.</p> <p>Also provide justification as to why mixing zone modelling has not occurred for construction releases.</p> <p>This section suggests the release trigger is 400ML/day from Copperfield River. Table 57 suggests 500ML/day will be released from Copperfield River Dam. Clarify how both relate to each other? (i.e. do they have to occur together, a total of 900ML/day)?</p>
180			<p>The construction phase Post Release Flush Statistics (Table 59) shows release to flush ratios approach 62% markedly higher than the operational phase. This indicates that the construction phase when compared to the operational phase have an elevated risks of lower dilution remaining in sections of the stream.</p>	<p>Additional detail around the construction phase would provide an insight into the potential impacts of proposed releases in the construction phase and assist with the assessment of the proposal.</p> <p>Two initial thoughts that would help understand the proposed releases follow:</p> <ul style="list-style-type: none"> - In the impact assessment to date has there been an assessment of the probability of elevated contaminants remaining in sections of the stream after flow has ceased? - If there has been any significant risk of the contaminants remaining in sections of the watercourse after the flow event, has there been any consideration of contingencies to dilute these sections of the stream?

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
181	4.5.6.7	Construction Phase Mass Balance (Downstream Dilution)	In table 60 the concentration of manganese being released is stated ~0.2mg/L. It is uncertain where this figure is obtained from?	The remainder of the report suggested manganese will be released at 3.6 mg/L. Recommend clarifying to the reader why 0.2mg/L is used in this model.
182	4.5.6.8	Use of Asymmetrical Release Triggers	<p>The reader cannot determine what the consequence/meaning of the findings in 4.5.6.8 are? (are the findings useful and going to be adapted?)</p> <p>(pg. 180) dot point 2 states 186 days, should this be 188 days?</p>	<p>Clarify the meaning of these results for the reader</p> <p>Review document for accuracy and consistency</p>
183	4.5.6.9	Construction Phase Assessment Summary	<p>Difficult to determine the release trigger for the chosen option.</p> <p>(pg. 181) - Dewatering will take place in two distinct phases – stages 1 and 2 which will transfer approximately 7.58 GL from Eldridge Pit into the Existing Wises Pit. How will water be pumped if nothing has been constructed yet?</p> <p>(pg. 181) - Upon completion of the proposed Wises upper reservoir embankment the remaining volume of water will be transferred from Eldridge Pit to the fully constructed Wises upper reservoir - how will water be pumped prior to completion of construction?</p> <p>- if water is somehow being pumped from Eldridge to Wises, will this not change the water quality of the pit (10% Wises and 90% Eldridge – but wises will have a significant amount of Eldridge water), as such altering the dilution ratios that will ensure WQO are met?</p> <p>This section does not sufficiently demonstrate that the required dewatering volume can be released to the Copperfield River during the construction period. Calculations provided throughout this section are inconsistent. - Table 62 (below) implies the project is proposing to release at a rate of 129.6ML per day when the trigger of 400 ML/day is reached. However this would represent a ~ 1:4 dilution.</p>	<p>Extend Table 62 include 500ML/day from Copperfield River Dam is also a release trigger?</p> <p>Provide information regarding the movement of pit water prior to pump construction</p> <p>Clarify if the dilution ratios in the document take into account additional water from Eldridge</p> <p>Provide more fully developed options for release of water during construction phase, given that releases resulting in exceedances of WQO in receiving environments may not be feasible.</p>

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
184			Inconsistent information regarding WQO and impact on Einasleigh	Figure 61 suggests P5 result for meeting WQOs at Einasleigh. Is this consistent with the text here?
185	4.6	Predicted Concentrations in the Receiving Environment	While predicted concentrations have been presented, potential impacts of the release on aquatic environments has not be fully described. There is no discussion of the potential elevation of sulphates from current low receiving environment concentration or the potential impacts.	
186	4.6.1	Construction Phase	<p>Table 63 uses only the toxicant WQO for nitrate.</p> <p>(pg. 183) 7 WQO are being exceeded, that is approx. 25% of WQO assuming use of 27 parameters outlined in Section 3.5. The impacts of this are temporary and reversible (pg. 183), is there proof to support this statement?</p> <p>(pg. 183) – dot point 2 – should be 2.5% of possible releases during the construction phase would be made at a release ratio lower than 4.70% NOT 25% - also refer to section 9.2 which does not exist</p> <p>Data inconsistencies are present between Table 63 and Table 64.</p>	<p>An appropriate physico-chemical stressor WQO for nitrate needs to be applied as per comments above.</p> <p>Provide information that there will be no cumulative effects of this release and that effects are in fact temporary and reversible</p> <p>Review document to ensure numbers are correctly reported and consistency throughout</p> <p>- Provide the data source for “release water” listed in Table 63 & 64. Review for consistency between Table 63 and Table 64 (ie Hardness in “Release Water” listed as 1809.8 in Table 63 and 1270 in Table 64; the ‘historical maximum’ in pits should not vary)</p>

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
187	4.6.2	Operational Phase	<p>Table 64 uses only the toxicant WQO for nitrate.</p> <p>(pg. 187) - Composite 2 which represents a mixture of 90% of Eldridge Pit water and 10% Wises Pit water sampled in June 2018. The second mixture shows the highest historical concentration of any parameter from the Eldridge Pit and the Wises Pit mixed together at a ratio of 9 to 1 respectively</p> <p>(pg. 187) "Nitrogen does not have many toxicological impacts on aquatic organisms; rather it is a nuisance nutrient that promotes algal growth." - This can still be a problem in aquatic environments if there is too much nitrogen in the system.</p>	<p>An appropriate physico-chemical stressor WQO for nitrate needs to be applied as per comments above.</p> <p>- 90% of Eldridge Pit water and 10% Wises Pit is the same as Eldridge Pit and the Wises Pit mixed together at a ratio of 9 to 1 – are they supposed to be? Review document to ensure accuracy and consistency.</p> <p>Please provide additional details to how excess nitrogen will not have a negative impact on the receiving environment, will there be cumulative impact associated with this?</p> <p>Review entire document to ensure numbers are correctly reported.</p>
188			Impact - algal growth	What are mitigation options?
189	4.7	Potential Hydrology Impacts		
190	4.7.1	Discharge and Flow Duration		
191	4.7.2	Flow Spells	(pg. 195) - wet season is defined as Nov – Apr, Section 4.10.1.4 states that all construction will be completed during the dry season. However Table 54 (pg.166) implies that construction will begin in Feb/Jan.	Review document for accuracy and consistency.
192	4.7.3	Conclusions		
193	4.8	Potential Hydraulics and Fluvial Geomorphology Impacts	It is uncertain if the study/modelling is applicable to the near scale (i.e. immediately downstream of the diffuser).	The reader would assume the diffuser (like many structures in a waterway) may create turbulence and increase in velocity immediately downstream. Clarify whether this is the case, and whether in stream scour protection would be required.
194	4.8.1	Hydraulic Impacts of Releases	Table 71 and 72 - useful to compare these results to wet season flow rates	
195	4.8.2	Fluvial Geomorphology	Will regulators receive results of modelling when release point has been chosen?	

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
196	4.9	Potential Hydrogeology Impacts	Hydrogeology section is very light in detail. There does not appear to be consideration of whether contaminants released into Copperfield River can move into the alluvial groundwater.	The alluvial groundwater is likely recharged by the Copperfield River during flows (often referred to as a losing stream). Recommend assessing whether elevated contaminant levels (particularly during construction releases) can make their way into the alluvial groundwater.
197	4.1	Potential Aquatic Ecology Impacts		
198	4.10.1	Water Discharges		
199	4.10.1.1	Water quality	This section draws no clear conclusion of the impact.	<p>Recommend splitting into 3 sections.</p> <p>Firstly there is the assessment within the mixing zone. The DTA can only be used to conclude the release won't cause immediate toxicity in the mixing zone. (i.e. the toxicants are still there in elevated concentrations but being cloaked by hardness).</p> <p>Secondly: by the end of the mixing zone, the cloaking hardness has been diluted away, but so have the toxicants. At these concentrations they are low enough to meet standard Water Quality Objectives and should be adequate to protect most species.</p> <p>Thirdly: by the end of the mixing zone it needs to be recognised that some of the contaminants - while meeting WQO's will be significantly higher than the baseline/background receiving environment (i.e. sulphate, and likely nitrate being 2 such examples amongst others). There needs to be some recognition this will occur, and recognition if this may result in favourable conditions for species more tolerant of these parameters and detrimental conditions for those which have low</p>

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
200	4.10.1.2	Hydrology	This section does not adequately discuss impacts on fish passage	<p>This section needs to address whether fish passage will be impeded by the diffuser structure in low flow conditions. The modelling assumes the diffuser is placed in the low flow channel and this is generally not accepted by Fisheries QLD as it inhibits the passage of fish in low flow conditions.</p> <p>Fisheries QLD also tend to assess impacts on fish passage during flow conditions. Their intent is usually to ensure fish can move upstream along the edges of the channel. Fisheries should be consulted as to what the acceptable hydrological/velocity outcomes are expected during high flows and whether the proposed diffuser arrangement can meet these targets.</p>
201	4.10.1.3	Erosion and sedimentation	This section does not address the complexities which arise from the nature of a braided stream	<p>This section needs to discuss whether this section of the Copperfield River has the potential to naturally shift/meander. Braided streams constantly shift in alignment and dimensions (low flow channels and banks move quickly over time).</p> <p>Address whether this is a risk for the diffuser and if any natural shift could impede upon adequate mixing/dispersion. i.e. will the low flow channel and bed/banks need to be "locked in" via retaining structures, scour protection etc?</p> <p>If there are no impacts to fish passageway please provide reasons</p>
202			Further, photographic monitoring of the release point over time will document and monitor the rate of erosion and deposition occurring at and downstream of the release point.	And if erosion is caused by release? What are the options / mitigations strategies?
203	4.10.1.4	Development of the release point	Riparian zone will be rehabilitated?	To what standard?
204	4.11	Risk Assessment	<p>What about likelihood?</p> <p>Insufficient identification of risks associated with proposed exceedance of WQO for several parameters during construction phase release.</p>	
205	4.12	Summary	<p>While approval is sought for releases which are predicted to result in exceedances of water quality objects, potential impacts of these proposed exceedances have only been minimally discussed</p>	<p>The summary will need to incorporate changes outlined above.</p> <p>The document is lacking in its description of potential real impacts associated with proposed exceedances of WQO.</p>

#	IAR Section	Heading/Topic	IAR review comment	Proposed Solutions
206	5	Release Criteria and MonitoringCriteria and Monitoring		
207	5.1	Summary of Proposed Release Criteria	<p>Statement made that "real time monitoring in the receiving environment and the pits for key contaminants is not practical.", with no further explanation.</p> <p>This section lacks end of pipe release limits. Such limits will likely be conditioned.</p>	<p>Firstly: Define what is meant by real time monitoring Secondly : Need further discussion on why this is not practical, and why it would not be warranted.</p> <p>It is suggested that the last two sub points from this section are translated into release limits and placed into Table 79.</p>
208			The minimum stream flow requirement and release volume should not be listed as a daily rate rather than instantaneous within the proposed conditions	In order that altering stream flow conditions can be rapidly responded to, an instantaneous stream flow condition and release flow condition should be utilised rather than a daily rate.
209	5.1.1	Indicative Approach to Releases	Not enough provided to set final conditions	
210	5.2	Monitoring	Monitoring does not include sediment	Some form of sediment monitoring should be included, particularly in locations where released sediment may settle and accumulate (possibly nearby bridge/culvert crossings etc)
211	6	References		
212	7	Standard Limitations		
213	Appendix A			
214	Appendix B			
215	Appendix C			
216	Appendix D			
217	Appendix E			
218	Appendix F			
219	Appendix G			
220	Appendix H			
221	Appendix I			

Permit¹

Environmental Protection Act 1994

Environmental authority

This environmental authority is issued by the administering authority under Chapter 5 of the Environmental Protection Act 1994.

Permit¹ number: EPML00817013

Environmental authority takes effect on 4 October 2013.

Anniversary date 19 November.

An annual return and the payment of the annual fee will be due each year on the anniversary day each year. At the time of issue the annual fee is \$30,028.80.

Environmental authority holder(s)

Name	Registered address
Kidston Gold Mines Limited	c/- Barrick Australia Pacific Ltd Brookfield Place - Level 9 125 St George Terrace PERTH WA 6000

Environmentally relevant activity and location details

Environmentally relevant activity(ies)	Location(s)
Mining – Mining Lease- Other Activities - Site Specific <i>Environmental Protection Regulation 2008 Schedule 2A – Item 20 – A mining activity that is an ineligible ERA, other than a mining activity mentioned in items 9 to 19</i> Aggregate Environmental Score - 136	ML3347

Additional information for applicants

Environmentally relevant activities

The description of any environmentally relevant activity (ERA) for which an environmental authority is issued is a restatement of the ERA as defined by legislation at the time the approval is issued. Where there is any inconsistency between that description of an ERA and the conditions stated by an environmental authority as to

¹ Permit includes licences, approvals, permits, authorisations, certificates, sanctions or equivalent/similar as required by legislation

the scale, intensity or manner of carrying out an ERA, then the conditions prevail to the extent of the inconsistency.

An environmental authority authorises the carrying out of an ERA and does not authorise any environmental harm unless a condition stated by the authority specifically authorises environmental harm.

A person carrying out an ERA must also be a registered suitable operator under the *Environmental Protection Act 1994* (EP Act).

Contaminated land

It is a requirement of the EP Act that if an owner or occupier of land becomes aware a notifiable activity (as defined in Schedule 3 and Schedule 4) is being carried out on the land, or that the land has been, or is being, contaminated by a hazardous contaminant, the owner or occupier must, within 22 business days after becoming so aware, give written notice to the chief executive.

<div style="border: 1px solid red; padding: 5px; display: inline-block;">sch4p4(6) Personal information</div>	4/10/13
Signature	Date

Dean Sharpe
Delegate of the administering authority
Environmental Protection Act 1994

Enquiries:
PO Box 7230
CAIRNS QLD 4870
Phone: (07) 4222 5334
Fax: (07) 4222 5070

Obligations under the *Environmental Protection Act 1994*

In addition to the requirements found in the conditions of this environmental authority, the holder must also **meet** their obligations under the EP Act, and the regulations made under the EP Act. For example, the holder must comply with the following provisions of the Act:

- general environmental duty (section 319)
- duty to notify environmental harm (section 320-320G)
- offence of causing serious or material environmental harm (sections 437-439)
- offence of causing environmental nuisance (section 440)
- offence of depositing prescribed water contaminants in waters and related matters (section 440ZG)
- offence to place contaminant where environmental harm or nuisance may be caused (section 443)

Location: Approximately 275km south-west of Cairns and 40km south of Einasleigh
 Located on Mining Lease ML3347

Relevant activity/ies:

Mining – Mining Lease- Other Activities - Site Specific

Environmental Protection Regulation 2008 Schedule 2A – Item 20 – A mining activity that is an ineligible ERA, other than a mining activity mentioned in items 9 to 19

Aggregate Environmental Score - 136

The environmentally relevant activity(ies) conducted at the location as described above must be conducted in accordance with the following site specific conditions of approval.

Schedules of Conditions

This **environmental authority** consists of the following schedules of conditions:

Schedule	Issue	Page
A	General	5
B	Air	10
C	Water	11
D	Noise and Vibration	22
E	Regulated Dams	23
F	Land and Rehabilitation	28
G	Definitions/Acronyms	31
H	Maps/Plans	34

SCHEDULE A – GENERAL**Activity**

- A1 This environmental authority does not authorise environmental harm unless a condition contained within this authority explicitly authorises that harm. Where there is no condition or the authority is silent on a matter, the lack of a condition or silence shall not be construed as authorising harm.

Maintenance of Measures, Plant and Equipment

- A2 The environmental authority holder must:
- (a) install all measures, plant and equipment necessary to ensure compliance with the conditions of this environmental authority;
 - (b) maintain such measures, plant and equipment in a proper condition;
 - (c) operate such measures, plant and equipment in a proper manner.
- A3 No change, replacement or alteration of any plant or equipment is permitted if the change, replacement or alteration increases, or is likely to increase, the risk of environmental harm caused by the mining activities.
- A4 All instruments and devices used for the measurement or monitoring of any parameter under any condition of this environmental authority must be calibrated, and appropriately operated and maintained.

Monitoring and Reporting

- A5 Any management or monitoring plans, systems or programs required to be developed and implemented by a condition of this environmental authority must be reviewed for effectiveness in minimising the likelihood of environmental harm on an annual basis and amended promptly as necessary to meet that objective.
- A6 The environmental authority holder must record, compile, evaluate and keep all monitoring results, records and documents required by this environmental authority, and any complaints received about the mining activities, and make available for inspection all or any of these records upon request by the administering authority.
- A7 Where monitoring is a requirement of this environmental authority, ensure that a competent person(s) or body possessing appropriate experience and qualifications perform the required measurements.
- A8 All analyses and tests required to be conducted under this environmental authority must be carried out by a laboratory that has NATA certification for such analyses and tests, except as otherwise authorised by the administering authority.
- A9 All determinations of water quality must be:
- (a) made in accordance with methods prescribed in the latest edition of the administering authority's Water Quality Sampling Manual.
 - (b) collected from the monitoring locations identified within this environmental authority within two hours of each other where possible.
 - (c) carried out on representative samples.
- A10 The following information must be recorded in relation to all water monitoring required under the conditions of this environmental authority and submitted to the administering authority in the specified format when requested:
- (a) the date and time upon which the sample was taken;
 - (b) the monitoring point at which the sample was taken;
 - (c) the measured or estimated daily quantity of the contaminants released from all release points;
 - (d) the release flow rate at the time of sampling for each release point;
 - (e) the results of all monitoring and details of any exceedences with the conditions of this environmental authority; and

- (f) water quality monitoring data must be provided to the administering authority electronically in the specified format upon request.

Financial Assurance

- A11 The holder of this environmental authority must provide a financial assurance of an amount determined by the administering authority in accordance with the administering authority's Guideline – *Financial assurance for mining activities*, and in a form acceptable to the administering authority.
- A12 The amount of financial assurance may be reviewed by the administering authority, at any time including when a plan of operations is amended or replaced, the authority is amended or new information is obtained from an audit or other sources. The financial assurance must remain in force until the administering authority is satisfied no claim on the financial assurance will be required.

Risk Management

- A13 The environmental authority holder must before 29 August 2013 develop and implement a risk management system for mining activities which conforms to the Australian Standard for Risk Management (AS/NZ 4360:2004) or the latest edition of Australian Standard for Risk Management.

Emergency Response / Contingency Planning

- A14 An emergency response / contingency plan must be developed and implemented to respond to emergency events and incidents. The emergency response / contingency plan must be contained within the current Plan of Operations.
- A15 The emergency response / contingency plan must address but must not be limited to the following matters:
- (a) response procedures to be implemented to prevent or minimise the risk of environmental harm arising from incidents;
 - (b) response procedures to minimise the extent and duration of environmental harm caused by an incident;
 - (c) the practices and procedures to be employed to restore the environment or mitigate any environmental harm caused;
 - (d) the resources to be used in response to an incident;
 - (e) procedures to investigate the cause of any incidents, including releases, and where necessary, implement remedial actions to reduce the likelihood of recurrence of similar events;
 - (f) the provision and availability of documented procedures to staff attending any incident to enable them to effectively respond;
 - (g) training of staff that will be called upon to respond to incidents to enable them to effectively respond;
 - (h) timely and accurate reporting of the circumstance and nature of incidents to the administering authority;
 - (i) procedures for accessing monitoring points during incidents; and,
 - (j) procedures to notify any person who may be affected by the event as soon as reasonably possible and no later than 24 hours of becoming aware of the event with the following information to be provided at a minimum:
 - i. the location of the release;
 - ii. the date and time of the release;
 - iii. the estimated quantity (if found in detectable concentrations within the limits of reporting) and type of any contaminants involved in the incident; and,
 - iv. the potential impacts to environmental values, livestock and public health caused by the release.

Notification of Emergencies, Incidents and Exceedences

- A16 The environmental authority holder must notify the administering authority by telephone or facsimile as soon as reasonably possible and no later than 24 hours after becoming aware of:

- (a) any emergency or incident which results in the release of contaminants not in accordance, or reasonably expected to be not in accordance with the conditions of this environmental authority; or,
- (b) any monitoring result that indicates an exceedence of any environmental authority limit.

A17 The notification must include but not be limited to the following:

- (a) the environmental authority number and name of the holder;
- (b) the name and telephone number of the designated contact person;
- (c) the location of the emergency, incident or exceedence;
- (d) the date and time of the emergency, incident or exceedence;
- (e) the time the holder of the environmental authority became aware of the emergency, incident or exceedence;
- (f) the estimated quantity and type of substances involved in the emergency, incident or exceedence;
- (g) the cause of the emergency, incident or exceedence if known;
- (h) a description of the nature and effects of the emergency, incident or exceedence including risks to the environment, public health or live stock;
- (i) immediate actions taken to prevent or mitigate any further environmental harm caused by the emergency, incident or exceedence; and,
- (j) details of any notification of persons who may be affected by the emergency, incident or exceedence.

A18 Further written advice must be provided to the administering authority within fourteen (14) days following the initial notification of an emergency, incident or exceedence, including the following:

- (a) results and interpretation of any samples taken and analysed;
- (b) outcomes of actions taken at the time to prevent or minimise unlawful environmental harm;
- (c) proposed actions to prevent a recurrence of the emergency, incident or exceedence.

Complaints

A19 Records must be kept of all environmental complaints received about the mining activities and must be made available for inspection by the administering authority on request including the following details:

- (a) name, address and contact number of the complainant;
- (b) time and date of the complaint;
- (c) reasons for the complaint;
- (d) investigations undertaken;
- (e) conclusions formed;
- (f) actions taken to resolve the complaint;
- (g) any abatement measures implemented; and,
- (h) person responsible for resolving the complaint.

A20 When requested by the administering authority, the environmental authority holder must undertake relevant specified monitoring within a timeframe nominated by the administering authority to investigate any complaint of environmental harm. The results of the investigation (including an analysis and interpretation of the monitoring results) and abatement measures implemented must be provided to the administering authority within fourteen (14) days of completion of the investigation.

Community

A21 The holder of this environmental authority must establish, promote and maintain easily accessible lines of communication with residents and land owners to ensure that community impacts are identified and managed. This must include but not be limited to regular meetings with all relevant stakeholders at intervals of not less than twelve (12) months.

Third Party Auditing

A22 Compliance with the conditions of this environmental authority must be audited annually by a suitably qualified third party auditor nominated by the environmental authority holder and accepted by the

administering authority within one year of the commencement of this environmental authority, and then at regular intervals not exceeding once every three years.

- A23 Upon receipt of the third party audit report, the environmental authority holder must submit a copy to the administering authority.
- A24 The third party auditor must certify the independent findings of the audit in the report.
- A25 The financial cost of the third party audit is the responsibility of the holder of this environmental authority.
- A26 The holder of this environmental authority must immediately act upon any recommendations arising from the audit report by:
- (a) investigating any non-compliance issues identified; and,
 - (b) as soon as practicable, implementing measures or taking necessary action to ensure compliance with the requirements of this environmental authority.
- A27 Not more than three (3) months following the submission of the audit report to the administering authority, the holder of this environmental authority must provide a written report to the administering authority addressing the:
- (a) actions taken by the holder to ensure compliance with this environmental authority; and,
 - (b) actions taken to prevent a recurrence of any non-compliance issues identified.

Storage and Handling of Flammable and Combustible Liquids

- A28 All explosives, hazardous chemicals, corrosive substances, toxic substances, gases, dangerous goods, flammable and combustible liquids must be stored and handled in accordance with the relevant Australian Standard where such is available. Where no relevant Australian Standard exists, store such materials within an effective on-site containment system.
- A29 Notwithstanding the requirements of any Australian Standard, any liquids stored on the licensed place that have the potential to cause environmental harm must be stored in or serviced by an effective containment system that is impervious to the materials stored and managed to prevent the release of liquids to waters or land. Where no relevant Australian Standard is available, the following must be applied:
- (a) storage tanks must be bunded so that the capacity and construction of the bund is sufficient to contain at least 110% of a single storage tank or 100% of the largest storage tank plus 10% of the second largest storage tank in multiple storage areas; and,
 - (b) All chemical product drum storages must be bunded so that the capacity of the bund is sufficient to contain at least 100% of the maximum design storage volume within the bund.
- A30 All containment systems for chemicals and flammable or combustible liquids must be designed to minimise rainfall collection within the system.
- A31 The holder of the environmental authority must minimise the potential for contamination of land and waters by diverting stormwater around contaminated areas and facilities used for the storage of chemicals and flammable or combustible liquids.
- A32 Spillage of any contaminant must be contained and land remediated to prevent environmental harm.

Transition to New Standards

- A33 Where a condition requires compliance with a standard published externally to this authority and the standard is amended or changed subsequent to the issue of this authority:
- (a) Comply with the amended or changed standard within two (2) years, unless a different period is specified in the amended standard or relevant legislation.

- (b) Until compliance with the amended or changed standard can be achieved, continue to remain in compliance with the standard that was current immediately prior to the relevant amendment or change.

Exploration

- A34 Disturbance due to exploration activities in areas not scheduled to be mined must be rehabilitated in accordance with the provisions detailed in the administering authority's *Code of Environmental Compliance for Exploration and Mineral Development Projects*.

END OF CONDITIONS FOR SCHEDULE A

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SCHEDULE B - AIR

General

- B1 The release of dust, noxious or offensive odour or any other airborne contaminants resulting from the mining activities must not cause environmental harm at any sensitive place or commercial place.

END OF CONDITIONS FOR SCHEDULE B

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RTI Act 2009

SCHEDULE C - WATER

General

- C1 Contaminants that will or have the potential to cause environmental harm must not be released directly or indirectly to any waters except as permitted under the conditions of this environmental authority.
- C2 The maintenance and cleaning of vehicles and any other equipment or plant must not be carried out in areas from which contaminants can be released into any waters, roadside gutter or stormwater drainage system.
- C3 Any spillage of wastes, contaminants or other materials must be cleaned up as quickly as practicable. Such spillages must be cleaned up using dry methods that minimise the release of wastes, contaminants or materials to any stormwater drainage system, roadside gutter or waters.

Contaminant Release to Waters

- C4 The release of contaminants to waters must only occur from the release points specified in Table C1 – Release Points and depicted in Schedule H Figure 1 – Existing Built Drainage, Clean Water Diversions and Seepage Containment Structures.
- C5 The release of contaminants to waters from the release points must be monitored at the locations and frequency specified in Table C1 – Release Points, for each quality characteristics specified in Table C2 – Release Water Trigger Levels and Contaminant Limits.

Table C1 - Release Points

Release Point	Description of Water Release	Description of Receiving Waters	Monitoring Frequency	Monitoring Location	
				Latitude (GDA94 MGA z55)	Longitude (GDA94 MGA z55)
TSF spillway	Stormwater overflow	Copperfield River	One sample must be taken within 12 hours of a release event ¹ commencing. A second sample must be taken between 12 and 24 hours after the release event ¹ commences. Where a release event ¹ has a duration of 24 hours or greater, samples must be taken daily for one week, and once a week thereafter until release ceases.	-18.9006	144.1490
Butchers Creek Dam spillway	Seepage waters & stormwater overflow	Copperfield River		-18.8874	144.1595
North Waste Rock Dump Seepage Dam spillway	Seepage waters	Charles Creek		-18.8614	144.1441
Managers Creek Dam spillway	Seepage waters & stormwater overflow	Copperfield River		-18.8778	144.1666
Sediment Dam 1 (HD2) spillway	Seepage waters & stormwater overflow	Copperfield River		-18.8625	144.1594
Sediment Dam 2 (HD3) spillway	Seepage waters & stormwater overflow	Copperfield River		-18.8684	144.1665
Sediment Dam 4 (HD5) spillway	Seepage waters & stormwater overflow	Charles Creek		-18.5853	144.1506

¹ Release event is a surface water release from water storages or contaminated areas on the licensed place.

- C6 The release of contaminants to waters must not exceed the contaminant limits stated in Table C2 – Water Trigger Levels and Contaminant Limits when measured at the release monitoring points specified in Table C1 – Release Points, for each quality characteristic.

Table C2 - Water Trigger Levels and Contaminant Limits

Quality Characteristic	Trigger Levels (µg/L for toxicants)	Contaminant Limit (Mg/L for toxicants)
EC (µS/cm)	435 ⁹	1000 ⁴
pH (pH unit)	6.0 ² (minimum) 7.5 ² (maximum)	6.0 ⁴ (minimum) 8.5 ⁴ (maximum)
Sulphate (SO ₄ ²⁻) (mg/L)	9 ¹	1000 ³ (mg/L) or 95% of reference ⁶ , whichever is lowest.
Aluminium	55 ²	5 ³ (mg/L) or 95% of reference ⁶ , whichever is lowest.
Arsenic	13 ²	0.5 ³ (mg/L) or 95% of reference ⁶ , whichever is lowest.
Cadmium	0.2 ²	0.01 ³ or 95% of reference ⁶ , whichever is lowest.
Cobalt	50 ¹	1 ³ or 95% of reference ⁶ , whichever is lowest.
Copper	1.4 ²	1 ³ or 95% of reference ⁶ , whichever is lowest.
Cyanide (Total)	7 ²	1 ⁵
Lead	3.4 ²	0.1 ³ or 95% of reference ⁶ , whichever is lowest.
Manganese	1900 ²	95% of reference ⁶
Molybdenum	50 ¹	0.15 ³ or 95% of reference ⁶ , whichever is lowest.
Nickel	11 ²	1 ³ or 95% of reference ⁶ , whichever is lowest.
Zinc	8 ²	20 ³ or 95% of reference ⁶ , whichever is lowest.
Hardness (CaCO ₃)	Interpretational purposes only	

- 1 Trigger values are based on the 80th percentile of at least 10 but not more than 24 consecutive reference site samples derived using the administering authorities (2006) methodology (Table D1, and section 3.4.3.1).
- 2 Default trigger values from ANZECC (2000) trigger levels for aquatic ecosystems indicative of slightly disturbed tropical Australian upland river ecosystems.
- 3 Contaminant limit based on ANZECC (2000) stock water quality guidelines.
- 4 Contaminant limit based on administering authority policy (Scientific Services, 2009).
- 5 Contaminant limit based on the predicted no effect concentration taken from page xii of the Sodium Cyanide (Priority Existing Chemical) Draft Assessment Report dated September 2009 (Department of Health & Ageing).
- 6 Where 95th percentile of reference is exceeded and the reference site also exceeds the value during the same event, the value of the reference site during the same event applies.
- 7 Default trigger value from Queensland Water Quality Guideline (Table G.4)

Note: All metals and metalloids must be measured for both total and dissolved (filtered) concentrations.

- C7** If quality characteristics of the release exceed any of the trigger levels specified in Table C2 - Water Trigger Levels and Contaminant Limits, during a release event, the environmental authority holder must compare the results of the downstream site to the data from reference monitoring sites and:
- (a) if the level of contaminants at the downstream site does not exceed the reference monitoring site data, then no action is to be taken; and,
 - (b) if the level of contaminants at the downstream site is greater than the reference monitoring site data, complete an investigation in accordance with the ANZECC & ARMCAZ (2000) methodology into the potential for environmental harm and provide a written report to the administering authority within 3 months, outlining:
 - i. details of the investigations carried out; and
 - ii. actions taken to prevent environmental harm.

Note: Where an exceedance of a trigger level has occurred and is being investigated, in accordance with C7(b) of this condition, no further reporting is required for subsequent trigger events for that quality characteristic within the three month investigation period.

- C8** If an exceedance in accordance with Condition (C7) is identified, the holder of the environmental authority must notify the administering authority within 14 days of receiving the result.

- C9 The release of contaminants directly or indirectly to waters must not produce any:
- (a) visible discolouration of receiving waters; nor,
 - (b) any slick or other visible or odorous evidence of oil, grease or petrochemicals, nor contain visible floating oil, grease, scum, litter or other objectionable matter.
- C10 Releases to waters must be undertaken so as not to cause erosion of the bed and banks of the receiving waters, or cause a material build-up of sediment in such waters.

Stream Flow Monitoring

- C11 The holder of this environmental authority must install, operate and maintain stream flow gauging stations to determine and record stream flows at the locations downstream of each release point as specified in Table C3 – Contaminant Release during Flow Events.
- C12 Notwithstanding any other condition of this environmental authority, the release of contaminants to waters must only take place during periods of natural flow events specified as the minimum flow in Table C3 – Contaminant Release during Flow Events, for the contaminant release points specified in Table C1 – Release Points.

Table C3 - Contaminant Release during Flow Events

Receiving Water Description	Release Point	Gauging Station Description	Latitude (GDA94)	Longitude (GDA94)	Minimum Flow in Receiving Water Required for a Release Event	Flow Recording Frequency
Copperfield River	Butchers Creek Dam spillway	Combination V-notch Rectangular Weir	-18.8874	144.1595	Twenty (20) times the rate at which treated waste waters are released	Continuous (minimum daily)
Charles Creek	North Waste Rock Dump Seepage Dam spillway	Combination V-notch Rectangular Weir	-18.8614	144.1441		

¹ The volume of flow can be determined by the height of water / flow. The actual flow must be a quantifiable measure. E.g. > or = 5 m³/sec.

- C13 At the time of release the flow rate in the receiving water must be at least twenty (20) times the rate at which treated waste waters are released.
- C14 The daily quantity of contaminants released from each release point must be measured and recorded at the monitoring points in Table C1 - Release Points.

Receiving Waters Monitoring

- C15 The quality of the receiving waters must be monitored at the locations and frequency specified in Table C4 - Receiving Waters Monitoring Points and depicted in Schedule H Figure 2 – Location of Receiving Waters Monitoring Sites for each quality characteristic stated in Table C2 - Water Trigger Levels and Contaminant Limits.
- C16 If quality characteristics of the receiving water at the downstream monitoring points exceed any of the trigger levels specified in Table C2 - Water Trigger Levels and Contaminant Limits the environmental authority holder must compare the downstream results to the reference results in the receiving waters and:
- (a) if the level of contaminants at the downstream site is the same or a lower value than the reference value for the quality characteristic then no action is to be taken; and,
 - (b) if the level of contaminants at the downstream site is greater than the reference monitoring site data complete an investigation in accordance with the ANZECC & ARMCANZ (2000)

methodology, into the potential for environmental harm and provide a written report to the administering authority within 3 months, outlining:

- i. details of the investigations carried out; and,
- ii. actions taken to prevent environmental harm.

Note: Where an exceedance of a trigger level has occurred and is being investigated, in accordance with C16(b) of this condition, no further reporting is required for subsequent trigger events for that quality characteristic within the three month investigation period.

C17 The release of contaminants to receiving waters must not exceed the contaminant release limits stated in Table C2 - Waters Trigger Levels and Contaminant Limits for each quality characteristic.

Table C4 - Receiving Waters Monitoring Points

Monitoring Point	Description of Receiving / Reference Waters	Monitoring Frequency	Monitoring Location	
			Latitude (GDA94 MGA z55)	Longitude (GDA94 MGA z55)
Receiving Water Monitoring Sites				
W1 Copperfield River; immediately downstream of the confluence of the Copperfield River and the unnamed tributary (TSF spillway discharge)	Copperfield River	Event based sampling of release ² or flow events ³ . One sample must be taken within 12 hours of a release event ² or flow event ³ commencing. A second sample must be taken between 12 and 24 hours after the release event ² or flow event ³ commences.	-18.8973	144.1599
W2 Copperfield River; immediately downstream of the confluence of the Copperfield River and Managers Creek	Copperfield River	Where a release event ² or a flow event ³ has a duration of 24 hours or greater, samples must be taken daily for one week, and once a week thereafter until release or flow event ceases.	-18.8779	144.1702
W3 Copperfield River; TBA ¹ (km) downstream of the Kidston Gold Mine	Copperfield River	For routine monitoring, upon commencement of flow of river and monthly thereafter whilst river is flowing.	-18.8268	144.1788
W4 Charles Creek; immediately downstream of the confluence of Charles Creek and the unnamed tributary (TSF western wall seepage collection system)	Charles Creek		-18.8736	144.1291
W5 Charles Creek; immediately downstream of the confluence of Charles Creek and the unnamed tributary (North Dump	Charles Creek		-18.8323	144.1488

Seepage Dam)				
Reference Sites				
WA Charles Creek; TBA ¹ (km) upstream of the Kidston Gold Mine	Charles Creek	For monitoring of release, upon commencement of release and weekly thereafter during release	-18.9015	144.1158
WB Copperfield River; TBA ¹ (km) upstream of the Kidston Gold Mine	Copperfield River	For routine monitoring, upon commencement of flow of river and monthly thereafter whilst river is flowing.	-18.9051	144.1625

1 To be determined and notified to the administering authority before 1 December 2012.

2 Release event is a surface water release from water storages or contaminated areas on the licensed place.

Monitoring of Water Storage Quality

C18 Water storages stated in Table C5 - Water Storage Monitoring must be monitored for the water quality characteristics specified in Table C6 – Water Storage Contaminant Limits, at the monitoring locations and at the monitoring frequency specified in Table C5 - Water Storage Monitoring.

Table C5 - Water Storage Monitoring

Water Storage Description	Monitoring Location	Latitude (GDA94 MGA z55)	Longitude (GDA94 MGA z55)	Monitoring frequency
TSF Sediment Dam	TSF Sediment Dam spillway	-18.9006	144.149	Quarterly
TSF Reclaim Dam	TSF Reclaim Dam spillway	-18.8847	144.1514	
Tailings Dam Western Wall Seepage Sump (S7)	Sump	-18.8827	144.1412	
Tailings Dam Western Wall Seepage Sump (S8)	Sump	-18.8877	144.1381	
Tailings Dam Western Wall Seepage Sump (S9)	Sump	-18.8899	144.1358	
Tailings Dam Western Wall Seepage Sump (S11)	Sump	-18.8969	144.1312	
Butchers Creek Dam	Butchers Creek Dam spillway	-18.8874	144.1595	
Managers Creek Dam	Managers Creek Dam spillway	-18.8778	144.1666	
North Waste Rock Dump Seepage Dam	North Waste Rock Dump Seepage Dam spillway	-18.8614	144.1441	
Sediment Dam 1 (HD2)	Sediment Dam spillway	-18.8625	144.1594	
Sediment Dam 2 (HD3)	Sediment Dam spillway	-18.8684	144.1665	
Sediment Dam 4 (HD5)	Sediment Dam spillway	-18.5853	144.1506	
Eldridge Pit	Base of ramp	-18.8695	144.1564	Annually
Wises Pit	Base of ramp	-18.8756	144.1495	

- C19 In the event that water storages defined in Table C5 - Water Storage Monitoring, exceed the contaminant limits defined in Table C6 – Water Storage Contaminant Limits, the holder of the environmental authority must implement measures to prevent access to waters by all livestock and minimise access by native fauna.

Table C6 – Water Storage Contaminant Limits

Parameter	Unit	Limit	Limit Type
EC	µS/cm	5970 ¹	Maximum
pH	pH units	4 – 9 ²	Range
Sulphate	mg/L	1000 ¹	Maximum
Aluminium	mg/L	5 ¹	Maximum
Arsenic	mg/L	0.5 ¹	Maximum
Cadmium	mg/L	0.01 ¹	Maximum
Cobalt	mg/L	1 ¹	Maximum
Copper	mg/L	1 ¹	Maximum
Cyanide (Total)	mg/L	10 ³	Maximum
Lead	mg/L	0.1 ¹	Maximum
Molybdenum	mg/L	0.15 ¹	Maximum
Nickel	mg/L	1 ¹	Maximum
Zinc	mg/L	20 ¹	Maximum

1 Contaminant limit based on ANZECC (2000) stock water quality guidelines.

2 Contaminant limit take from page 4.2-15 of ANZECC (2000) "Soil and animal health will not generally be affected by water with pH in the range of 4–9".

3 Limit previously negotiated with environmental authority holder.

Note: Analysis based upon total contaminant concentrations.

Stream Sediment Contaminant Levels

- C20 Sediment quality of receiving waters and reference waters must be monitored twice a year (once at the end of the wet season and once at the end of the dry season) at the monitoring locations defined in Table C4 - Receiving Waters Monitoring Points and Schedule H Figure 2 – Location of Receiving Waters Monitoring Sites, for the parameters defined in Table C7 - Stream Sediment Trigger Levels and Contaminant Limits.
- C21 If quality characteristics of the release exceed any of the trigger levels specified in Table C7 - Stream Sediment Trigger Levels and Contaminant Limits, during a release event, the environmental authority holder must compare the results of the downstream site to the data from reference monitoring sites and:
- if the level of contaminants at the downstream site does not exceed the reference monitoring site data, then no action is to be taken; and,
 - if the level of contaminants at the downstream site is greater than the reference monitoring site data, complete an investigation in accordance with the ANZECC & ARM CANZ (2000) methodology, into the potential for environmental harm and provide a written report to the administering authority within 3 months, outlining:
 - details of the investigations carried out; and,
 - actions taken to prevent environmental harm.

Note: Where an exceedance of a trigger level has occurred and is being investigated, in accordance with C21(b) of this condition, no further reporting is required for subsequent trigger events for that quality characteristic within the three month investigation period.

- C22** The release of contaminants to water must not result in an exceedance of the sediment contaminant limits stated in Table C7 - Stream Sediment Trigger Levels and Contaminant Limits when measured at the monitoring points specified in Table C4 - Receiving Waters Monitoring Points, for each quality characteristic.

Table C7 - Stream Sediment Trigger Levels and Contaminant Limits

Parameter	Unit	Trigger Level ²	Limit ³
Cyanide	mg/kg	0.1 ⁴	0.1 ⁴
Arsenic	mg/kg	Reference value ¹ or 20 ² , whichever is higher.	70 ³ or 3 times the reference value ¹ , whichever is higher
Cadmium	mg/kg	Reference value ¹ or 1.5 ² , whichever is higher.	10 ³ or 3 times the reference value ¹ , whichever is higher
Copper	mg/kg	Reference ¹ or 65 ² , whichever is higher.	270 ³ or 3 times the reference value ¹ , whichever is higher
Nickel	mg/kg	Reference value ¹ or 21 ² , whichever is higher.	52 ³ or 3 times the reference value ¹ , whichever is higher.
Lead	mg/kg	Reference value ¹ or 50 ² , whichever is higher.	220 ³ or 3 times the reference value ¹ , whichever is higher
Zinc	mg/kg	Reference value ¹ or 200 ² or, whichever is higher.	410 ³ or 3 times the reference value ¹ , whichever is higher
Particle size distribution for interpretation purposes			

1 Reference sites as defined in Table C4 - Receiving Waters Monitoring Points.

2 ANZECC (2000) interim sediment quality guideline - low values.

3 ANZECC (2000) interim sediment quality guideline - high values.

4 Origin TBA by environmental authority holder before 1 November 2012.

Note: Sediment quality contaminant levels are based upon total contaminant concentrations.

- C23** If an exceedance in accordance with Condition (C22) is identified, the holder of the authority must notify the administering authority within 14 days of receiving the result.
- C24** All stream sediment sampling must be undertaken in compliance with AS 5667.1 *Guidance on Sampling of Bottom Sediments* dated 1998 or subsequent versions of this publication.

Receiving Environment Monitoring Program

- C25** A Receiving Environment Monitoring Program (REMP) must be developed and implemented before 1 November 2013 to monitor and record the effects of the release of contaminants on the receiving environment periodically and whilst contaminants are being released from the licensed place, with the aim of identifying and describing the extent of any adverse impacts to local environmental values and for monitoring any changes in the receiving waters including groundwater.

A copy of the REMP must be provided to the administering authority prior to its implementation and due consideration given to any comments made on the REMP by the administering authority.

Note: For the purposes of the REMP, the receiving environment is the waters and connected waterways downstream of the release points identified in Table C1 – Release Points.

- C26** The REMP must address but should not necessarily be limited to the following:
- (a) Description of potentially affected receiving surface waters and groundwater's including key communities, reference water quality and sediment characteristics based on accurate and reliable monitoring data that takes into consideration any temporal variation (e.g. seasonality);
 - (b) Description of applicable environmental values and water quality objectives to be achieved (i.e. as scheduled pursuant to the Environmental Protection (Water) Policy);

- (c) Any relevant reports prepared by other governmental or professional research organisations that relate to the receiving environment upon which the REMP is proposed;
- (d) Water and sediment quality targets to be achieved within the receiving environment, and clarification of contaminant concentrations or levels indicating adverse environmental impacts during the period of the REMP;
- (e) Monitoring for any potential adverse environmental impacts caused by the release;
- (f) Monitoring of stream flow and hydrology;
- (g) Monitoring of toxicants that should consider the characteristics specified in Table C2 - Release Water Trigger Levels and Contaminant Limits, to assess the extent of the compliance of concentrations with water quality objectives and/or the ANZECC (2000) & ARM CANZ guidelines for slightly to moderately disturbed ecosystems;
- (h) Monitoring of physical chemical parameters as a minimum those specified in Table C2 - Release Water Trigger Levels and Contaminant Limits (in addition to dissolved oxygen saturation and temperature). The list of quality characteristics required to be monitored as per Table C2 will be reviewed once the results of the monitoring data is gathered or becomes available and if it is determined that there is no need to monitor for certain individual quality characteristics, these can be removed from Table C2;
- (i) Monitoring biological indicators (for macro-invertebrates in accordance with the administering authorities' monitoring and sampling manual (AusRivas methodology) and metals/metalloids in sediments (in accordance with ANZECC (2000) & ARM CANZ, BATLEY and/or the most recent version of AS5667.1 *Guidance on Sampling of Bottom Sediments*) for permanent, semi-permanent water holes and water storages;
- (j) The locations of monitoring points (including the locations of reference/upstream and downstream sites for each release point). Reference sites must comply with the following criteria:
 - i. be from the same bio-geographic and climatic region;
 - ii. have similar geology, soil types and topography;
 - iii. contain a range of habitats similar to those at the test sites;
 - iv. have a similar flow regime; and,
 - v. not be so close to the downstream sites that any disturbance at the downstream site also results in a change at the reference site;
- (k) The frequency or scheduling of sampling and analysis sufficient to determine water quality objectives and to derive site specific reference values within 2 years (depending on wet season flows) in accordance with the *Queensland Water Quality Guidelines*. For ephemeral streams, this should include periods of flow irrespective of mine or other discharges;
- (l) Specify sampling and analysis methods and quality assurance and control;
- (m) Any historical datasets to be relied upon;
- (n) Description of the statistical basis on which conclusions are drawn; and
- (o) Any spatial and temporal influences to exclude potential confounding factors.

C27 A report outlining the findings of the REMP, including all monitoring results and interpretations in accordance with Condition (C26) must be prepared and submitted in writing to the administering authority before 31 August 2015. This should include an assessment of reference water quality, any assimilative capacity for those contaminants monitored and the suitability of current discharge limits to protect downstream environment values.

Saline & Metalliferous Drainage

C28 The holder of this environmental authority must ensure proper and effective measures are taken to avoid or otherwise minimise the generation and/or release of saline and/or metalliferous mine drainage.

Groundwater

C29 Groundwater quality and level must be monitored at the locations and frequencies defined in Table C8 - Groundwater Monitoring Locations and Frequency and Schedule H Figure 3 – Groundwater Monitoring Locations, for parameters defined in Table C9 - Groundwater Trigger Levels and Contaminant Limits.

Table C8 - Groundwater Monitoring Locations and Frequency

Monitoring Point	Latitude (GDA94 MGA z55)	Longitude (GDA94 MGA z55)	Surface RL ² (m)	Monitoring Frequency
Compliance Bores				
AB1 North-East of TSF	-18.8912	144.1527	523	Quarterly
AB7 East of TSF	-18.8917	144.1538	525	
AB8 West of TSF	-18.8897	144.1355	531	
AB13 West of TSF	-18.8838	144.1368	529	
AB14 West of TSF	-18.8748	144.1374	528	
Reference Bores				
AB2 East of TSF	-18.8917	144.1559	524	Quarterly
Reference Bore No.2 (TBA)	TBD ¹	TBD ¹	TBD ¹	

- 1 To be determined and notified to the administering authority before 1 December 2012.
2 RL measurements to be taken from top of bore casing.

- C30 If quality characteristics of groundwater from compliance bores identified in Table C8 - Groundwater Monitoring Locations and Frequency, exceed any of the trigger levels stated in Table C9 - Groundwater Trigger Levels and Contaminant Limits, the environmental authority holder must compare the compliance monitoring bore results to the reference bore results and:
- (a) if the level of contaminants at the compliance bore does not exceed the reference monitoring site data, then no action is to be taken; and,
 - (b) if the level of contaminants at the compliance bore is greater than the reference monitoring site data, complete an investigation in accordance with the ANZECC (2000) & ARMCANZ methodology, into the potential for environmental harm and provide a written report to the administering authority within 3 months, outlining:
 - i. details of the investigations carried out; and,
 - ii. actions taken to prevent environmental harm.

Note: Where an exceedence of a trigger level has occurred and is being investigated in accordance with C30(b) of this condition, no further reporting is required for subsequent trigger events for that quality characteristic within the three month investigation period.

- C31 Groundwaters from bores identified in Table C8 - Groundwater Monitoring Locations and Frequency, must not exceed any of the limits defined in Table C9 - Groundwater Trigger Levels and Contaminant Limits.
- C32 If an exceedence in accordance with Condition (C31) is identified, the holder of the environmental must notify the administering authority within fourteen (14) days of receiving the result.

Table C9 - Groundwater Trigger Levels and Contaminant Limits

Quality Characteristic	Trigger Levels (µg/L for toxicants)	Contaminant Limit (Mg/L for toxicants)
EC (µS/cm)	435 ¹	1000 ⁴
pH (pH unit)	6.0 ² (minimum) 7.5 ² (maximum)	6.0 ⁴ (minimum) 8.5 ⁴ (maximum)
Sulphate (SO ₄ ²⁻) (mg/L)	9 ¹	1000 ³ (mg/L) or 95% of reference ⁶ , whichever is lowest.
Aluminium	55 ²	5 ³ (mg/L) or 95% of reference ⁶ , whichever is lowest.

Arsenic	13 ²	0.5 ³ (mg/L) or 95% of reference ⁶ , whichever is lowest.
Cadmium	0.2 ²	0.01 ³ or 95% of reference ⁶ , whichever is lowest.
Cobalt	50 ¹	1 ³ or 95% of reference ⁶ , whichever is lowest.
Copper	1.4 ²	1 ³ or 95% of reference ⁶ , whichever is lowest.
Cyanide (Total)	7 ²	1 ⁵
Lead	3.4 ²	0.1 ³ or 95% of reference ⁶ , whichever is lowest.
Manganese	1900 ²	95% of reference ⁶ ,
Molybdenum	50 ¹	0.15 ³ or 95% of reference ⁶ , whichever is lowest.
Nickel	11 ²	1 ³ or 95% of reference ⁶ , whichever is lowest.
Zinc	8 ²	20 ³ or 95% of reference ⁶ , whichever is lowest.
Level and chloride	Interpretational purposes only	

- 1 Trigger values are based on the 80th percentile of at least 10 but not more than 24 consecutive reference site samples derived using the administering authorities (2006) methodology (Table D1, and section 3.4.3.1).
- 2 Default trigger values from ANZECC (2000) trigger levels for aquatic ecosystems indicative of slightly disturbed tropical Australian upland river ecosystems.
- 3 Contaminant limit based on ANZECC (2000) stock water quality guidelines.
- 4 Contaminant limit based on administering authority policy (Scientific Services, 2009).
- 5 Contaminant limit based on the predicted no effect concentration taken from page xii of the Sodium Cyanide (Priority Existing Chemical) Draft Assessment Report dated September 2009.
- 6 Where 95th percentile of reference is exceeded and the reference site also exceeds the value during the same event, the value of the reference site during the same event applies.
- 7 Default trigger value from Queensland Water Quality Guideline (Table G.4)

Note: All metals and metalloids must be measured as total (unfiltered) and dissolved (filtered).

- C33 Groundwater monitoring bores must be constructed and operated in accordance with methods prescribed in the latest edition of the Agriculture and Resource Management Council of Australia and New Zealand manual titled *Minimum Construction Requirements for Water Bores in Australia*.
- C34 An annual monitoring report must be prepared and presented to the administering authority when requested. This report shall include but not be limited to:
- (a) a summary of the previous twelve (12) months monitoring results required under this approval in graphical form showing relevant limits;
 - (b) an evaluation/explanation of the data from any monitoring programs;
 - (c) a summary of any record of quantities of releases required to be kept under this approval;
 - (d) a summary of the record of equipment failures or events recorded, which have resulted in non-compliance with approval conditions; and,
 - (e) an outline of actions taken or proposed to minimise the environmental risk from any deficiency identified by the monitoring or recording programs.

Stormwater, Sediment and Erosion Controls

- C35 An Erosion and Sediment Control Plan must be developed by an appropriately qualified person and implemented for all stages of mining activities on the licensed place to prevent or minimise erosion and the release of sediment to receiving waters and the contamination of storm water.
- C36 The Erosion and Sediment Control Plan must be included in the Plan of Operations and provide for at least the following stormwater management functions:
- (a) prevent or minimise the contamination of stormwater;

- (b) diverting uncontaminated stormwater run-off around areas disturbed by mining activities or where contaminants or wastes are stored or handled;
- (c) contaminated stormwater runoff, incident rainfall and leachate is collected and treated, reused, or released in accordance with the conditions of this environmental authority;
- (d) roofing or minimising the size of areas where contaminants or wastes are stored or handled;
- (e) using alternate materials and or processes (such as dry absorbents) to clean up spills that will minimise the generation of contaminated waters;
- (f) erosion and sediment control structures are placed to minimise erosion of disturbed areas and prevent the contamination of any waters;
- (g) procedures to ensure that erosion and sediment control structures are maintained and adequate storage is available in sediment dams in accordance with design criteria; and,
- (h) training of staff that will be responsible for maintenance and operations of sediment and erosion control structures.

- C37 Erosion prevention and sediment control measures must be implemented and maintained to minimise erosion and the release of sediment and contamination of stormwater.
- C38 The erosion and sediment control plan must be consistent with any certified design plans for regulated dams on the licensed place.
- C39 Suitable banks and / or diversion drains must be installed and maintained to exclude stormwater runoff from entering any containment or other structures used for the storage or treatment of contaminants or wastes.

Water Management Plan

- C40 A Water Management Plan must be developed and implemented by 1 November 2012 that provides for the proper and effective management of the actual and potential environmental impacts resulting from the mining activity and to ensure compliance with the conditions of this environmental authority.
- C41 The Water Management Plan must be developed in accordance with the latest version of the administering authorities *Guideline for Preparing a Water Management Plan* and must include at least the following components:
- (a) contaminant source study;
 - (b) site water balance and model;
 - (c) a description of the water management system and its components;
 - (d) saline and/or acid mine drainage prevention and management measures;
 - (e) emergency and contingency planning;
 - (f) monitoring and review.
- C42 Each year the holder of the environmental authority must undertake a review of the Water Management Plan prior to the wet season (i.e. no later than 1 November) and a further review following the wet season (i.e. by 1 May the following year) to ensure that proper and effective measures, practices and procedures are in place so that the mine is operated in accordance with the conditions of this environmental authority and that environmental harm is prevented or minimised.
- C43 A copy of the Water Management Plan and/or a review of the Water Management Plan must be provided to the administering authority on request.

END OF CONDITIONS FOR SCHEDULE C

SCHEDULE D – NOISE AND VIBRATION

Noise Nuisance

D1 Noise from the mining activity must not cause an environmental nuisance at any sensitive place.

END OF CONDITIONS FOR SCHEDULE D

Published on DES Disclosure Log
RTI Act 2009

SCHEDULE E – REGULATED DAMS

Regulated Dams Containing Hazardous Waste

- E1 The Design Storage Allowance for dams specified in the *Code of Environmental Compliance for Mining Lease Projects* and this environmental authority are a minimum design storage requirement and any releases from any dams to the receiving environment must meet the trigger and contaminant limits set out under Schedule C Table C2 – Water Trigger Levels and Contaminant Limits.
- E2 The construction and operation of any regulated dam containing hazardous waste on the licensed place must comply with Table E1 – Size and Purpose of Regulated Dams Containing Hazardous Waste.

Table E1 - Size and Purpose of Regulated Dams Containing Hazardous Waste

Name of Dam Containing Hazardous Waste	Site	Maximum Surface Area (Ha)	Maximum Volume (m ³)	Maximum Depth (m)	Purpose
Tailings Storage Facility	HD 1	310	68,000,000	32	Storage of Cyanide Tailings
Sediment Dam 1	HD 2	1	16,000	3.2	Prevent the release of potentially contaminated stormwater runoff and/or seepage from the waste rock dumps
Sediment Dam 2	HD 3	1	15,000	3	
Sediment Dam 4	HD 5	0.5	12,500	5	
Butchers Creek Dam	HD 6	3	60,000	4	
North Dump Seepage Dam	HD 7	1	5,000	0.5	Prevent the release of potentially contaminated stormwater runoff and/or seepage from the waste rock dumps
South East Dump Seepage Dam	TBD ¹	TBD ¹	TBD ¹	TBD ¹	
East Dump Seepage Dam	HD 9	0.5	10,000	3	
Managers Creek Dam	TBD ¹	TBD ¹	TBD ¹	TBD ¹	
Reclaim Dam	HD 11	0.5	7,500	2	
Wises Pit	HD 12	52	43,500,000	240	Storage of Cyanide Tailings
Eldridge Pit	HD 13	52	49,900,000	270	Containment of potentially contaminated stormwater runoff and/or seepage from the waste rock dumps

¹ To be determined and notified to the administering authority before 1 December 2012

- E3 The location of any regulated dam containing hazardous waste must be located on the licensed place within the polygonal area defined by the co-ordinates listed in Table E2 - Location of Regulated Dams Containing Hazardous Waste.

Table E2 - Location of Regulated Dams Containing Hazardous Waste

Name of Dam Containing Hazardous Waste	Site Code	Latitude (GDA94 MGA z55)	Longitude (GDA94 MGA z55)
Tailings Storage Facility	HD1	-18.8819	144.1475
		-18.8906	144.1528
		-18.8958	144.1511
		-18.8986	144.1481
		-18.8803	144.1425

Name of Dam Containing Hazardous Waste	Site Code	Latitude (GDA94 MGA z55)	Longitude (GDA94 MGA z55)
		-18.8864	144.1403
		-18.9011	144.1294
		-18.8795	144.145
		-18.893	144.1331
Sediment Dam 1	HD2	-18.8625	144.1594
		-18.8631	144.1592
		-18.8633	144.1597
		-18.8631	144.16
Sediment Dam 2	HD3	-18.8672	144.167
		-18.8683	144.1666
		-18.8683	144.1658
		-18.8681	144.1658
Sediment Dam 4	HD5	-18.8581	144.1501
		-18.858	144.1511
		-18.8586	144.1511
		-18.8589	144.1503
Butchers Creek Dam	HD6	-18.8861	144.1606
		-18.8869	144.1603
		-18.8869	144.1594
		-18.8844	144.155
		-18.8869	144.1577
		-18.8855	144.155
		-18.8858	144.1577
North Dump Seepage Dam	HD7	-18.8614	144.1425
		-18.8614	144.1442
		-18.8622	144.1436
		-18.8622	144.1428
South East Dump Seepage Dam	HD8	-18.8812	144.1601
		-18.8822	144.1601
		-18.8822	144.161
		-18.8812	144.161
East Dump Seepage Dam	HD9	-18.8772	144.1661
		-18.8781	144.1653
		-18.8775	144.1647
		-18.8769	144.1653
TSF Wetlands	HD10	-18.8858	144.1517
		-18.8844	144.1511
		-18.8842	144.15
		-18.8847	144.1497
		-18.8856	144.1506
Reclaim Dam	HD11	-18.8847	144.1528
		-18.8856	144.1525

Name of Dam Containing Hazardous Waste	Site Code	Latitude (GDA94 MGA z55)	Longitude (GDA94 MGA z55)
Wises Pit	HD12	-18.8853	144.1519
		-18.885	144.1517
		-18.8761	144.1572
		-18.8783	144.1556
		-18.8789	144.1528
		-18.8769	144.1489
		-18.8744	144.1486
		-18.873	144.152
		-18.873	144.1545
		-18.8744	144.1565
Eldridge Pit	HD13	-18.8744	144.1594
		-18.8711	144.1544
		-18.8719	144.155
		-18.8683	144.1555
		-18.8665	144.158
		-18.8667	144.16
		-18.8683	144.162
		-18.8707	144.163
Managers Creek Dam	HD14	-18.8778	144.1668
		-18.8774	144.1662
		-18.8781	144.1654
		-18.8785	144.1658

Hydraulic Performance Criteria

- E4 Regulated dams constructed on the licensed place must comply with the hydraulic performance criteria shown in Table E3 - Hydraulic Performance Criteria for Regulated Dams.

Table E3 - Hydraulic Performance Criteria for Regulated Dams

Name of Regulated Dam	Design Storage Allowance (Dams other than levees) AEP	Spillway Capacity or Diversion Capacity (Levees) AEP	Mandatory Reporting Level ¹ (Dams other than levees) AEP ²
Tailings Storage Facility	1 in 10 AEP, 3 month wet season plus other inputs for the 3 month wet season. To be available on 1st November each year	1 in 10,000 AEP	1 in 100 AEP
Sediment Dams	N/A ³	1 in 100 AEP	1 in 100 AEP
Butchers Creek Dam			
Reclaim Dam			
Waste Rock Dump Seepage Dams			

Name of Regulated Dam	Design Storage Allowance (Dams other than levees) AEP	Spillway Capacity or Diversion Capacity (Levees) AEP	Mandatory Reporting Level ¹ (Dams other than levees) AEP ²
Managers Creek Dam	1 in 20 AEP, 3 month wet season plus other inputs for the 3 month wet season. To be available on 1st November each year	1 in 100 AEP	1 in 100 AEP, 72 hour duration storm event
Wises Pit	N/A ⁴	N/A ⁴	N/A ⁴
Eldridge Pit	N/A ⁴	N/A ⁴	N/A ⁴

- 1 Refers to the level below the spillway crest required to contain either the AEP (design risk) 72hr storm or the AEP (design risk) wave allowance, whichever is lower.
- 2 AEP means the Annual Exceedence Probability which is the probability that at least one event in excess of a particular magnitude will occur in any given year.
- 3 Design Storage Allowance is unknown and therefore not applicable for these existing regulated dams.
- 4 Hydraulic Performance Criteria not applicable as there is no release from final voids.

- E5 The spillway for any regulated dam containing hazardous waste constructed within on the licensed place must be designed to withstand the peak flow from the critical design storm in Table E3 - Hydraulic Performance Criteria for Regulated Dams
- E6 The environmental authority holder must notify the administering authority as soon as possible but within 24 hours of the level in any regulated dam reaching the mandatory reporting level in Table E3 - Hydraulic Performance Criteria for Regulated Dams, and must immediately act to prevent or minimise the risk of environmental harm.
- E7 In the event the mandatory reporting level of the Managers Creek Dam is exceeded, the available storage capacity of the dam must be returned to below the mandatory reporting level within 7 days by the transfer of water to an alternative regulated dam with available storage capacity.

Certification and Operation

- E8 The environmental authority holder must repair, maintain, operate and decommission the dams defined in Table E2 - Location of Regulated Dams Containing Hazardous Waste, in accordance with an acknowledged design plan that must comply with the standard environmental conditions in the *Code of Environmental Compliance for High Hazard Dams Containing Hazardous Waste*.
- E9 When construction or modification of any regulated dam is complete and prior to commencing operation of that dam, the holder must submit to the administering authority two copies of a set of 'as constructed' drawings, together with the certification of a suitably qualified and experienced person that the dam 'as constructed' will deliver the performance stated in the submitted design plan and that the dam is compliant with this environmental authority.
- E10 All containment embankments of all regulated dams must be monitored for signs of embankment deterioration.

Decommissioning of Tailings Storage Facility - Objective

- E11 The environmental authority holder must prior to surrender of the tenures on which the Tailings Storage Facility is located, implement either:
- (a) a plan for de-commissioning the Tailings Storage Facility such that, amongst other things, contaminated water will no longer be stored in the facility, the containment embankment and its contents will be structurally stable and resistant to erosion and any seepage or other emissions will not cause environmental harm; or,
 - (b) a site management plan for the continued operation and maintenance of the Tailings Storage Facility.

Decommissioning of Regulated Dams – Objective

- E12 Regulated dams containing hazardous waste must not be abandoned and must be dealt with in accordance with the conditions of this environmental authority.
- E13 On cessation of operation of any regulated dam, that regulated dam must be maintained so as to avoid environmental harm until that regulated dam is decommissioned.

Decommissioning of Regulated Dams – Documentation and Compliance

- E14 Decommissioning activities for dams must be documented in detail in the Plan of Operations under which the activities are to occur. Where the detailed documentation is not already contained in the Design Plan for the dam, the detailed documentation is considered to be an amendment to the Design Plan and must be submitted as an amendment to the Design Plan.

Water Management – Regulated Dams

- E15 The holder of this environmental authority shall maintain and operate measures for all regulated dams of adequate capacity to ensure that all water leaving the licensed place at the release points defined Table C1 – Release Points, complies with the water quality release limits listed in Table C2 - Release Water Trigger Levels and Contaminant Limits.

Note: No release of contaminants to land is authorised.

END OF CONDITIONS FOR SCHEDULE E

SCHEDULE F – LAND & REHABILITATION

Rehabilitation Landform Criteria

- F1 All areas significantly disturbed by mining activities must be rehabilitated to a safe, stable, non-polluting landform with a self-sustaining vegetation cover in accordance with Table F1 - Rehabilitation Requirements.

Table F1 - Rehabilitation Requirements

Disturbance Type ¹	Projective Surface Area (ha) ¹	Post-mine Land Description ^{1,2}	Post-Mine Land Suitability Classification ^{1,2}	Land Use Acceptance Criteria ¹
General Disturbance	335	Low Intensity Grazing ³	VII	As specified in the Rehabilitation Monitoring Manual ⁴
Sediment Dams	2	Low Intensity Grazing ³	VII	Water quality compliant with ANZECC (2000) stock water quality guidelines
Open Cut Pits	107	Wildlife Habitat	VIII	
Butchers Creek Dam, Managers Creek Dam and Waste Rock Dump Seepage Dams	TBD ⁵	Wildlife Habitat	VIII	
Tailings Storage Facility	310	Low Intensity Grazing ³	VII	As specified in the Rehabilitation Monitoring Manual ⁴ with water quality compliant with ANZECC (2000) stock water quality guidelines
Waste Rock Dumps	260	Low Intensity Grazing ³	VII	

- 1 Source EMOS (Environmental Management Overview Strategy, Kidston Gold Mine Project North Queensland Mining Lease 3347 dated 19 March 2003) except as otherwise stated.
- 2 Land Capability defined by Rosser et al (1974) Land Capability Classification for Agricultural Purposes. Division of Land Utilisation, Technical Bulletin, No. 14 QDPI.
- 3 Low Intensity Grazing is defined as the sustainable stocking rate able to be maintained in perpetuity for the rehabilitated areas in question.
- 4 Methods for the assessment of rehabilitation and criteria for determining rehabilitation success at Kidston Gold Mine, July 2001 or more recent updates following further research undertaken on site that are acceptable to the administering authority.
- 5 To be determined and notified to the administering authority before 1 December 2012.

- F2 Landform rehabilitation monitoring must be conducted annually in accordance with the Rehabilitation Monitoring Manual developed for Kidston Gold Mine.

Grazing Pasture Outcome

- F3 Areas that are to be rehabilitated to low intensity grazing must comply with the following outcomes;
- (a) possess a self-sustaining vegetation with vegetation cover, dry matter production and species composition and distribution comparable to analogue sites identified in the Rehabilitation Monitoring Manual;
 - (b) result in stable landforms with rates of erosion comparable to those of analogue sites; and,
 - (c) meet the acceptance criteria listed in Table F1 – Rehabilitation Requirements.
- F4 The environmental authority holder must complete an investigation into the rehabilitation of disturbed areas and submit a report to the administering authority proposing acceptance criteria to meet the outcomes in Condition (F3) at least one year prior to any application for surrender of this environmental authority.

Residual Void Outcome

- F5 Residual voids must not cause any serious environmental harm to land, surface waters or any recognised groundwater aquifer other than the environmental harm constituted by the existence of the residual void itself and subject to any other condition within this environmental authority.

Infrastructure

- F6 All infrastructure constructed by or for the environmental authority holder during mining activities including water storage structures must be removed from the licensed place prior to mining lease surrender except where agreed to in writing by the land owner / holder.

Rehabilitation Monitoring Program

- F7 The holder of the environmental authority must develop and implement a Rehabilitation Monitoring Program on at least a yearly basis which must include sufficient spatial and temporal replication to enable scientifically justifiable conclusions as established under the rehabilitation program or other methodology to the satisfaction of the administering authority.
- F8 The rehabilitation monitoring program must be developed before 1 November 2013 and be implemented by a person nominated by the environmental authority holder possessing appropriate qualifications and experience in the field of rehabilitation management.
- F9 Verification of rehabilitation success is to be determined by comparison with the criteria documented in the Post Mine Land Use Plan required under Condition (F10).

Post Mine Land Use Plan

- F10 A Post Mine land Use Plan for the licensed place must be prepared before 1 November 2013 and be developed and implemented for a nominal period of:
- (a) at least thirty (30) years following the cessation of mining activities on the licensed place; or
 - (b) a shorter period if the licensed place is proven to be geo-technically and geo-chemically stable and it can be demonstrated to the satisfaction of the administering authority that no release of contaminants from the licensed place will result in environmental harm.
- F11 The Post Mine Land Use Plan must be included in the Plan of Operations and updated with each subsequent Plan of Operations describing how the rehabilitation objectives in Table F1 – Rehabilitation Requirements will be achieved.
- The Post Mine Land Use Plan must include:
- (a) schematic representations of final land form inclusive of drainage features;
 - (b) slope design;
 - (c) cover design including a report on the effectiveness of existing cover systems;
 - (d) drainage design;
 - (e) erosion controls on reformed land;
 - (f) description of the experimental design for the monitoring of analogue and rehabilitated areas inclusive of statistical design;
 - (g) proposed revegetation criteria including:
 - i. species diversity, abundance and composition,
 - ii. projective cover,
 - iii. dry matter production, and
 - iv. stocking rates to ensure self-sustaining vegetation is maintained.
 - (h) proposed revegetation methods inclusive of plant species selection, re-profiling, resspreading soil, soil ameliorants/amendments, surface preparation and method of propagation;
 - (i) materials balance including available top soil and low permeability encapsulation media for capping;
 - (j) research program and associated milestones;
 - (k) geotechnical, geochemical and hydrological studies;

- (l) chemical, physical and biological properties of soil and water;
- (m) measurable completion criteria for each rehabilitation indicator that enables determination of rehabilitation success for each disturbance type;
- (n) rehabilitation monitoring program, including the monitoring of:
 - i. surface water quality;
 - ii. groundwater quality;
 - iii. erosion rates;
 - iv. integrity and effectiveness of final cover of final cover systems; and,
 - v. health and resilience of vegetative cover;
- (o) grazing management plan, and,
- (p) operation and maintenance of:
 - i. the surface water management system;
 - ii. groundwater monitoring network;
 - iii. final cover systems; and,
 - iv. vegetative cover.

END OF CONDITIONS FOR SCHEDULE F

SCHEDULE G – DEFINITIONS/ACRONYMS

Words and phrases used throughout this Environmental Authority are defined below. Where a definition for a term used in this Environmental Authority is sought and the term is not defined, the definitions in the *Environmental Protection Act 1994*, its Regulations and Environmental Protection Policies apply.

"EMOS" means the environmental management overview strategy report titled Kidston Gold Mine Environmental Management Plan, dated 2005. Although legally the environmental authority is the enforceable document, not the EMPlan, if there was any need for interpretation of the conditions, then the interpretation should be in the context of the EMPlan.

"acceptance criteria" means the measures by which the actions implemented to rehabilitate the land are deemed to be complete (same as completion criteria).

"authority" means environmental authority (mining activities) under the *Environmental Protection Act 1994*.

"dam" means a containment or proposed containment whether permanent or temporary, which is designed to contain, divert or control flowable substances. However this does not include a fabricated or manufactured tank or container designed to a recognised standard.

"design plan" in the context of a dam design is the documentation required under the Code of Environmental Compliance for High Hazard Dams Containing Hazardous Waste to describe the physical dimensions of the dam, the materials and standards to be used for construction of the dam, the procedures and criteria to be used for operating the dam and the decommissioning and rehabilitation objectives in terms procedures, works and outcomes at the end of dam life. The documents can include design and investigation reports, drawings, specifications and certifications.

"environmental authority holder" means the holder of this environmental authority.

"flowable substance" means matter or mixture of materials which can be forced to or otherwise flow under any conditions possible in a situation. It includes water, other liquids or a mixture that includes water or any other liquid or suspended solids.

"hazardous waste" means any substance, whether liquid, solid or gaseous, derived by or resulting from, the processing of minerals that tends to destroy life or impair or endanger health.

"infrastructure" means water storage dams, roads and tracks, buildings and other structures built for the purpose of mining activities but does not include facilities required for the long terms management of mining impacts or the protection of potential resources. Such facilities include dams containing hazardous waste, waste rock dumps, voids, or ore stockpiles and buildings or other structures whose ownership can be transferred and which have a residual beneficial use for the next owner of the operational land or the background land owner.

"land" in the 'land schedule' of this document means land excluding waters and the atmosphere. "noise sensitive place" or a "commercial place"

"land suitability" as defined in the DME 1995 Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland.

"land use" term to describe the selected post mining use of the land, which is planned to occur after the cessation of mining operations.

"leachate" means a liquid that has passed through or emerged from, or is likely to have passed through or emerged from, a material stored, processed or disposed of at the operational land which contains soluble, suspended or miscible contaminants likely to have been derived from the said material.

"low intensity grazing" means the sustainable stocking rate able to be maintained in perpetuity for the rehabilitated areas in question.

"noxious" means harmful or injurious to health or physical wellbeing, other than trivial harm.

"offensive" means causing reasonable offence or displeasure; is disagreeable to the sense; disgusting, nauseous or repulsive, other than trivial harm.

"progressive rehabilitation" means rehabilitation (defined below) undertaken progressively OR a staged approach to rehabilitation as mining operations are ongoing.

"rehabilitation" the process of reshaping and revegetating land to restore it to a stable landform and in accordance with the acceptance criteria set out in this environmental authority and, where relevant, includes remediation of contaminated land.

"self-sustaining" means an area of land which has been rehabilitated and has maintained the required acceptance criteria without human intervention for a period nominated by the administering authority.

"sensitive place" means:

- a dwelling, residential allotment, mobile home or caravan park, residential marina or other residential premises; or
- an educational institution; or
- a medical centre or hospital; or
- a protected area under the Nature Conservation Act 1992, the Marine Parks Act 1992 or a World Heritage Area; or
- a public park or gardens; or
- a place used as a workplace, an office or for business or commercial purposes which is not part of the mining activity and does not include employee's accommodation or public roads.

"spillway" means passage or outlet from the dam through which surplus water flows.

"stable" means land form dimensions are or will be stable within tolerable limits now and in the foreseeable future. Stability includes consideration of geotechnical stability, settlement and consolidation allowances, bearing capacity (trafficability), erosion resistance and geochemical stability with respect to seepage and contaminant generation.

"suitably qualified and experienced person" means a person who is a Registered Professional Engineer of Queensland under the provisions of the *Professional Engineers Act 1988* or a Corporate Member of the Institution of Engineers Australia or holds equivalent professional qualifications and has the following:

- (a) knowledge of engineering principles related to the structures, geomechanics, hydrology, hydraulics, chemistry and environmental impact of dams; and
- (b) at least a total of five years of suitable experience and demonstrated expertise in at least four of the following areas:
 - i. investigation, design or construction of dams;
 - ii. operation and maintenance of dams;
 - iii. geomechanics with particular emphasis stability, geology and geochemistry;
 - iv. hydrology with particular reference to flooding, estimation of extreme storms, water management or meteorology;
 - v. hydraulics with particular reference to sediment transport and deposition, erosion control, beach processes;
 - vi. hydrogeology with particular reference to seepage, groundwater,
 - vii. solute transport processes and monitoring thereof; or
 - viii. dam safety.

"tolerable limits" means that a range of values could be accepted to achieve an overall environmental management objective (e.g. a range of settlement of a tailing capping could still meet the objective of draining the cap quickly, preventing pondage and limiting infiltration and percolation).

"waters" includes river, stream, lake, lagoon, pond, swamp, wetland, unconfined surface water, unconfined water natural, bed and bank of any waters, dams, non-tidal or tidal waters (including the sea), and any under groundwater, any part thereof.

END OF CONDITIONS FOR SCHEDULE G

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SCHEDULE H - Maps / Plans



Figure 1 – Existing Built Drainage, Clean Water Diversions and Seepage Containment Structures

Figure 2 – Location of Receiving Waters Monitoring Sites

Note: Revised figure to be provided before 1 December 2012.

Figure 3 – Groundwater Monitoring Locations

Note: Revised figure to be provided before 1 December 2012.

END OF CONDITIONS FOR SCHEDULE H

END OF PERMIT

Kidston Teleconference Internal DES 9/11/18

11:35am

Cathie, Mel, Steven, Emma, Nicky - see email
from Mel, Dean, Ingrid, Caitlin.

Mel: Contaminated water not good.

Steven: Nothing too much to add, where are you
with assessment?

IFM: high level - not good. Operation can
work with, Construction is difficult to work
with. 50km downstream. Ordinarily not acceptable.

Dean: Issue around dilution factor, if the increase
and/or decrease discharge rate may be
good

IFM: Just looking at dilution and not source.

Dean: Irrigation - existing groundwater issues -
potential to mitigate through gw migration

Steven: existing flows from mine site?

IFM: Existing issues to mining activity.

Dean: Irrigation needs to be very carefully managed.

IFM: Need to look at broader options

Steven: Discharge regime approach

IFM: Cheapest but not best, could combine options - offstream storage, treatment etc, I don't want to be the consultants.

Steven: What they've got is not approvable they need to look at options. want to be prepared to push them in the right direction. Discharge is not acceptable and push them in a different direction, So they meet WFO.

IFM: Are you asking threshold?

Steven: Do they bother using scenarios they propose. Can we rule out particular regions

IFM: To have an impact on gorge we don't want. There are options but it's back to them. Consultant needs to look that through. Multi pronged approach is where solution will be.

MEL: Agree - can't have impacts at the gorge.

IFM: Huge impact for us to take on as ^{QLA} gov. Need middle ground.

Dean: level of social licences for proponent, not desirable for them to pollute receiving waters.

MEL: Steven and I are having a ~~full~~ on heads up in Aecom and Genex today in preparation for ~~live~~ day.

IFM: Need to get to point of agreement to do something else.

Cathie: Worth raising impact assessment is cursory. 3yr construction release is a significant impact but temp + reversible.

MEL: Additional impacts

IFM: When/if we approve we need scientific basis.

MEL: All in agreement. Construction is too risky. Comments back to them, meaningful discussion Tuesday.

Steven: Number of options - need to look at other approval requirements. Can move forward in operation + not construction.

MEL: will call after meeting to update the best way forward.

Cathie: Operational - ER on operation and leave out construction, have to approve all at once?

Steven: Can separate, project can change.

MEL: In CG evaluation we make clear we haven't conditioned construction YET!

Cathie: Option for them to pull out of co-ordinate project?

~~Steven~~ IFM: Would be in non-compliance w/ EP Act for unauthorised discharge. Set the outcome + that's it

MEL: I'd rather not, that's last effort opt.

IFM: If they need funding approval, here's your outcome we're balancing for them.

Steven: Wait until Tuesday to tell that but they need to start thinking other options.

Cathie: How can we manage - keep assessing options? Will we engage on a reg basis.

Steven: We will do what we can to manage the proponent.

Cathie: Yeah, set bounds of when they submit things

Steven: For construct pull out separate.

IFM: Makes sense - have some options how easy to amend application

Steven: Same as EA.

IFM: If driver is investors we can push through and work with if you could get their drivers.

Steven: All been delayed so far.

IFM: Turnaround times - have not approved leave for things to not come in on time. People have bent backwards for them they're not helping and Christmas is coming. Have made significant resource decisions.

MEL: Any thing else to add?

Agreed No.

Dean: ~~tutti~~ Mel, in terms of briefing

MEL: Briefed ED she is supportive.

Close at 12.07

Bob

Internal DES / OCG Pre-Client meeting

1/3/11/18
1045am

MEL HARRIS; DEAN SHARPE; RENEE FARKAS;
CAITLIN BOOY; LATHIE PAGE; IFM; STEVEN TARTE
+ OCG Crew - see email.

DS: IF they're not willing to go back that's a concern

ST: They're very defensive of their work.

MH: Today is about solutions moving forward

ST: Identify items that we need to act on.

IFM: How do you see them go forward with key issues. How do we get to an end point? In principal happy with operation, construction is an issue.

DS: In terms of feed back from client meeting - it was unknown what the threats would be in terms of PR response.

Craig Johanson dials in

MH: We will explain our concerns to the client.

ST: a heads up meeting with the client

IFM: We've done to the best of our ability

but need works from Sciences.

ST: Bit unclear about how they've done the assessment. Does mass-balance take into account wet season inputs. Don't incorporate post-release flushes until risk assessment at end.

IFM: Conservative in mass-balance but ~~doesn't~~ Coarse in other ways. Not a sophisticated way. We need to think of a ~~more~~ better way to assess it. IF they continue to pursue this option they need a more sophisticated analysis.

ST: Forces them into other options? change the ratios of release.

IFM: Undesirable - can set outcomes but they CAN'T be 50km downstream. Can't use all assimilative capacity 50km downstream.

RF: doesn't account for other releases already there.

CJ: 'Remediation' will be able to be done after construction. They raise it but don't discuss it.

ST: They rely heavily on the OTA AECOM dials in - See email. (Client meeting).

At Genex dials in - See email. 11:05am

MH: ~~that~~ Want to walk through issues and how to move forward. Advice and comments back on Thursday.

IFM: Preface again - Sciences haven't finalised assessment. Concerns around construction. Significant concerns about downstream. IF Outcome of mass-balance shows WPOS exceedance not acceptable.

RL: Were there particular parameters of concern?

IFM: During construction there are exceedances of... (List from IAR). Does not

work for us. If they are exceeded that far downstream (Einsaleigh) does not work for us that far downstream. Are there other options. Landing at one option is not the way to go, probably a multi-pronged solution.

MH: Any impacts on Einsaleigh - I don't know how - its a big concern.

RL: The current proposal uses IMU/day for construction. Really need to look at how much water we can contain in Wises Pit.

IFM: Any option to reduce water inventory right now

Aaron: Simply - nothing now - looking at options

IFM: Ideal situation how to get rid of water. Using all and beyond assimilative capacity is not acceptable. Need to really think that through. Can get rid of a lot of water now.

MH: IAR says during construction assimilative capacity will be used.

IFM: DTA looked at in relation to mixing zone, if it ends up in the Gorge, need to look at chronic impacts. Info around construction is large, to remediate it takes years to recover. They will bind with sediments. DTA would be ok if you were below WQOs.

ST: How to reduce water on site now.

IFM: 2.56GL excess not looked at, is there some scope there.

Aaron: Never looked at actually treating 27.5GL

IFM: That's how the report reads. Solution lies in a multi-pronged approach.

Aaron: I think we agree, but finding the right combination. Looking at it right now to try and significantly reduce the

amount of water.

Regina: Is there an option for external storage for water?

Arnon: There are options, FSL and retaining buffer capacity for unplanned release event.

IFM: Also tank storage option, CSG have examples where no extra water comes in. As it stands is problematic.

ST: Talk about mitigation measures?

IFM: Prefer to give comments in writing.

Arnon: looked at options, not cheap, but will need to go back and look again.

IFM: A lot of mine sites use evaporative approach to reduce water levels, a multipronged approach is required, whatever we can do to reduce water now should be looked at.

ST: Draw those things to a close, anything to add?

Agreed no.

ST: Comments on Thursday.

~~MH: might be this fi~~

IFM: Still waiting sciences, may not be ready Thursday.

MH: Anything else to add?

Agreed no.

meeting ends 11:30am

sch4p4(6) Personal information

Date : 16/11/2018 1:43:55 PM

From : "BOOY Caitlin"

To : "Melanie Harris"

Cc : "SHARPE Dean" , "FARKAS Renee" , "RIGBY Siobhan" , "PAGE Cathie"

Subject : DES Kidston IAR Comments

Attachment : DES Info stage Response to IAR.pdf;Advice_Kidston Water Release IAR comments EIA_20181116 - DES Combined.xlsx;image001.png;image003.png;

Hi Mel,

Please see attached a spreadsheet containing comments from MBC, Water Sciences and the EIS team. I have also attached a 'cover letter' that addresses DES's main concerns.

I would just like to note, that there are a few things that MBC would like to clarify with the Sciences team. However, as they are unavailable today, these comments will most likely be communicated on Monday.

Feel free to give me a call if you have any questions.

Cheers

Caitlin



Caitlin Booy

Environmental Officer (Minerals)

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Published on DES Disclosure Log
RTI Act 2009

The Kidston Pumped Storage Hydro Project Impact Assessment Report (“the Report”) identifies a need for a release of poor quality water from the mine pits associated with the former Kidston Gold Mine.

The proposed project occurs in a “slightly to moderately disturbed” region of the Gilbert River basin. The quality of Queensland waters is protected under the Environmental Protection (Water) Policy 2009 (EPP (Water)), which achieves the object of the *Environmental Protection Act 1994* (EP Act) to protect Queensland's waters while supporting ecologically sustainable development. In slightly disturbed areas, the EPP (Water) identifies that water quality is to be improved where needed, to achieve WQOs.

The Report identifies a number of proposed exceedances of WQOs associated with the proposed releases during both construction and operation of the Kidston Pumped Hydro Storage Project. Whilst an analysis of the potential impacts to Environmental Values has been provided, the Department considers that data analysis provided is not sufficient to support the stated conclusion that no significant adverse impacts to Environmental Values relevant to the Project area will result from proposed Operational and Construction releases. Information deficiencies relating to the assessment of impacts on Environmental Values are identified in Attachment A.

In addition, the proposed “*temporary and reversible*” nature of impacts to Environmental Values during the three year construction phase is not demonstrated and is also insufficient to meet the required environmental management objective.

The Department of Environment and Science (the Department) would like to highlight the following key issues of concern.

1. **Issue:** Inadequate consideration of alternative options to prevent, control or abate the release of residual wastewater (Construction Phase)
 - The Report identifies that:
 - o following consideration of alternative development options and optimisation of water handling options, a release of up to 2.56 GL of residual excess water from the former mine Pits will be required during the construction phase.
 - o Water in the former mine Pits is of poor quality and, if released in the dilutions proposed, the release is predicted to result in the exceedance of Water Quality Objectives for a range of parameters up to ~48 km downstream (township of Einasleigh).
 - o Increasing the water storage in Wises Pit above the authorised Full Supply Level is identified in Section 4.2.2 as an option which may further reduce the excess water inventory. However, this approach increases the likelihood of an uncontrolled release during the construction period, and the likelihood of discharge approval is not discussed.
 - As a general guide, the Department's Technical Guideline “*Wastewater Release to Queensland Waters*” (ESR/2015/1654 Version 2.01) (the Guideline) recommends compliance with WQO's be met within three stream widths or 300 m of the release point, whichever is the smaller.
 - As per page 15 of *Wastewater Release to Queensland Waters* (ESR/2015/1654 Version 2.01), approval of mixing zones with exceeded WQOs greater than this size may be granted in specific cases where social and economic considerations support the discharge of residual waste water and there are no other feasible alternatives.

Recommendation: The Department recommends that Genex provide an options analysis for reducing the residual excess water during the construction phase. If any release is proposed as part of a multi-optioned approach to reducing residual excess water, it must be demonstrated that, for any proposed release, all WQO's can be met within three stream widths or 300 m of the release point, whichever is smaller.

2. **Issue:** Proposed mixing zone of up to 623m (Operations)

- The Report considers four mixing scenarios resulting in mixing zone lengths ranging from 52 m to 623m, based on different release concentrations, in stream flow rates and diffuser configurations. The design is identified as conceptual.
- As per above, the Department's Technical Guideline "*Wastewater Release to Queensland Waters*" (ESR/2015/1654 Version 2.01) recommends compliance with WQO's be met within three stream widths or 300 m of the release point, whichever is the smaller.

Recommendation: The Department strongly recommends the final selected diffuser configuration and release strategy be optimised such that all WQO can be achieved within three stream widths or 300 m of the release point, whichever is smaller.

3. **Issue:** Elevated nutrient concentrations in excess of WQO at downstream locations (Operations)

- The Report identifies Total nitrogen is modelled to be in excess of WQO up to 48 km downstream.
- Section 6.2.3 states that "*Whilst the levels of nitrogen exceed the WQO, the exceedance is not likely to cause such impacts given the nature of the receiving environment and composition of the discharge water, namely the limited availability of phosphorus*".
- However, elevated levels of phosphorus in Eldridge Pit water are identified in Table 7 (up to 9 times higher than the WQO), which would provide a source of phosphorous in the released water. Therefore, this analysis is insufficient and does not address potential impacts of releasing elevated nutrients to a low nutrient environment.

Recommendation: an options analysis should be provided for reducing the concentration of nutrients in wastewater and subsequently demonstrate that the relevant Water Quality Objectives can be met within three stream widths or 300 m of the release point, whichever is smaller.

4. **Issue:** Lack of detail regarding water quality or quantity for 'Type 2 – Pass through discharge'.

- Section 4.7.2 of the Report identifies that "*Type 2 pass-through discharges have not been assessed for causality, frequency, discharge volume or quality*."

Recommendation: The Department notes that, in the absence of information relating to the quantity or quality of water proposed to be released via a 'Type 2' discharge type, the Department will recommend the operator be required to comply with the imposed operational release water quality conditions for release of wastewater via a 'Type 1' release.

IAR Section	Heading / Topic	IAR Review Comment	Recommendation
IAR			
Executive Summary	Receiving Environment	No evidence is provided to confirm that Middle Spring is not hydraulically connected to the groundwater regime of the proposed release area.	Provide evidence to support the assertion that the Middle Spring is not hydraulically connected to the proposed release area groundwater regime. If this evidence is not available, connection between Middle Spring and local groundwater should be assumed.
Executive Summary	Operational/Construction Releases	This section should state the likely volume of water that would need to be released during construction and continued operations.	State the volume of water that would be released during construction and continued operations.
Executive Summary	Construction Releases	Specific detail regarding the number of days per year over which releases may occur should be included, for example, the likely minimum and maximum number of release days.	At a minimum, include the minimum and maximum number of days over which water will be released during the construction period.
Executive Summary	Hydraulics and Fluvial Geomorphology Impacts for Temporary Construction Releases	Visual inspections during construction releases are proposed to identify erosion and scouring at the release location. However, no information is provided to indicate what level of erosion or scour would be deemed unacceptable - noting that underwater scouring will not be visible. Furthermore, no mitigation measures are identified to limit the impacts of unacceptable levels of erosion and scouring - noting that once erosion or scour is identified it may be too late to intervene to ensure further erosion or scouring is limited or prevented.	The IAR should describe: 1) how unacceptable erosion or scouring will be defined 2) how underwater scouring would be identified 3) suitable mitigation measures that would be implemented to limit/prevent further scouring or erosion 4) whether water releases would cease or be slowed to limit the potential impacts of erosion or scouring.
4.1.1	Construction Phase	HDPE liners may leak if damaged during or after installation. Suitable mitigation measures should be described that would minimise the likelihood of any damage and also limit potential environmental impacts should the HDPE liner be damaged and leak.	Include suitable mitigation measures to minimise the likelihood of damage to the HDPE liner and limit the potential impacts to environmental values should the HDPE liner be damaged and leak.
4.1.2	Release Infrastructure	Table 2 details that "releases will be from the Wises upper reservoir at the operational phase mixture of 9 parts Eldridge water to 1 part Wises". However, Table 81 only details releases to the river from Eldridge pit.	Provide details/clarity around when releases during construction will occur from a mixed scenario, and how a 9:1 mixture would be achieved prior to commissioning.
4.1.2	Release Infrastructure	This section does not describe the rationale for the location of the release infrastructure.	This section should clearly describe why this release location was chosen. Describe how this location maximises the avoidance and mitigation of potential impacts to environmental values of the land and Copperfield River.
4.2.2	Design Refinement and Assessment of Alternatives	Costs estimates for in-pit treatment or RO treatment and release have been undertaken on 17.5 and 12 gegalitres (GL), respectively (Table 4). Given the WQO risks identified in Chapter 7 from 1:25 discharge proposal, these costs should also be presented for the latest predicted construction volume (1.5 -2 GL). Queensland Water Quality Guidelines state there is a need to justify that achieving water quality objectives (based on ANZECC toxicity guidelines) is economically or technically unacceptable before relaxation of the objectives (QWQGs Section 5.3).	Without a reliable assessment of the economics and feasibility of the various possible treatment options for the construction phase predicted volume (1.5 -2 GL) the temporary alteration (3 years) of water quality objectives to <80% species protection for 50 kms of the Copperfield cannot be thoroughly assessed.
4.2.2	Design Refinement and Assessment of Alternatives	Options for treatment or alternative disposal of the remaining 1.85 – 2.56GL of excess construction water are not proposed.	This section should include a discussion of options for addressing the 2.56GL. Disposal to waters should only be considered after other all alternative re-use, recycling and treatment options have been utilised.
4.7.2	Release Event Type 2 – Pass-Through Discharge	This section states that the "rapidity of any potential mixing has not been estimated as it is likely that the incident rainfall will remain at least partially separated from the higher density pit water during a pass through discharge event." Nonetheless, the quality of water to be released during a Type 2 release is not adequately described. A quantitative assessment of the impact of this type of release must be included in the IAR to allow for a full assessment of it's potential impact and acceptability.	Include a full and detailed description of the likely quality of water that would be released during a Type 2 release. Include a comprehensive detailed quantitative assessment of the likely impacts of this type of release on water quality and environmental values downstream of the release location.
4.7.2	Release Event Type 2 – Pass-Through Discharge	Type 2 pass-through discharges have not been assessed for causality, frequency, discharge volume or quality.	If approval is sought relating to a pass through discharge, a quantitative assessment needs to be undertaken
5.6.3	Sulfate	Sulfate is considered 'high risk' given its historical exceedances of the default WQO for recreation. In risk assessment as "Hydrogeochemical modelling of the predicted water quality at the Gorge suggests, however, that mineral precipitation is not expected beyond that already associated with the (prerelease) Copperfield River."	Mentioned twice in risk assessment (Table 107), but not further described. IAR needs to discuss why sulfate is considered high risk in detail.
6.1.1.2	Dilution Ratio for Adoption	This section describes the use of up to 69% of the receiving environment's assimilative capacity during operational releases. It is expected that during the wet season some assimilative capacity may already be taken up by overtopping of the Kidston tailing dams and other inputs of runoff from the Kidston site. The assimilative capacity of the receiving environment used by the current development, excluding the proposed water releases, should be described in full in this section. The cumulative impact of all inputs (including the proposed construction and operational releases) from the project into the Copperfield River must also be more concisely discussed.	This section should include an comprehensive analysis of the assimilative capacity of the receiving environment already used by the current Kidston Development, including stormwater runoff and tailing dams overtopping during the wet season. It should also include a more detailed quantitative analysis of the potential cumulative impacts of all inputs from the site into the Copperfield River (including the proposed construction and operational releases).

6.2	Water Quality Impact Assessment	The proposed risk assessment for operational phase-controlled discharges predicts that environmental values are unlikely to be adversely impacted by the modelled minimum 1:200 dilution. It is important to highlight that while the impacts assessment was undertaken using a 1:200 dilution design approach, for the purposes of regulation, the operational phase CG approval conditions will require end of pipe limits for the identified important physico-chemical indicators and toxicants, and conditioning around the minimum stream flow and discharge quantities (as well as monitoring frequencies defined). Maximum EOP limits for toxicants need to be derived from the assumptions around inputs used in the impact assessment predictions. Increasing the EOP limits well above the numbers used within modelling represents a higher risk prospect.	
6.2.1	Near Field Mixing Zone Assessment (CORMIX)	The near field mixing assessment has returned a result suggesting that the mixing zone where WQOs are not met will be mostly less than 135 m distance downstream (worst case 623 m, in 2% natural flow conditions), and at the minimum release flow trigger the mixing zone is estimated as 51 m distance downstream and a stream width 32 m. While the physical dimensions of the mixing zone based on minimum DTA dilutions has not been assessed specifically, this is anticipated to be a much smaller distance than based on WQOs. However, the dilutions identified in both DTAs do not represent worse case given the water quality assessed was based on composite samples, rather than 100% Eldridge pit. The near field mixing assessment for the operational phase is acceptable.	
6.2.3	Assessment of Water Quality Impacts to Environmental Values	Parameters relevant to the aquatic ecosystem EV are below the WQO at all locations, with the exception of total nitrogen and dissolved zinc .	The document needs to detail what the exceedance may cause – i.e. it currently does not discuss/explore the possibility of increased turbidity/residence time in the creek/Einasleigh Gorge etc. – for neither the construction phase or operations phase Needs to discuss the potential increase in releases from rest of Kidston Mine Site in high rainfall events, which has historically resulting in WQO exceedances
6.2.4	Conclusions of Water Quality Impact Assessment	Approval conditions will need to ensure that operational and construction discharge conditions are mutually exclusive and do not co-occur, given that no section of the IAR has assessed the potential for concurrent discharges. In addition, regulatory receiving environment triggers are most likely required, rather than simply being part of a non-specific REMP condition. Triggers and sampling location should reflect modelling output predictions.	
6.2.4	Conclusion of Water Quality Impact Assessment	The second dot point in this section describes mixing within 625m as "rapid". The department does not agree with is statement - mixing over this distance should not be described as rapid.	Reword the description of mixing within 625m as "rapid mixing".
6.2.4	Conclusion of Water Quality Impact Assessment	An estimated 625m mixing zone is larger than most approved mine water release mixing zones. Additional measures should be examined to reduce the length of the mixing zone.	Describe additional measures to reduce the release mixing zone.
7.2.1.2	Construction Stages and Model Objective Functions	While this section indicates that a release of waters would not be required until Construction Phase 3 (188 days), any proposed construction release should be optimised to take advantage of high river flow scenarios across the three year construction phase.	Please provide clarity on the proposed duration of the construction releases (i.e. first and last date of potential release, integrated with the construction schedule)
7.3	Water Quality Impact Assessment	Scouring near the temporary outfall is noted. However, the area over which scouring may occur is not adequately described. There is no description of potential impacts to flora and fauna values within the area that may experience scouring. No assessment is provided of potential indirect impacts on downstream environmental values from increased sedimentation and turbidity from scouring.	Describe the area that may experience scouring including any potential direct and indirect impacts to flora and fauna values.
7.3.1	Near Field Mixing Zone Assessment	Construction phase discharges of toxic wastewater proposed via pontoon mounted submersible pumps and HDPE pipes is proposed for a significant yet undefined duration of time (>1.5 years?). Water Sciences does not support a large toxicity mixing zone where it is not consistent with the Australian Water Quality Guidelines and has the potential to cause environmental harm. In such cases, a diffuser to promote near-field mixing of the release would normally be required to minimise impacts. No dispersion assessment (CORMIX) is presented in the IAR for the construction discharge proposal (Chapter 7.2 Preliminary Construction Phase Assessment, Section 7.3.1 Near Field Mixing Zone Assessment).	Further consideration and modelling of mixing zones for the proposed construction discharges via the "temporary outfall structure" and via the "diffuser" is required as part of the IAR. Refer to page 13 of the Technical guideline: Wastewater release to Queensland waters for further guidance (https://environment.des.qld.gov.au/assets/documents/regulation/pr-gl-wastewater-to-waters.pdf). Define the physical dimensions of the initial mixing zone where relevant WQOs and DTA thresholds are reached (see further comments in relation to appropriate safety factors and considerations for the application of DTA data) via 1) the "temporary outfall structure" and 2) the "diffuser" (for construction phase proposal).

7.3.2	Far Field Assessment of Sustainable Load (Mass Balance)	An incomplete impact assessment is presented for the mid-field locations within the Copperfield River. Limited detail is presented regarding the anticipated concentrations of toxicants and duration of likely exposures within the identified semi-permanent pools downstream of the proposed wastewater discharge.	If the majority of release opportunities within the construction phases are utilised in succession (over a wet season for example), what are the predictions regarding aquatic ecosystem impacts within these important refugia.
7.3.4	Assessment of Water Quality Impacts to Environmental Values	The concentrations represented by the mass balance will only be present whilst the release is occurring. However, the section does not provide examples of how long the system takes to return to < WQOs, how long the water takes to move from Kidston to Einasleigh, etc.	The IAR needs to detail, how long the system takes to return to < WQOs in scenarios where they are being exceeded for large periods downstream, how long the water takes to move from Kidston to Einasleigh (i.e. days/weeks), how long will elevated concentrations be present at that location; and the proportion of days per year where there is 'unimpacted' water present in the system, compared to release impacted days.
7.3.4	Assessment of Water Quality Impacts to Environmental Values	Many indicators are predicted to exceed WQOs up to and over 50 km downstream from proposed construction release. The impact assessment has also assessed the resultant water quality against less stringent toxicity guidelines due to the temporary nature of this discharge (80% species protection). Again, exceedances are modelled to occur downstream up to 50 km. If this is correct, this places this application within a high-risk category in terms of potential aquatic ecosystem and drinking water impacts. Wastewater discharge assessments typically attempt to achieve relevant WQOs within 300m (or 3 stream widths if less) rather than 50 km (page 14 of Technical guideline: Wastewater release to Queensland waters).	
7.3.4	Assessment of Water Quality Impact to Environmental Values	Construction releases are predicted to exceed the available assimilative capacity of the receiving environment (Copperfield River) and would result in an exceedance of WQO up to 48km downstream of the release location. Given the severity of the potential impacts of the construction releases, the impact assessment for construction releases is inadequate. The IAR should fully describe and assess the potential impacts of any releases on environmental values, including aquatic flora and fauna values. The impact assessment should be significantly expanded. For example, the impact assessment must describe in detail whether the proposed project is predicted to result in localised impacts to aquatic flora and fauna, how recolonization of potential impacted areas might occur and how long this recolonization may take. This is particularly important given the presence of macroinvertebrate communities sensitive to change in the Copperfield River.	The IAR should provide a comprehensive and detailed quantitative assessment of the project's potential impacts on environmental values.
7.3.4	Assessment of Water Quality Impact to Environmental Values	The information provided in Table 92 is not sufficient to support the statement that impacts from construction releases will be transitory and reversible. For example, an exceedance of the WQO for 95% species protection 48km downstream of the release for up to 41 days per year for three years has the potential to significantly impact environmental values - yet potential impacts are discussed in a cursory manner in the IAR.	Further evidence, including a detailed impact assessment based on reasoned discussion should be provided to support the assertion that potential impacts of construction releases will be transitory and reversible.
7.3.4	Assessment of Water Quality Impact to Environmental Values	Post-release flushing from the Copperfield Dam is proposed to aid in the dilution of releases from the project site. However, a quantitative assessment of the impact of this flushing on water quality is not provided in the IAR. If post-release flushing from the Copperfield Dam is proposed as an acceptable mitigation measure to reduce the risk and severity of impacts of the project, an additional quantitative assessment should be included in the IAR to support claims regarding the effectiveness of this proposed mitigation measure.	The IAR should include a quantitative assessment of the impacts of post-release flushing on water quality to support the implementation of this measure to improve water quality after a water release.
7.3.4	Assessment of Water Quality Impact to Environmental Values	The impact assessment does not include a risk matrix assessing the likelihood and severity of potential impacts arising from the proposed operational and construction water releases. The risk matrix should detail how proposed mitigation measures would reduce the likelihood or severity of impacts of the proposed project.	Include a risk matrix assessing the likelihood and severity of potential impacts of the proposed project, including the likely effectiveness of mitigation measures in reducing the likelihood or severity of impacts.
7.3.4	Assessment of Water Quality Impact to Environmental Values	Based on worst case maximum values during the later stages of construction - WQO for drinking water are predicted to be exceeded at downstream locations at which water may be used for drinking. Given the potential for impacts to human health, the precautionary approach must be applied so that no water from the Copperfield River is consumed, and potable water provided, at any stage during operations and construction when WQO for drinking water may be exceeded.	Revise this IAR section to clarify that no river water will be used for potable uses at any stage during operations and construction when WQO for drinking water may be exceeded.

7.3.4	Assessment of Water Quality Impact to Environmental Values	Water quality should be monitored at the Oaks homestead to validate modelling results and confirm that water quality objectives for potable water are achieved before potable usage of water at this location recommences following a release.	Include the monitoring of water quality at the Oaks homestead and triggers for the cessation and commencement of the use of water from the Copperfield River for potable uses at this location. Provide details on how the proponent would communicate with the Oaks homestead to ensure river water is not in used during releases when WQO for drinking water may be exceeded. It is recommended that Queensland Health be consulted regarding the appropriateness of this WQO exceedance and any proposed mitigation measure(s).
7.3.4	Assessment of Water Quality Impact to Environmental Values	Mitigation measures are not proposed to improve the quality and quantity of pit water prior to release - despite the exceedance of WQO during construction releases.	Describe and fully assess suitable mitigation measures to limit WQO exceedances during construction releases, including mitigation measures to improve the quality and reduce the quantity of pit water prior to any release.
7.3.5	Conclusions of Water Quality Impact Assessment	<p>Justification regarding proceeding with 1:25 approach are based on the:</p> <ol style="list-style-type: none"> 1) DTA biological effects data, and; 2) Temporary nature of the construction phase discharges (3 years) for the proposal being satisfactory in terms of adverse impacts. <p>The water quality of the DTA Composite 2 is a better quality than observed from historical sampling. The following table presents a comparison between the DTA sample and statistical information in terms of historical water quality from Eldridge Pit:</p> <p>Constituent concentration in composite sample submitted for DTA 2</p> <p>90% Eldridge:10% Wises Corresponding closest percentile from Eldridge Pit historical data in Appendix B (maximum recorded)</p> <p>Dissolved Zinc (1.09 mg/L) 80th percentile (max 1.75 mg/L)</p> <p>Dissolved Cadmium (0.0221 mg/L) 75th percentile (max 0.0321 mg/L)</p> <p>Dissolved Cobalt (0.004 mg/L) 20th percentile (max 0.029 mg/L)</p> <p>Electrical Conductivity (3210 µS/cm) 75th percentile (max 4790 mg/L)</p> <p>Sulphate (1720 mg/L) 25th percentile (max 2500 mg/L)</p> <p>The above table presents a selection of certain relevant indicators, and is not a comprehensive comparison. It does highlight, however, that the water quality tested for biological impacts (using DTA) was generally better quality than historical worse-case findings. What is clear from much of the information presented in the construction IAR is firstly, that the 1:25 discharge proposal represents a high risk to downstream environmental values and secondly, that water quality in the proposed discharge will change over time and is not static.</p>	<p>If the DTA is proposed to be used as the primary justification of low risk, then the end of pipe limit maximums will need to be set according to the water quality measured within the DTA composite (and adjusted by agreed safety factors for hardness modification and to lowest NOEC (x 10)). The hardness in the lowest DTA dilution is still very high and predictions regarding the toxicity ameliorating effects at this range may be less predictable.</p> <p>According to the ANZECC guidelines where mixture toxicity is observed, the next step in the assessment is toxicity identification and evaluation (TIE) techniques, which assist in identifying the main toxicants of concern for that particular mixture (see page 3.4-16 ANZECC). This could be considered further although is time consuming. The DTA did not actually investigate a dilution factor relevant to the proposed discharge dilution (lowest in the DTA is 6.25%, while the discharge proposal is 4%). This presents more uncertainty with the DTA and a discussion should be presented about whether application of a safety factor on top of the lowest NOEC may be appropriate, i.e. build in a safety factor to lowest NOEC (x 10).</p> <p>Further discussion is required in the IAR regarding the anticipated long term impacts to aquatic ecosystems from potential toxicity experienced intermittently over three years (as per the IAR states). The life-cycles of relevant species should be outlined and three years of possible population impacts discussed, including how this timeframe may negatively influence the possibilities of recovery. Three years is a relatively long duration for impacts without further assessment, especially given species lifecycles may range from 2 years or significantly less.</p> <p>Where a pre-approval risk assessment highlights a potential for high risk from discharges, there is the possibility that post-approval DTAs can be conditioned and utilised for compliance/ongoing risk assessment and feedback into tiered approval conditions. This would involve a suitable frequency and sampling locations for DTA samples collected directly from receiving water during the influence of discharges and should relate back to the dilutions allowed as part of the approval and original assessment.</p> <p>A more detailed assessment of the proposal in relation to the potential for algae blooms should be provided. The proponents mention that there is no evidence of algae growth within Eldridge Pit to date, despite nitrate levels of 5 mg/L. The toxicity assessment revealed that 100% Eldridge water was non-toxic within an algae test, i.e. it did not inhibit growth. Hence an assessment is required regarding other important factors downstream including turbidity and settling which may inhibit or promote algal growth.</p>
7.3.5	Conclusion of Water Quality Impact Assessment	The assumption that the river will not be used for recreation in high flow conditions is not an acceptable measure to avoid the impacts of the exceedance of recreation WQO for Manganese.	Explore and fully describe suitable additional mitigation measures to further limit the exceedance of WQO.
7.5.1	Water Quality	The sensitivity of macroinvertebrates downstream from the release location is stated in this section, including the "adoption and application of appropriate release management strategies" to reduce the level of residual risk to aquatic downstream aquatic values. These potential management strategies and mitigation measures not detailed in the IAR, nor is their potential efficacy adequately assessed. Monitoring outlined in Table 5 of the REMP is not of a sufficient frequency to enable the effective management of water releases to limit impacts to flora and fauna values.	The IAR should provide detailed management and mitigation measures to further reduce the risk of construction water release impacts to aquatic flora and fauna values. The IAR should adequately assess and provide evidence of the likely efficacy of any proposed mitigation measures.

7.5.1	Water Quality	The IAR suggests macroinvertebrate communities as an ideal biological indicator for the future project REMP. However, no detail is provided as to how macroinvertebrate sensitivities would be used to monitor potential impacts of the proposed project, or how the proposed project may be modified if impacts to macroinvertebrates are detected. Note - frequent monitoring would be required to ensure any impacts are detected and can be responded to within a timeframe likely to limit those impacts.	The IAR should detail how macroinvertebrate monitoring would be undertaken to enable project modification in response to the detection of impacts on macroinvertebrates. The proponent should consider increasing the frequency of sampling of flora and fauna values to allow modification of releases in response to any monitoring results.
7.5.2	Hydrology	Noting that changes in hydrology and increased flows and water permanency may suit some species, it is also likely to negatively impact other species. This should be assessed in the IAR.	The IAR should detail and discuss which species are likely to benefit or suffer under a regime with increased water flow rates and increased water permanency.
7.5.3	Erosion and Sedimentation	This section does not adequately describe the impact/potential impact regarding the accumulation of contaminants in sediment.	The IAR needs to further assess the actual/potential impacts that accumulation of sediment will have on the receiving environment that provides scientific justification that these impacts are 'low'.
9.1	Summary of Proposed Release Criteria	Release conditions should include contaminant end of pipe triggers and limits for the relevant parameters, in addition to conditions regarding flow triggers and minimum dilutions. The impact assessment has been undertaken on the basis of assessing the risk of 1:25 or 1:200 assuming water quality from historical information (and based on the site water balance predictions of what will be required in terms of discharges). Licensing processes utilise information from the impact assessment to then consider the appropriate conditions, EOP and within the receiving environment. Assumptions cannot be reliably made to assert that water quality within the pit will not alter (or deteriorate) over the operation lifetime. This is especially important, given the likely increased ingress of groundwater once the current water levels in Eldridge Pit are dropped. There is also an identified potential for oxidation of the sulphides and liberation of cadmium, zinc, copper and arsenic from pit walls.	<p>If the maximum release rate is proposed to be adjusted on real time data from upstream gauge, then the minimum flow triggers should also be managed on a real time or short term basis (i.e. cubic metres/second, rather than ML/Day). Any request to use variable release ratios (volumes) based on real time dilution factor with the receiving water flows presents additional complications in regards to the onsite management and compliance assessment. A discussion of how the onsite management would be designed to enable rapid alterations of discharge volumes to fluctuating natural stream flows should be detailed within the IAR.</p> <p>Some early attempts to develop an EOP limits appear to have been presented for dissolved zinc for operational discharges, but nothing has been presented for the construction phase limits. If modelling has assessed EOP maximum of 1.58-1.75 for dissolved zinc then this will more closely reflect the EOP limit, which should then be applied. Doubling the end of pipe limit would require impact assessments and modelling using the requested limit, and this has not been undertaken.</p> <p>The release ratio during the construction phase of 4.2% listed in Table 108 does not equate to 25:1. The release ratio should read 4%. This error needs to be corrected throughout the documents.</p>
9.2	Monitoring	<p>Increased water quality and aquatic ecosystem health risks from construction phase proposal would require, if approved, a more comprehensive and responsive monitoring regime. Within the "Overview of Receiving Environment Monitoring Program" Table 109, the upstream and downstream water quality monitoring frequency during releases stipulates a sample is to be taken within the first 24 hours, and then every three days thereafter until one week after the release ceases. Given that Type 1 discharges will not occur at flows less than 400 ML/day, an estimate of how long the minimum flow (plus discharge volume for construction phase 16 ML/day) would take to reach the last downstream monitoring site EG1 is necessary. The proposed monitoring timing/frequency should capture sampling for declining water quality and impacts in relation to the predicted timing of impacts.</p> <p>By ceasing monitoring after 1 week of the discharge ceasing, as is currently proposed, the water quality at the sensitive Einasleigh gorge (and semi-permanent waterholes Pond 4, Pond 5 and W3) will not be assessed in the weeks following a release. The limited assessment of potential receiving environment impacts during construction phase discharges is not supported, given the high-risk of WQO exceedances, and possibility of evapo-concentration.</p>	<p>The approval will need to nominate the relevant indicators, conditions and monitoring points/frequency. Currently this information sits within the REMP document.</p> <p>The nominated site DS1 is listed as immediately downstream of the mixing zone, however, no clarification of which mixing zone is relevant for this site location has been presented. Further downstream, monitoring is also required with the semi-permanent waterholes Pond 4, Pond 5, and W3 during the construction phase.</p>
Appendix B	Water Quality Statistics Table	Appendix B appears to exclude the information more recently obtained from depth profiling within the Eldridge Pit.	

Appendix G Draft REMP	DTA - June 2018	The most diluted wastewater Rainbow fish embryo hatching assessment (for both DTA 1and DTA 2) shows a trend (although not statistically significant) of more toxicity and much higher variability than less diluted tests. The possible influence of hardness within the DTA dilutions is lacking from the IAR. A written discussion and explanation from Ecotox Pty Ltd in regards to the possibility of a multiple phase dose response should be included in the IAR. The possibility of higher toxicity in more dilute mixtures should be addressed given the well-established influence of water hardness on toxicity. Can the results of the DTA be relied upon to assure that no acute and/or chronic toxicity impacts are posed by the proposal (over a 3 year period of repeated event-based discharges)?	
1.0	Aims and objectives	Note - An objective of the REMP is also to outline mitigation and measurement measures that would be implemented to further limit potential impacts of the water releases, as suggested in section 7.5.1.	The IAR should include potential mitigation and management measures that may be implemented in response to monitoring undertaken as part of the REMP to limit impacts of water releases. It should include triggers for the implementation of each mitigation measure.
4.1	Figure 3, Water monitoring location map	Figure 3 is not included in the draft REMP.	Include Figure 3 to clarify proposed water quality monitoring locations.
4.4.2	Assessment Method	The methodology for assessing aquatic flora and fauna communities is not provided.	Detail the methodology for assessing aquatic flora and fauna communities.
6.0	Reporting	The placeholder in this section indicates that reporting will be completed "as per conditions of EA." Note - the proposed project will not have an EA as it is not an environmentally relevant activity requiring an EA.	Clearly state here and in other sections of the IAR that no EA approval would be issued for the proposed project as the activity is not an ERA. Any approval conditions would sit as imposed conditions in the Coordinator-General's Evaluation Report for the proposed project. Compliance with any imposed conditions would be the responsibility of the Office of the Coordinator-General.

Date : 20/11/2018 3:50:25 PM
From : "SHARPE Dean"
To : "FOMIATTI MINNESMA Ingrid"
Subject : FW: Update on Kidston construction issues
Attachment : image001.png;image003.png;image004.png;image005.png;

I spoke to Mel briefly about the e-mail and suggested we discuss next Monday re implications around any proposal for tailings removal from Wises Pit and disposal on site.



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From: Melanie Harris [mailto:Melanie.Harris@coordinatorgeneral.qld.gov.au]
Sent: Tuesday, 20 November 2018 1:11 PM
To: SHARPE Dean <Dean.Sharpe@des.qld.gov.au>
Cc: Rosemary Shearman <Rosemary.Shearman@coordinatorgeneral.qld.gov.au>; Steven Tarte <Steven.Tarte@coordinatorgeneral.qld.gov.au>; FOMIATTI MINNESMA Ingrid <Ingrid.FomiattiMinnesma@des.qld.gov.au>; FARKAS Renee <Renee.Farkas@des.qld.gov.au>; BOOY Caitlin <caitlin.booy@des.qld.gov.au>; PAGE Cathie <Cathie.Page@des.qld.gov.au>
Subject: Update on Kidston construction issues

Hi Dean,

Steven and I had a quick catch up with Craig and Arran from Genex and Rouven this morning seeking an update on how construction issues are being resolved. Key points are:

- Genex are proposing to temporarily increase the storage capacity of Wises Dam from 551 m to approximately 552 m until operations commence
- This would be achieved by:
 - filling Wises to above FSL (temporarily blocking off the spillway) – increasing capacity by approximately 1 GL
 - excavating part of the waste rock in Wises Pit and relocating to other parts of the site – increasing capacity by 1 GL
- the additional capacity in Wises Dam would reduce the amount of water to be released to 0.5 GL
- early modelling indicates that this will provide a dilution rate of between 1:60 and 1:100 (as opposed to the 1:25 for construction or 1:140 for operation)
- benefits of this approach include:
 - better environmental outcome than disposing on land
 - no requirements for temporary discharge infrastructure as release would not be needed until dry season of 2021

AECOM are currently re-running the modelling for the construction phase and will develop updated impact assessment tables for discussion. AECOM plan to update the whole IAR rather than supplying an addendum. We are currently waiting on Rouven to provide an updated program for when we will get the revised material.

On that note Dean, I was wondering when we can start a discussion on conditions for operations?

Cheers Mel



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DES - OCG Kidston Internal 330pm 26/11/18
Steven Tarte, Mel Harris, Dean Sharpe, Caitlin Booy,
Renee Farkas, Melissa Williams

MH: phone call from Genex - need to DES ined.
OS: As discussed - has significant
MH: Moving WR from one dump to the other
OS: Still mining related, POOPs, FA, far as
I'm aware its all tailings.

MH: Have said to them + they would love to have a teleconference with you tomorrow to have a chat.

DS: Midday to 1pm

MH: Can hear what they propose.

DS: No concerns, clear way forward, EA amendment, PoOps, FA.

ST: EA amendment around WR movement?

DS: Yes, need to identify what they're doing.

MH: Ramifications with IAR and EA.

DS: No concerns, will flag what needs to happen. Did they look at other options?

MH: No that and increasing FSL on Wises

DS: DEWS is happy with that

MH: May have some implications, need to make a phone call.

ST: Will need in writing.

MH: Said I'm concerned over Christmas. If we are to complete by Christmas need a final IAR Monday. Craig has ~~said~~ the IAR is not a good document.

ST: WQ downstream is why they don't want to do land waste, that's why they've looked at other options. Don't propose to release this wet season.

DS: Decreases ability to release if they do go ahead with what they propose they need to do all the EA stuff. If they don't go ahead with tailing removal. In terms of water storage, that should be sized appropriately, which I think is minimal based on WQ. Construction of storage allows access to water to put back in the system.

MH: Counter-intuitive. Listen to what they

Say - look at O.S.G.L modelling, have a listen tomorrow.

DS: Strides forward in terms of N

MH: No and nothing new just "Unlikely"

ST: In terms of operations is there conditioning

DS: We're working on it, whether they can comply with them is another question. Will not sanction WPD exceed without mitigation measures.

ST: Key during construction?

DS: It's both, need to meet WPDs, what dilution factors apply, justify 625m otherwise 500m, ensure no ponding of water in downstream environment will drive how conditions look. Need to have a conditioning framework that are justifiable.

ST: I expected that.

DS: Seems to be a pick and choose in regards to WPDs.

MH: Understood

ST: What's the best way to discuss construction related issues. Coming to Cairns?

DS: If they want to come to Cairns happy to do so, in terms of staff is very limited. If they come they may want to present something new. If nothing new I'm not sure what they want to discuss.

ST: Discuss conditioning?

DS: Discussion will be rather static. Not sure it will be value adding. Happy to discuss but not at a point to send them out yet.

MH: That's what I've said. If you want

it done they need to give us what we ask for

DS: A + end of day we can give them conditions but they need to meet them.

MH: Will send a meeting invite.

DS: Window of opportunity to get it done before Christmas is closing. Info provided is lacking. Any engagement with minister CG etc?

ST: CG is informed, briefed on WPU exceedance, he wasn't keen to take that risk on. Not much from ministers

MH: Steven will brief on Wednesday.

DS: Ready to engage. Can't make...

MH: Done well with what we've got. Can take a horse to water, can't make it drink. Will keep you posted.

DS: holding statement alone?

MH: have a media release draft, Q&As

DS: Happy to be involved.

ST: Once they've been prepared we have limited control.

DS: Please send to Ingrid as well.

Close at 4pm

sch4p4(6) Personal information

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DES OCG Genex Aecom 12pm 27/11/18
teleconference.

Regina, Mel Harris, Caitlin Booy, IFM, Dean Sharpe
- See email from Mel.

MH: Can you please explain the proposal.

RL: Discussion around approach, we will go
away at update the IAR. I sent some
maps around.

AM: First of the maps is 'zoomed' view of
existing WRD from construction of Eldridge
map- (30269-01). Need to minimise the amount
of water to discharge during constr.

Its not the tailings its the WRD, relocate it to another WRD (new spoil area - map 307269-02). New area is outside existing Wises Dam. look to excavate soil (WRD capping material) which leads into the intake structure. Will grass the area. No existing drainage will be altered or changed will remain operating.

IFM: Waste rock on side of Wises and moving to another WRD, will you be interfering with the new WRD? ~~The~~

AM: top 2m is weathered soil. The ~~IFM:~~ area will be flooded once the dam is constructed. HDPE liner will come into it. Wises dump excavation will move to new spoil area. That material would be flooded internally once dam is built.

IFM: That is current capping material

DS: Was this always proposed as the final void structure.

AM: No it wasn't this is to create more capacity.

DS: have you engaged with ~~DEWS~~ NRME

AM: Not yet, not changing levy dam the design is not changing just internal. Creating additional space.

IFM: And excavate other material

AM: Yes to vegetate

DS: It would be prudent to discuss with ~~DEWS~~ NRME

AM: Conceptual - in principal agreement before going ahead.

IFM: Material you excavate for capping is going down 2m what connectivity will that have

AM: HDPE liner will tie in ~ 4m down

IFM: In terms of Wises is it PAF, NAF or

AM: Predominantly its non-PAF. If we came across PAF we would into new dump area. Will require monitoring during movement.

IFM: Will compromise the rehabilitation and may concern the mining EA

AM: I don't think its any different from the TSF and solar farm.

IFM: WRD were capped. which is different to the tailings dam what your proposing is putting high risk material on an area that was reliant on the revegetation. Interferes with Mining EA.

AM: IF the additional WR material is capped in the previous method.

IFM: No because your now conducting a mining activity. Happy to go there but will impact PoOps + FA.

AM: Why FA?

IFM: Because you 'unrehabing' an area - adds a new area.

AM: IF we rehabed it once we relocated

IFM: Need to understand risk of material I just want you to understand there are financial implications. Begs the question, by excavation Wises - is there an ability to store the wastes and use it later

AM: That's what we're trying to do. ~~Options to build a~~ Most economical option

IFM: Economics may not add up (PoOps, FA) may be more effective to have a separate storage space on site.

AM: will require excavation of another hole

IFM: OR a turkey's nest

AM: We're creating one with Wises dam anyway. I think the idea of a turkey's nest on new land it will be much more costly.

IFM: A conventional cap. Kidston is challenged, the current capping hasn't work, will need a new cap which will increase EA. Not as simple as we will move material.

AM: What capping guidelines apply.

IFM: 1.5m approx growth media etc.

DS: The guide guide has a lot of examples.

IFM: FA Calculator will give rates for high, low + medium risk cap.

AM: IF we did it - extended with the applicable capping standard the FA will increase.

IFM: highest term of disturbance while constructing will change FA.

AM: 17.5ha wouldn't take long to do.

IFM: I would get some advice first.

Caithlin to email FA guideline.

DS: will need to attend EA if its major - may need public notification etc that will take time.

IFM: Need to work through. Need a better idea around type of material.

DS: Around turkey's nest if it was built for the hydro you wouldn't need to do all this.

IFM: Gets some more info around proposal. Understand other options considered. Long short is it will interfere with the EA. EA may not need to be amended but you will need a new PoPs and FA.

RL: I take your point may not be high-risk material.

IFM: Kidston rehab has not been signed off and moving material will have implications. There is a reason rehab wasn't + hasn't been signed off.

RL: Would there be a middle ground not meeting the current standard.

IFM: Not historic, no break in tenure, no argument that this is historic in terms of economics I don't think you've looked at a real cost for what you're proposing.

AM: We will go away and have another look.

IFM: look at new FA calculator

DS: I will send that through.

MH: Will keep working on operation.

Close at 12:40pm.

sch4p4(6) Personal information

DES / OCG Kidston phone call

17/12/18

9.50am

Mel Harris, Caitlin Bay, Teale Gibbs + Renee Farkas.

- Phone call to discuss the updated modelling received from AECOM.
 - OCG not expecting a response but one is welcome.
 - OCG will request that AECOM do not submit anything in the first week of Jan 2019.
 - DES require assumptions for modelling analysis.
 - Nutrients remains key concern.
- End at 9.55am

sch4p4(6) Personal information

Date : 21/12/2018 11:59:54 AM

From : "BOOY Caitlin"

To : "Melanie Harris" , "GIBBS Teale" , "FARKAS Renee" , "PAGE Cathie"

Cc : "Steven Tarte" , "SHARPE Dean" , "FOMIATTI MINNESMA Ingrid"

Subject : RE: Kidston pumped storage hydro project - use of waste rock

Attachment :

image002.png;image005.png;image007.png;image009.png;image011.png;image012.png;image013.png;image014.png;image015.png;

Good morning Mel,

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Should you require anything further or have any other questions, please feel free to contact me.

Kind regards,
Caitlin



Caitlin Booy
Environmental Officer (Minerals)
Minerals & North Queensland Compliance I Environmental Services & Regulation
Department of Environment and Science

P: 07 4222 5456
Email: Caitlin.booy@des.qld.gov.au
5B Sheridan Street Cairns QLD 4870
Postal address: PO Box 7230 Cairns QLD 4878

From: Melanie Harris <Melanie.Harris@coordinatorgeneral.qld.gov.au>

Sent: Friday, December 21, 2018 11:26 AM

To: GIBBS Teale; BOOY Caitlin; FARKAS Renee; PAGE Cathie

Cc: Steven Tarte; SHARPE Dean; FOMIATTI MINNESMA Ingrid

Subject: FW: Kidston pumped storage hydro project - use of waste rock

Good morning,

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I hope that this clarifies the matter.

Thanks again for everything this year,

Kind regards,

Mel



Melanie Harris
Project Manager
Office of the Coordinator-General
Department of State Development,
Manufacturing, Infrastructure and Planning

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From: Sonya Booth

Sent: Friday, 21 December 2018 11:04 AM

To: Steven Tarte <Steven.Tarte@coordinatorgeneral.qld.gov.au>; Melanie Harris <Melanie.Harris@coordinatorgeneral.qld.gov.au>

Subject: FW: Kidston pumped storage hydro project - use of waste rock

FYI Team – for your action, please.

Thanks



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From: CROTON Luke <Luke.Croton@dnrme.qld.gov.au>
Sent: Friday, 21 December 2018 9:15 AM
To: Sonya Booth <Sonya.Booth@coordinatorgeneral.qld.gov.au>
Cc: DENDLE Cale <Cale.Dendle@dnrme.qld.gov.au>
Subject: RE: Kidston pumped storage hydro project - use of waste rock

Sonya

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Luke Croton
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e: Luke.Croton@dnrme.qld.gov.au
w: www.dnrme.qld.gov.au

From: Sonya Booth <Sonya.Booth@coordinatorgeneral.qld.gov.au>
Sent: Friday, 21 December 2018 9:10 AM
To: CROTON Luke
Subject: FW: Kidston pumped storage hydro project - use of waste rock

Hi Luke – as discussed – thanks



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From: Steven Tarte
Sent: Tuesday, 18 December 2018 12:05 PM
To: 'luke.croton@dnrme.qld.gov.au' <luke.croton@dnrme.qld.gov.au>
Subject: FW: Kidston pumped storage hydro project - use of waste rock

Hi Luke,

Thank you for discussing this matter with me.

As discussed, the proponent has sought and obtained a development approval under the *Planning Act 2016* for the construction and operation of the Kidston Pumped Storage Hydro project (attached).

Could you please confirm that the approval requirements under the *Mineral Resource Act 1989*.

Regards,

Steven



Steven Tarte
A/Director
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Department of State Development,
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From: DENDLE Cale <Cale.Dendle@dnrme.qld.gov.au>
Sent: Wednesday, 12 December 2018 11:10 AM
To: CROTON Luke <Luke.Croton@dnrme.qld.gov.au>
Cc: Sonya Booth <Sonya.Booth@coordinatorgeneral.qld.gov.au>; Steven Tarte <Steven.Tarte@coordinatorgeneral.qld.gov.au>
Subject: RE: Kidston pumped storage hydro project - use of waste rock

Luke,
Could you please give Steve Tarte a call? Contacts below.
Thanks,
Cale.

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Sent: Wednesday, 12 December 2018 11:00 AM
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Hoping to discuss the matter further.

Regards,

Steven



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From: Sonya Booth
Sent: Wednesday, 12 December 2018 10:42 AM
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Subject: RE: Kidston pumped storage hydro project - use of waste rock

Hi Cale – thank you for your advice – much appreciated. My colleague Steven will give you a call to check in, if you'd like us to organise a telecon to confer happy to do so.

Thanks again



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Date : 24/12/2018 2:34:02 PM

From : "FOMIATTI MINNESMA Ingrid"

To : "Melanie Harris"

Cc : "Steven Tarte", "SHARPE Dean", "BOOY Caitlin", "GIBBS Teale", "PAGE Cathie", "FARKAS Renee"

Subject : RE: Kidston pumped storage hydro project - use of waste rock

Attachment :

image001.png;image006.png;image010.png;image017.png;image005.png;image007.jpg;image009.png;image011.png;image012.png;

Hi Mel

I can talk you through this if you like, however it does not change the issue at hand that if you use current WRDs and disturb the rehabilitation of these areas – there is a need to ensure it authorised under the relevant approval, and the activities reflected in the PoO and subsequent FA/ ERC for the disturbance calculated.

In short just because it is allowable as part of the ML under the MRAct does not mean the activity would not need to be authorised and dealt with through the appropriate means including the ensuring its allowed under the EA as well as have the activities included in a PoO and FA (or ERC) calculated and lodged commensurate to the disturbance and rehabilitation costs of the area.

Kind regards

Ingrid



Ingrid Fomiatti Minnesma

Director Minerals

Minerals & North Queensland Compliance | Environmental Services & Regulation

Department of Environment and Science

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From: BOOY Caitlin

Sent: Friday, 21 December 2018 12:00 PM

To: Melanie Harris <Melanie.Harris@coordinatorgeneral.qld.gov.au>; GIBBS Teale <Teale.Gibbs@des.qld.gov.au>; FARKAS Renee <Renee.Farkas@des.qld.gov.au>; PAGE Cathie <Cathie.Page@des.qld.gov.au>

Cc: Steven Tarte <Steven.Tarte@coordinatorgeneral.qld.gov.au>; SHARPE Dean <Dean.Sharpe@des.qld.gov.au>; FOMIATTI MINNESMA Ingrid <Ingrid.FomiattiMinnesma@des.qld.gov.au>

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