APPENDIX B INDEPENDENT REVIEW OF WATER MANAGEMENT PLAN

4 March 2019

Emma Smith
EcOz Pty Ltd.
Winlow House, 3rd Floor
75 Woods Street
Darwin, NT 0800

Dear Emma,

Re: Independent Peer Review of Water Management Plan (WMP) for the Grants Lithium Project, prepared by EcOz Pty Ltd. (EcOz) on behalf of Core Exploration Limited (Core), Northern Territory, Australia, October 2018.

Please find below the results of the Out-Task Environmental (OTE) independent peer review of the above referenced WMP for the Grants Lithium Project.

1. Objective

The objective of this WMP review is to respond to the following instruction contained on page 14 of the NTEPA Terms of Reference (ToR) for the preparation of an Environmental Impact Statement (EIS), Grants Lithium Project, CORE Exploration Ltd, dated August 2018:

> *"The Water Management Plan is to be peer reviewed by an independent, third party. The NT EPA expects the peer reviewer to be recognised by industry as a senior practitioner and be independent from the Proponent/principal consultant and the proposal. The reviewer should demonstrate independence by acting objectively, disclose interests as appropriate and be free from conflicts of interest that may arise in relation to the engagement".*

Out-Task Environmental (OTE) was engaged by EcOz (principal consultant for the Proponent) to conduct an independent peer review of the Grants Lithium Project WMP. This review was undertaken by the following OTE principal experts:

- Rohan Ash, Principal Environmental Engineer (Appointed pursuant to the Environmental Protection Act 1970 (Victoria) and Qualified Person pursuant to the NT Waste Management and Pollution Control Act; and
- Dr Bill Howcroft, Principal Hydrogeologist, and expert support team member approved by EPA Victoria to support Rohan in audit work

Bio-sketches for Rohan and Bill are provided in **Attachment A**.

It is understood that all reviewer comments and recommendations will be addressed in an updated WMP to be submitted as part of the Supplementary EIS.

I, Rohan Ash, declare that OTE and its staff member do not have any business, financial or other interests in the Grants Lithium Project and is independent of the Proponent and its consultants. There are no conflicts of interest associated with this engagement.

2. Scope of Work

The Scope of Work conducted by OTE for this WMP review consisted of the following:

(i) Ensuring that the WMP conforms to the WMP content requirements defined in Section 6 of the Mining Management Plan (MMP) Structure Guide for Mining Operations.

(ii) Independent peer review of the WMP document, including ancillary documents that were utilised in preparation of the WMP. For this review, OTE reviewed the following documents:

- Water Management Plan (WMP), EcOz (2018a);
- Water Balance Report (Appendix J to the WMP), EcOz (2018b);
- Erosion and Sediment Control Plan (ESCP), EcOz (2018c);
- Development of a Groundwater Model for the Grants Lithium Project, Final Version 1.0, CloudGMS (2018);
- Project 1: Existing Hydrological Condition and Hydrology Model Calibration, EnviroConsult (2018a);
- Project 2: Mining Lease 31726 and Observation Hill Dam Water Balance, Report ECA-HA-0004-02, EnviroConsult (2018b);
- Project 3: Mining Lease 31726 Flood Inundation Study, EnviroConsult (2018c);
- Finniss Lithium Project, Groundwater Investigation Report, GHD (2017a);
- Finniss Lithium Project, Aquatic Ecology Baseline Monitoring, GHD (2017b), and
- Notice of Intent, Grants Lithium Project, Bynoe Harbour, Northern Territory, EcOz (2017).

(iii) Ensuring that the Water Balance is in conformance with the Minerals Council of Australia Water Accounting Framework (MCA WAF)

(iv) Assessment and Reporting

This letter report provides a summary of the findings of the review of the WMP and its ancillary documents, a statement of conformance of the WMP to Section 6 of the MMP, a statement of conformance on the Water Balance Report to MCA WAF, as well as conclusions and recommendations.

3. Summary of Findings

3.1. Conformance of the WMP with Section 6 of the MMP Structure Guide

WMP requirements with respect to the MMP Structure Guide

The primary purpose of a Mining Management Plan (MMP) is to formalise the actions to be taken and strategies to be implemented that will manage impacts to the environment to acceptable and sustainable limits over both the short- and long-term. A key component of an MMP is the Water Management Plan (WMP), which covers all surface and groundwater on a mine lease, as well as the receiving environment both up- and down-gradient of the lease. In addition, the WMP covers all interactions of those waters with activities related to the mine and its infrastructure, and how those interactions might affect water quality, quantity and/or timing. Towards these purposes, Section 6 of the MMP Structure Guide provides specific requirements for a WMP.

Summary of Findings

A tabulated statement of conformance with Section 6 of the MMP Structure Guide is provided as **Attachment B**. Overall, OTE's review indicates that the WMP generally complies with the requirements of the MMP Structure Guide. There are exceptions, however, which comprise the following:

a) Section 6.1 of the MMP Structure Guide specifies that a water balance must be included, and that the water balance "must include consideration of the full range of climatic conditions that the site may experience, i.e. successive drier than average seasons and successive wetter than average wet-seasons and sensitivity to extreme events". In the Water Balance (EcOz, 2018b; Appendix A to the WMP) report prepared for Grants Lithium WMP, 50th percentile climate (precipitation and evaporation) data from the Darwin Airport weather station were utilised. However, the given Water Balance does not account for successive dry or wet seasons, nor does it account for extreme weather events.

b) As stated in Sections 6.2.2 and 6.3.2 of the MMP Structure Guide, timelines are required for the filling of information/knowledge gaps and actions and strategies to mitigate the identified risks. Timelines associated with these items are not currently outlined in the WMP.

3.2. General Comments on the Water Management Plan (WMP)

OTE has reviewed the WMP in detail and offers the following comments on individual components of the document:

Site Operations

a) Section 2.1 of the WMP provides pit dimensions that differ from that outlined in the groundwater (CloudGMS, 2018) modelling report. Specifically, the WMP states that the pit will extend vertically downward to 180 m whereas, in the groundwater modelling report, the stated pit depth will be 150 m. This discrepancy in pit depths will affect the water balance, pit inflows, and dewatering requirements and should therefore be addressed and corrected, as needed.

b) The inundation modelling report (EnviroConsult, 2018c) recommends extending the bunds and installing a culvert to prevent flood inundation on the eastern side of the mine footprint. Has this been considered? If inundation occurs in this area, how will this water be managed?

c) In Table 8-4, Row 1 of the WMP, site clearing and preparation receives a Moderate residual risk, with most of that risk being avoided provided that these works occur in the Dry season. What if the project is delayed and works then occur during the Wet season?

d) Specify the liner material and permeability for the proposed for the concentrated product pad, and also discuss leachability and risk management for potential contaminants from concentrated product.

e) Specify location of septic tank system and effluent adsorption field, and show on site plans. Also specify buffer from adsorption field to nearest drainage line. Also discuss how seepage and runoff from the adsorption field will be managed (high permeability Cenozoic sediments and laterite gravels, high water tables in wet season).

Groundwater

f) A limited number (6) of monitoring bores have been installed at the proposed mine site. None of these bores are located on the west side of the proposed mine footprint. Consequently, it is considered that the existing monitoring bore network does not provide adequate coverage to fully assess baseline conditions and therefore potential impacts to groundwater associated with the proposed mining operations. It is noted, however, that additional bore installations are proposed within the WMP and these are considered generally acceptable.

g) Hydraulic conductivity values were estimated using slug and recovery tests. The results from these tests differed in some cases by an order of magnitude. In addition, such tests examine only a small area around the screened section of the well being tested. Lastly, the methods by which hydraulic conductivity are estimated apply more to porous media than fractured rock aquifers. Consequently, the derived hydraulic values may not be truly representative of the regional aquifer(s). The results of aquifer these tests should be compared to those performed on the proposed monitoring bores (assuming that aquifer tests will be performed on the new bores).

h) The log for groundwater monitoring bore GWB01 indicates three screened zones with bottom depths of 100, 124 and 154 m, respectively. Also, the gravel pack extends across all three screened zones, i.e. there are no individual seals between the well casings. It is unclear from which well casing the groundwater samples were collected, on which well casing the aquifer tests were conducted, and from which well casing the recorded standing water levels were measured. This should be clarified and the usefulness of water quality, SWL and aquifer test data from this bore for EIS purposes discussed.

i) The groundwater modelling report should be referenced as CloudGMS (2018), not Knapton and Fulton (2018).

j) During the life of mine, it is predicted that a cone of groundwater depression will extend approximately one (1) km from the mine pit. It is also stated that "some" groundwater likely discharges to ephemeral streams to the north (Section 3.3.1, page 1-33 of the WMP) but that this drawdown will not affect groundwater levels beneath the ephemeral streams. However, this drawdown could nonetheless decrease groundwater flux into the streams as a result of reduced hydraulic gradients and a reduced recharge area. This in turn could lead to impacts to riparian vegetation and aquatic species along and within the streams. Groundwater levels within shallow bores located proximal to the streams should be monitoring before commencement of mining operation, during operations and post-closure.

k) Post-mine closure, a pit lake will form in the mining lease. This will result in a groundwater sink and, consequently, alteration, of the local flow regime. It is stated within the groundwater modelling report (and within the WMP) that no change in the water table surface is predicted at the ephemeral water courses. As above, however, this alteration to

the groundwater flow system may decrease groundwater flux into the streams as a result of a reduced hydraulic gradient and recharge areas. As in point "j)" above, groundwater levels within shallow bores located proximal to the ephemeral should be monitoring before commencement of mining operation, during operations and post-closure.

l) Rainfall and evaporation data utilised in the groundwater modelling study differ from that utilised in the Water Balance and the hydrologic studies. Ideally, and to minimise uncertainty, the same (most up to date) climatic data should be utilised in each study.

m) In Table 2-1 of the groundwater modelling report, the more permeable near-surface sediments are not considered to be a hydro-stratigraphic unit. Exclusion of this more permeable unit from the groundwater model may result in an underestimation of groundwater inflows into the mine pit, especially during the early stages of mining operations. Consider inclusion of the shallow surface sediments in the model, or otherwise justify in the text of the WMP and groundwater modelling report its exclusion from the model.

n) Future reporting should include a vertical, two-dimensional equipotential diagram, which documents equipotential gradients, stratigraphic units, bore locations, streams, and bore screen intervals. This will greatly enhance interpretation of hydrogeologic conditions.

o) The groundwater contours (and, therefore, groundwater flow direction) presented in the groundwater modelling report should be considered as approximate and preliminary only. This is due to the fact that the contours were generated from groundwater levels that were measured in a limited number (4) of monitoring bores that are screened at different depth intervals. As a result, groundwater flow direction may be more complex than that indicated.

p) Groundwater flow direction in the shallow aquifer is presently undetermined, as only two bores have been installed within this unit. The flow direction should be subject to review upon completion and monitoring of the new bores as proposed.

q) The rapid response to rainfall exhibited at monitoring bore GWB10 may be due to how the bore was constructed. This bore was installed in a swampy area. In addition, the top of the well screen is just 0.5 m below ground surface (bgs). For these reasons, the observed downward head gradient at this location might be simply due to ingress of surface water into GWB10. For this same reason too, groundwater quality results from this bore may not be truly representative of groundwater quality within the shallow aquifer. Lastly, groundwater monitoring bore GWB10 does not meet the minimum construction standards for water bores in Australia, which specifies a minimum of 1 m of casing between ground surface and the production zone being monitored. This limitation should be discussed in the WMP and associated groundwater modelling/assessment reports. In addition, GWB10 should be decommissioned and replaced with a new monitoring bore.

r) The southern boundary of the groundwater model domain (which is assumed to correspond to that of the surface water catchment divide) differs significantly from that presented in the WMP (Figure 3-2, Section 3.2). It is unclear as to which boundary is correct and how will this difference affect the estimation of groundwater inflows into the pit. Furthermore, if the catchment boundary specified in the groundwater model is correct, this suggests that the ephemeral streams located to the south of the mining lease may, in fact, be affected by mining operations. This should be clarified in the relevant documents.

s) Given a north-northeast inferred groundwater flow direction, groundwater monitoring bores GWB06 and GWB07 are located cross-gradient to the mine footprint, not upgradient, as stated in Section 3.3.1 of the WMP. This should be clarified/amended in relevant documents.

t) The upper Quaternary aquifer is poorly characterised, from both a water quality perspective, as well as from a basic hydrogeologic understanding. Only two bores have been installed within this unit, one of which is poorly constructed and the second which has been

compromised by cement. In addition, groundwater flow gradients within the shallow aquifer are poorly understood. Following installation of the proposed bores within this unit, efforts should be made to more adequately characterise groundwater flow direction and groundwater quality.

Aquatic Ecology and Groundwater Dependent Ecosystems (GDEs)

u) One sampling event was conducted (May 2017) and at an only limited number (4) of locations. Results from this sampling showed that macroinvertebrate and fish species within the streams are typical of watercourses in the NT and are relatively similar across all sites. Justification as to why one or more additional rounds of sampling are unnecessary should be provided in the WMP.

v) No sampling was conducted in the stream course located downstream of the Observation Hill Dam (OHD). Justification as to why this is unnecessary should be provided in the WMP.

w) In Section 3.3.2 of the WMP, medium potential GDEs were noted downstream of the OHD. Raising the OHD wall by 1.5 was shown to significantly reduce discharge to the drainage course downstream of the OHD. If the dam wall is to be raised, and flows decrease, how will the GDEs be affected?

Surface Water

x) In the hydrologic studies, a 2 m DEM was utilised in determining ground surface topography. Yet, within the groundwater modelling study, a different model of topography was utilised. Use of these different data sets may be the reason for the difference in the delineation of the southern catchment boundary (noted in point n above). The WMP should comment as to how this difference could affect flows, including runoff and groundwater inflows into the mine pit.

y) Raising the spillway elevation of the Observation Hill Dam (OHD) will cause inundation of lands previously above dam level. What are the implications of this inundation to aquatic ecology and native habitat around the OHD?

z) Raising the spillway height of the OHD by 1.5 m, as a potential option proposed in the WMP, will reduce flows immediately downstream of the dam by up to 69%. This value exceeds the NT Water Allocation Framework flow reduction guideline of ≤ 20%. The WMP should address possible mitigation strategies to meet this guideline.

aa) Construction of an alternative dam, e.g. the Mine Site Dam, results in a modelled decrease in flow volumes in that stream course of up to 37%. This value exceeds the NT Water Allocation Framework flow reduction guideline of ≤ 20%. The WMP should address possible mitigation strategies to meet this guideline.

bb) There is no hydrogeological data in the area of the proposed Mine Site Dam. Consequently, the impacts of this dam on the groundwater flow system is undetermined. However, it is recognised that two new monitoring bores are proposed in the area of the Mine Site Dam.

cc) Construction of the Mine Site Dam (MSD) is not considered in the CloudGSM (2018) groundwater modelling report, the Water Balance Report (EcOz, 2018b), the Inundation Study (EnviroConsult, 2018c), nor the GHD (2017b) aquatic ecology report. It is unclear what affect, if any, that construction of the MSD will have on the groundwater flow systems, the water balance, inundation and aquatic ecology. The WMP should comment on how construction of the Mine Site Dam may affect the conclusions drawn within these studies.

dd) Likewise, Mine Water Dams 1 and 2, the sedimentation ponds, and the raw water dam are also not considered in the CloudGSM (2018) groundwater modelling report, the Water Balance Report (EcOz, 2018b), the Inundation Study (EnviroConsult, 2018c), nor the GHD

(2017b) aquatic ecology report. What affect, if any, will construction and use of these storages have on the groundwater flow system, the water balance, inundation and aquatic ecology?

ee) In Table 2-1 of the WMP, it is stated that Mine Water Dam 2 acts a contingency for holding excess water dewatered from the pit to avoid "Dry" Season release from MWD1. Should this be "Wet" Season instead of Dry?

ff) In the original ToR, there was to be no discharge of water to the environment. However, within the WMP, water from Mine Water Dam 1 (MWD1) will need to be discharged at a rate not to exceed 50 L/sec. The change from the TOR to the EIS should be made transparent and reasons for the offsite discharge requirement should be explained.

gg) Section 2.4.1 should include discussion on the Sedimentation dams, including volumes and inputs.

hh) It appears that water within the sedimentation ponds may be periodically discharged to the environment. The WMP should state where this water will be discharged.

ii) Table 4-2 of the WMP appears to be missing the reduction to flows if the OHD wall is raised by 1.5 m. Only no dam and existing dam scenarios are included. This table should be revised to include the missing information.

jj) It is clear that, during the wet season, there will be a reduction in stream flow downstream of the MSD in excess of the NT Water Allocation Framework guideline of less than or equal to 20%. It is noted that these reductions "could alter the quality and/or species composition of the riparian zone" but that "the riparian habitat along this waterway is relatively sparse and not an example of a rare, highly diverse, or significant habitat for threatened species in the region". This argument may not hold much validity and the mine proponent should seek other means by which stream flows could be maintained above the noted threshold. It is probably presumptuous to ascertain that the riparian zone is of limited ecological value.

kk) In Section 4.4 of the WMP, why is increased discharge from the Mine Site Dam (MSD) during the Wet Season decoupled from a similarly predicted reduction in discharge?

<u>Water Quality Monitoring Program</u>

ll) Laboratory parameters for surface water sampling locations should include total metals as well as dissolved metals.

mm) Laboratory parameters for all sampling locations, including surface water and groundwater, should include ionic balance, pH and TDS.

nn) Proposed bores GWB13 and GWB14 appear to be within the footprint of the MSD and may therefore need to be relocated.

oo) Turbidity triggers: the turbidity trigger of 75 NTU taken from the INPEX project, may not be appropriate for the Grants project. INPEX which was a very large footprint project that included wet season construction. The turbidity limit in that project was also subject to a design (major) storm event rather than a blanket trigger, and also subject to adjustment from performance review of monitoring results. Adjust the Grants project turbidity limit and assign a design storm event based the final turbidity trigger adopted by INPEX and approved by NTEPA following review of monitoring data (background and discharge) from that project.

3.3. Conformance of the Water Balance with the MCA WAF

Summary of the MCA WAF

The Terms of Reference (ToR) for the preparation of an Environmental Impact Statement (EIS) for this project dictate that the Water Balance should be prepared in accordance with the MCA WAF. The MCA WAF provides a mechanism by which sites can account for, report upon and compare site water management practices in a rigorous, consistent and unambiguous manner that can be easily understood by non-experts. Companies that utilise the WAF are encouraged, if not required, to seek continual improvement in environmental performance, as well as implement effective, transparent engagement with stakeholders.

Water accounting entails identifying, measuring, recording and importing information on water. Thus, the objectives of the WAF are to provide a: a) consistent approach for quantifying flow into, and out of, a site, based on their sources and destinations, b) consistent approach for reporting of water use, c) consistent approach in quantifying and reporting on water that is reused or recycled, and d) model for a more detailed water balance. The WAF can be applied at two levels, as an Input-Output Model, or as an Operational Model. The Input-Output Model provides a consistent approach for quantifying flows into, and out of, a facility. The Operation Model provides guidance for water processes within a facility. As the Water Balance Report covers inflows, outflows, and water used in processing, the reviewed model is regarded as applying to both purposes.

The WAF contains a certain degree of flexibility. Nonetheless, use of the WAF typically results in the generation four main components (reports): a) an Input-Output Statement, b) a Statement of Operational Efficiencies, c) an Accuracy Statement, and d) a Contextual Information Statement. The Input-Output Statement documents inflows, outflows, changes in storage and diversions, with an emphasis on water quality. The Statement of Operation Efficiencies separates flows into tasks, volume of re-used water, re-use efficiency, volume of recycled water and recycling efficiency. The Accuracy Statement lists the percentage of flows that were measured, simulated or estimated. Finally, the Contextual Information provides information on regional water resources and on the catchment in which a particular site is located. It should be noted that diversions are not included in the Input-Output Statement, as such water is not used in site operations. However, a statement of diversions should be included within the Input-Output Statement.

Three classifications of water quality are defined in the WAF: Category 1) high quality water that requires little, or only minor, treatment, Category 2) medium quality water, which may require moderate levels of treatment, and Category 3) low quality water, which requires significant levels of treatment. In addition, the MCA defines water as either "raw" or "worked". Raw water is defined as water that is received as input, but which has not been used in a task. In contrast, worked water is water that has been used in a task.

Summary of Findings

A tabulated statement of conformance with the MCA WAF, as well as general comments, are provided in **Attachment C** and are summarised below:

a) A Contextual Statement is not included in the Water Balance Report. While some contextual information is provided, e.g. climate data in Section 4, the Contextual Statement should provide additional information such as site geology, hydrogeology and topography, catchment details, regional water resources, and water policy and rules applicable to the proposed mining operations. While this information is provided elsewhere in the WMP, and its ancillary documents, a standalone Contextual Statement should be included within the Water Balance report;

b) The Water Balance Model report (Section 3.1) assumes a 25-month operational life of the mine. Yet, in Section 1 of the WMP, the life of the mine is indicated to be 2 to 3 years (Section 1. WMP), a difference ranging from -1 to +11 months. The correct timeline should be made consistent in all updated reports;

c) It is noted that a variety of different climate data are used in the various technical reports, i.e. the groundwater modelling study, the hydrologic studies and, again, in the Water Balance report. Ideally, the same climate data should be used in each study as using variable data introduces unnecessary uncertainty in the results;

d) The Water Balance Model uses 50th percentile climatic data from the Darwin Airport weather station. However, the MMP Structure Guide specifically states that the Water Balance Model should include scenarios of successively drier, or wetter, than average seasons, as well as extreme weather events. This should be addressed in updated reports.

e) Figure 2 should use the colour guidelines specified in Section 3.1 of the MCA WAF. In addition, for consistency with the WMP, the Environmental Dams should be re-labelled as Sedimentation Dams. "Sedimentation" or "Environmental" should include rainfall as an input.

f) The stated pit area (12.6 hectares) in Section 5.1.1 of the Water Balance Report differs from that (14 hectares) stated in the groundwater modelling report. This inconsistency should be corrected and addressed, as pit area will directly affect the amount of rainfall entering the pit and, therefore, the amount of water that requires dewatering.

4. Conclusions and Recommendations

The following conclusions and recommendations are for consideration by the Proponent for and proposed updates to the WMP and ancillary reports as part of the Supplementary EIS:

(i) Inconsistencies in the WMP and associated documents should be corrected if possible and, if not, uncertainties associated with these inconsistencies be commented upon. These inconsistencies include variable climate data and pit dimensions (surface area and depth);

(ii) Incorporate timelines into WMP Sections 9 (Management Measures) and 11.2 (Filling Information/Knowledge Gaps) to fulfil the requirements of the MMP Structure Guide.

(iii) Groundwater monitoring bore GWB10 does not meet the minimum construction standards for water bores in Australia, which specifies a minimum of 1 m of casing between ground surface and the zone being monitored. Consequently, this bore should be decommissioned and a new bore installed with a minimum of 1 m of casing between ground surface and top of the screen.

(iv) The Water Balance Model should be amended so as to include provision for successive drier and wetter climatic conditions, as well as extreme weather events;

(v) A contextual statement should be included in the Water Balance Report;

(vi) Future reporting should include a vertical, two-dimensional equipotential diagram, which documents equipotential gradients, stratigraphic units, bore locations, streams, and bore screen intervals. This will greatly enhance interpretation of hydrogeologic conditions.

(vii) Groundwater flow direction and quality within the shallow aquifer should be added to the Information/Knowledge Gaps section (Section 11) of the WMP.

5. Limitations

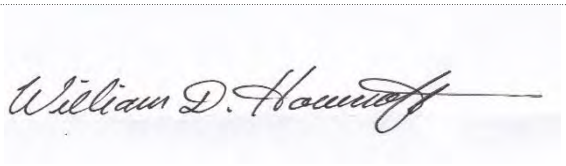
Out-Task Environmental (OTE) has prepared this review document in accordance with the usual care and thoroughness of the consulting profession. It has been prepared for use by EcOz Pty Ltd (EcOz), the Proponent, NTEPA and only those parties who have been authorised in writing by OTE.

This document is based on generally accepted practices and standards at the time that it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this document. It is prepared in accordance with the Scope of Work and for the purpose outlined in this document and the OTE proposal. The methodology adopted and the sources of information used by OTE are outlined in this document.

This report is based on the information reviewed at the time of report preparation. OTE disclaims responsibility for any changes that may have occurred after the date of issue of this report.

This review and its attachments should be read in full. No responsibility is accepted for use of any part of this document in any other context or for any other purpose or by third parties. This document does not purport to give legal advice, which can only be given by qualified legal practitioners.

Should you have any questions or comments regarding the content of this letter report, please do not hesitate to contact Rohan Ash on 0407 349 172.



Dr Bill Howcroft
Principal Hydrogeologist
Out-Task Environmental
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4 March 2019

Rohan Ash
EPA Appointed Auditor (Industrial Facilities)
Appointed pursuant to the Environmental Protection Act 1970 (Victoria)
Qualified Person pursuant to the NT Waste Management and Pollution Control Act
Out-Task Environmental
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Attachments

Attachment A: OTE Team Bio-sketches

Attachment B: Conformance Statement of WMP, Section 6 of the MMP Structure Guide.

Attachment C: Conformance Statement of the Water Balance relative to the MCA WAF.

Attachment A: OTE Team Bio-sketches

Rohan Ash

Principal environmental engineer with 30 years' experience as an environmental manager, regulator, consultant and expert advisor to industry and government. Rohan is an Environmental Auditor (Industrial Facilities) appointed by EPA Victoria. He is also a Qualified Person pursuant to the Waste Management and Pollution Control Act to perform environmental audits in the NT.

He specialises in:

- environmental impact and risk assessments,
- EMS, environmental management plans, monitoring programs and performance reporting
- environmental audits of industrial facilities, landfills, wastewater treatment plants, water recycling schemes, mines, quarries and construction sites
- wastewater treatment and water quality management
- water use efficiency, water balances and recycling strategies
- land capability, erosion control, groundwater and catchment management
- statutory approvals, licensing, compliance strategies, regulator/stakeholder liaison

Rohan is regularly sought after to provide these services by a wide range of industries including water, power, landfills, construction, ports, food and other manufacturing businesses, agriculture, industry associations, research bodies and government agencies (federal, state, territory and local). Rohan has conducted a number of audits and independent OEMP and WMP reviews in the NT including for INPEX LNG plant at Bladin Point, Port Melville and AACo abattoir.

Dr Howcroft

Principal hydrogeologist with more than 20 years' experience conducting hydrogeologic and environmental investigations across Australia including within the Northern Territory and Victoria.

He holds Bachelor's, Master's and PhD degrees in the Geology, Geography and Hydrogeology, respectively and has published scientific articles in internationally recognized, peer-reviewed journals examining groundwater-surface water interaction using aqueous geochemistry and stable and radioactive isotopes.

Dr Howcroft has been involved in numerous mining-related projects, including the development of a new TSF for BHP Billiton on Groote Eylandt, investigation of caustic impacts to groundwater at Rio Tinto's facility in Alcan Gove, geochemical and groundwater transport modelling for Crocodile Gold at its facilities near Pine Creek, and the preparation of a Water Management Plan (WMP) for HNC (Australia) at its Brown's Oxide Mine near Bachelor. Bill was also key part of the OTE's audit team providing expert hydrogeological review for the AACo's Livingstone beef abattoir as part of environmental and NTEPA licence compliance audits, and Operational EMP and WMP reviews.

Since 2015, Dr Howcroft has undertaken expert hydrogeological and groundwater audits as part of Rohan's expert support team for biennial statutory environmental audits of the leached ash landfill within the overburden dump at AGL's Loy Yang coal fired power station and mine. Rohan and Bill are currently engaged by AGL to conduct this year's audit.

Attachment B: Conformance Statement of WMP, Section 6 of the MMP Structure Guide.

Attachment B: Conformance Statement of WMP, Section 6 of the MMP Structure Guide.

Item	WAF Requirement	Met	Not Met	Reviewer Comments	Recommendations
1	**Current Conditions**	-	-	-	-
1.1	Water Balance		√	The MMP Structure Guide specifies that the Water Balance must include consideration of the full range of climatic conditions that the mine site might experience, i.e. successive dryer or wetter than average rainfall, as well as extreme wether events. However, the Water Balance Report prepared for the WMP only considers 50th percentile climatic conditions. No provisions are made in the Water Balance for dryer or wetter conditions, nor extreme weather events.	The Water Balance should be modified to include dryer and wetter than average climatic conditions, as well as extreme weather events.
1.2	Surface Water	√		The WMP provides a full description of surface water, including flows, volumes and water quality.	-
1.3	Groundwater	√		The WMP provides a comprehensive groundwater model for the proposed mine site.	-
2	**Information/Knowledge Gaps**	-	-	-	-
2.1	Identification of Information/Knowledge Gaps	√	-	Section 11.1 of the WMP identifies Information/Knowledge gaps.	-
2.2	Filling of Information/Knowledge Gaps	-	√	Section 11.2 of the WMP identifies actions to be taken to fill the identified Information/Knowledge gaps. However, a commitment to a timeline is also required, as well as interim management strategies that will be implemented until such time the information gathering process is completed. A timeline and interim management strategies are not included in Section 11.2.	Identify the actions to be taken, a timeline by which those actions will be taken, and any interim management strategies that will be implemented. For example, if discharge requirements from MWD1 exceedwaste discharge license conditions, what will be done and when?
2.3	Water Account	√	-	A Water Account has been provided in the Water Balance Report.	-
3	**Risk Management**		-	-	-
3.1	Identify Hazards and Rank Risks	√	-	A risk assessment is presented in Section 8 of the WMP. However, it is noted that the assessment only identifies risks associated with the construction and operation phases of the project. Section 6.3.1 of the MMP Structure Guide indicates that the risk assesment must be given to potential short- and long-term impacts, including mine closure. According to the WMP, post-closure requirements will be addressed in future updates of the WMP.	Ensure that risks following mine-closure are assessed in future updates of the WMP.
3.2	Actions and Strategies in Response to Identified Risks	-	√	Actions and strategies to mitigate identified risks are outlined in Section 9 of the WMP. However, a timeline for implementation of these actions and/or strategies is not included.	Include a commitment to an implementation timetable.
4	**Monitoring**	-	-	-	-
4.1	Monitoring Program	√	-	Section 6 of the MMP Structure Guide states the operator should ensure that a comprehensive data set has been collected over multiple seasons and years. It is noted that, to date, monitoring has only been conducted during the dry and wet seasons of 2017. However, the WMP states that further monitoring will be conducted prior to commencement of mining operations, so this should be sufficient.	-
4.2	Data Review and Interpretation	√	-	-	-
5	**Management**	-	-	-	-
5.1	Remedial or Corrective Management Actions	-	-	Remedial or corrective management actions are outlined in Section 9 of the WMP.	-
6	**Actions Proposed Over the Reporting Period and their Potential to Impact Water Quality**	√	-	Section 6.6 of the MMP Structure Guide requires that details of ny action planned or anticipated include commitments to provide the Department of Primary Industry and Resources to the Water Management Plan if and when they occur.	Provide a commitment within the WMP as to circumstances and timing of when futures updates to the WMP may occur.

Attachment C: Conformance Statement of the Water Balance relative to the MCA WAF.

Attachment C: Conformance Statement of the Water Balance relative to the MCA WAF

Item	WAF Requirement	Met	Not Met	Reviewer Comments	Recommendations
1	**Input-Output Statement**	√			
1.1	Inputs Defined	√		Inputs include surface flows from the OHD and Mine Site Dam, direct precipitation, groundwater inflows and runoff. Entrained water within the ore is not included, but is assumed to be negligible.	-
1.2	Outputs Defined	√		Outputs include water used for dust suppression, discharge to the environment, evaporation and standpipe loss, administrative uses and ablution, crushings and screening usage, task losses, entrainment in product and rejects and entrainment in tailings. Outputs do not include seepage from storages, which is assumed to be negligible.	-
1.3	Diversions Specifed	√		Diversions comprise runoff and discharge to the environment from the Sedimentation Dams. A Statement of Diversions is appended to the Input Output Statement.	-
1.4	Water Quality Classification	√		Three categories of water quality are included in the Input-Output Statement.	-
1.5	Store Aggregation	√		Water is classified as "raw" or "mixed".	-
1.6	Changes in Storage	√		Changes in storage are specified in the Input-Output Statement.	-
2	**Accuracy Statement**	√		The Accuracy Statement includes flows that are measured, simulated or estimated.	-
3	**Statement of Operational Efficiencies**	√		Reuse efficiciences for when water is used, or not used, for dust suppression are estimated at 39% and 41%, respecitively.	-
4	**Contextual Statement**		√	A Contextual Statement is not included in the Water Balance Report.	Add a Contextual Statement to the Water Balance Report.
5	**General Comments**				
5.1	Operational Life of Mine	-	-	Operational life of mine is given as 25 months. However, in the WMP, the operational life of mine is given as 2 to 3 years (24 to 36 months).	Confirm that the correct life of mine is being utilised and re-run the Water Balance Model if necessary.
5.2	Climate Data	-	-	50th Percentile rainfall and evaporation data from the Darwin Airport weather station were utilised. These data differ from that utilised in the groundwater and hydrologic modelling reports.	-
5.3	Figure 2	-	-	Figure 2 needs to be modified so as to incorporate the colour guidelines specified in the Section 3.1 of the WAF. In addition, to be consistent with the WAF, the Environmental Dams should be re-labelled as Sedimentation Dams. Lastly, rainfall should be included as an input to the Environmental (Sedimentation) Dams.	Use proper colour guidelines, relabel dam titles, and show rainfall as an input to the dams.

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Responses to independent review comments received from Rohan Ash and Bill Howcroft (Out-Task Environmental)

Review sub-section	Ref	Relates to	Review comment	Response
3.1 Conformance with Sec. 6 MMP Structure Guide	a	Water Balance	Section 6.1 of the MMP Structure Guide specifies that a water balance must be included, and that the water balance "must include consideration of the full range of climatic conditions that the site may experience, i.e. successive drier than average seasons and successive wetter than average wet-seasons and sensitivity to extreme events". In the Water Balance (EcOz, 2018b; Appendix A to the WMP) report prepared for Grants Lithium WMP, 50th percentile climate (precipitation and evaporation) data from the Darwin Airport weather station were utilised. However, the given Water Balance does not account for successive dry or wet seasons, nor does it account for extreme weather events.	The updated water balance (Appendix A) now includes low, average and high rainfall scenarios and also uses SILO data to be consistent with groundwater model.
	b	WMP	As stated in Sections 6.2.2 and 6.3.2 of the MMP Structure Guide, timelines are required for the filling of information/ knowledge gaps and actions and strategies to mitigate the identified risks. Timelines associated with these items are not currently outlined in the WMP.	Timelines will be added in the next WMP update due in May 2019.
3.2 General Comments on WMP	a	WMP and Groundwater model	Section 2.1 of the WMP provides pit dimensions that differ from that outlined in the groundwater (CloudGMS 2018) modelling report. Specifically, the WMP states that the pit will extend vertically downward to 180 m whereas, in the groundwater modelling report, the stated pit depth will be 150 m. This discrepancy in pit depths will affect the water balance, pit inflows, and dewatering requirements and should therefore be addressed and corrected, as needed.	All groundwater modelling (see CloudGMS 2019), hydrological modelling (see EnviroConsult 2019) and the water balance (Appendix A) have been consistently updated using the same most-recent mine site design and all now also use the same SILO data for climate inputs.

Review sub-section	Ref	Relates to	Review comment	Response
	b	WMP	The inundation modelling report (EnviroConsult, 2018c) recommends extending the bunds and installing a culvert to prevent flood inundation on the eastern side of the mine footprint. Has this been considered? If inundation occurs in this area, how will this water be managed?	The updated inundation modelling (see EnviroConsult 2019) indicates the site is protected by the inundation bund for a 1% AEP event and no further recommendations were made.
	c	WMP	In Table 8-4, Row 1 of the WMP, site clearing and preparation receives a Moderate residual risk, with most of that risk being avoided provided that these works occur in the Dry season. What if the project is delayed and works then occur during the Wet season?	If site clearing and preparation was to occur during the wet season, a wet-season specific ESCP will be developed in accordance with IECA Guidelines. This requirement is prescribed in the Primary ESCP submitted with the EIS. This management measure has been added to the risk assessment Table 8.4 and water management framework Table 9.1 in the WMP.
	d	WMP	Specify the liner material and permeability for the proposed for the concentrated product pad, and also discuss leachability and risk management for potential contaminants from concentrated product.	This is now discussed in Section 2.8.4 of the WMP. The stockpiled product (spodumene concentrate) is not classified as hazardous according to Safe Work Australia criteria and is not classified as a Dangerous Good by the criteria of the Australian Dangerous Goods Code. Leachate test results available for spodumene concentrate exported through Fremantle Port in WA, indicate very low levels of leaching of heavy metals. As the spodumene concentrate that will be produced does not have hazardous properties, the product pad does not require any specific pollution prevention or containment measures. The product pad foundation will be constructed of compacted clay material and drainage from the pad will report to the internal drainage network that reports to sediment basins for testing and treatment prior to off-site discharge.
	e	WMP	Specify location of septic tank system and effluent adsorption field, and show on site plans. Also specify buffer from adsorption field to nearest drainage line. Also discuss how seepage and runoff from the adsorption field will be managed (high permeability Cenozoic sediments and laterite gravels, high	This is discussed in Section 2.8.3 of the WMP. A septic tank system is not suitable for the volumes of wastewater that will be produced by the project. A secondary treatment system is proposed with irrigation of treated wastewater to a location near the mine administration area, north-west of the pit. The

Review sub-section	Ref	Relates to	Review comment	Response
			water tables in wet season).	system design will comply with the *Code of Practice for On-site Wastewater Management.* A Land Capability Assessment will be undertaken to determine a suitable location for the irrigation area and associated management requirements for seepage and runoff. Core will apply for a wastewater design works approval from Department of Health prior to installation of the system.
	f	WMP and Groundwater model	A limited number (6) of monitoring bores have been installed at the proposed mine site. None of these bores are located on the west side of the proposed mine footprint. Consequently, it is considered that the existing monitoring bore network does not provide adequate coverage to fully assess baseline conditions and therefore potential impacts to groundwater associated with the proposed mining operations. It is noted, however, that additional bore installations are proposed within the WMP and these are considered generally acceptable.	Additional bores will be installed as per the locations indicated in Section 10 of the WMP. These will be installed once site conditions allow i.e. dry enough following the end of the wet season (April 2019). Drilling during the wet season may give false groundwater aquifer strikes (e.g temporary perched aquifers). Regular (quarterly) sampling of existing and new bores will commence immediately in order to gain a representative baseline dataset to be used in future WMP updates. This was added as an information/knowledge gap in Section 11.
	g	WMP and Groundwater model	Hydraulic conductivity values were estimated using slug and recovery tests. The results from these tests differed in some cases by an order of magnitude. In addition, such tests examine only a small area around the screened section of the well being tested. Lastly, the methods by which hydraulic conductivity are estimated apply more to porous media than fractured rock aquifers. Consequently, the derived hydraulic values may not be truly representative of the regional aquifer(s). The results of aquifer these tests should be compared to those performed on the proposed monitoring bores (assuming that aquifer tests will be performed on the new bores).	The slug and recovery test methods applied in GHD (2018) are standard industry methods for aquifers with low hydraulic conductivity (K). In such systems more rigorous aquifer testing methods (e.g. multi observation bore pumping tests) are impractical as bore yields are typically too low to elicit a response in observation bores within standard test time frames. Limited K estimates are available for the Burrell Creek formation outside the field tests performed by GHD (2018), however, the values obtained in GHD (2018) are consistent with the low K aquifer described in other regional groundwater studies targeting the Burrell Creek Formation. The K values used in the numerical model were selected using parameter optimisation and were subject to sensitivity analysis, both processes that give more confidence that the adopted values are representative of the regional aquifer. To increase confidence in the observed K range, slug testing will

Review sub-section	Ref	Relates to	Review comment	Response
				be undertaken on the new monitoring bores proposed in the WMP.
	h	WMP and Groundwater model	The log for groundwater monitoring bore GWB01 indicates three screened zones with bottom depths of 100, 124 and 154 m, respectively. Also, the gravel pack extends across all three screened zones, i.e. there are no individual seals between the well casings. It is unclear from which well casing the groundwater samples were collected, on which well casing the aquifer tests were conducted, and from which well casing the recorded standing water levels were measured. This should be clarified and the usefulness of water quality, SWL and aquifer test data from this bore for EIS purposes discussed.	Investigation Bore GWB01 is constructed with a long screen interval from 88 - 154 m with a single casing string as opposed to being a nested piezometer with three discrete casing strings, which is how the bore is depicted in GHD (2018). Groundwater pumped from this bore will reflect a composite sample between 88 - 154 m. Given that there is no evidence from the groundwater levels or water quality, that there are multiple aquifers within the Burrell Creek Formation, water quality samples/hydraulic test results from GWB01 are considered representative of the aquifer. To date all sampling of this bore has been undertaken with the pump placed at 70 m depth. This is the maximum depth possible with the equipment used. Sampling at this depth (i.e. 18 m above the top of the screened interval) will still obtain a sample representative of the aquifer as long as the bore is pumped long enough to purge a minimum of three well volumes and also for enough time that field parameters stabilise. This procedure has been used in the monitoring program undertaken by EcOz to date.
	i	WMP	The groundwater modelling report should be referenced as CloudGMS (2018), not Knapton and Fulton (2018).	This has been changed in the updated WMP.
	j	WMP and Groundwater model	During the life of mine, it is predicted that a cone of groundwater depression will extend approximately one (1) km from the mine pit. It is also stated that “some” groundwater likely discharges to ephemeral streams to the north (Section 3.3.1, page 1-33 of the WMP) but that this drawdown will not affect groundwater levels beneath the ephemeral streams. However, this drawdown could nonetheless decrease groundwater flux into the streams as a result of reduced hydraulic gradients and a reduced recharge area. This in turn could lead to impacts to riparian vegetation and aquatic species along and within the streams. Groundwater levels	A change in hydraulic gradient will only have an impact on groundwater flux beneath the ephemeral creeks if the groundwater elevation is predicted to change at these locations. No such change is predicted in the modelling scenarios and as a result no change in flux to the groundwater system beneath the ephemeral creeks is anticipated. In order to provide real world verification of the model predictions groundwater levels in both the shallow and deeper groundwater system will be monitored as outlined in the WMP.

Review sub-section	Ref	Relates to	Review comment	Response
			within shallow bores located proximal to the streams should be monitoring before commencement of mining operation, during operations and post-closure.	
	k	WMP and Groundwater model	Post-mine closure, a pit lake will form in the mining lease. This will result in a groundwater sink and, consequently, alteration, of the local flow regime. It is stated within the groundwater modelling report (and within the WMP) that no change in the water table surface is predicted at the ephemeral water courses. As above, however, this alteration to the groundwater flow system may decrease groundwater flux into the streams as a result of a reduced hydraulic gradient and recharge areas. As in point "j)" above, groundwater levels within shallow bores located proximal to the ephemeral should be monitoring before commencement of mining operation, during operations and post-closure.	As above.
	l	Water Balance and Groundwater model	Rainfall and evaporation data utilised in the groundwater modelling study differ from that utilised in the Water Balance and the hydrologic studies. Ideally, and to minimise uncertainty, the same (most up to date) climatic data should be utilised in each study.	All groundwater modelling (see CloudGMS 2019), hydrological modelling (see EnviroConsult 2019) and the water balance (Appendix A) have been consistently updated using the same most-recent mine site design and all now also use the same SILO data for climate inputs.
	m	Groundwater model	In Table 2-1 of the groundwater modelling report, the more permeable near-surface sediments are not considered to be a hydro-stratigraphic unit. Exclusion of this more permeable unit from the groundwater model may result in an underestimation of groundwater inflows into the mine pit, especially during the early stages of mining operations. Consider inclusion of the shallow surface sediments in the model, or otherwise justify in the text of the WMP and groundwater modelling report its exclusion from the model.	The surficial silty sands and gravels were initially included in HSU1 but did not improve model performance. They were not included in the final model because they are spatially discontinuous across the site and are typically unsaturated.
	n	Groundwater model	Future reporting should include a vertical, two-dimensional equipotential diagram, which documents equipotential gradients, stratigraphic units, bore locations, streams, and bore screen intervals. This will greatly enhance interpretation of hydrogeologic conditions.	There is no requirement to include this style of diagram within modelling guidelines or within the EIS terms of reference. If required by regulators, such a diagram can be developed for future reporting. This would occur after the additional monitoring bores are installed.

Review sub-section	Ref	Relates to	Review comment	Response
	o	Groundwater model	The groundwater contours (and, therefore, groundwater flow direction) presented in the groundwater modelling report should be considered as approximate and preliminary only. This is due to the fact that the contours were generated from groundwater levels that were measured in a limited number (4) of monitoring bores that are screened at different depth intervals. As a result, groundwater flow direction may be more complex than that indicated.	The reliability of groundwater contours presented in the modelling report is limited by the availability of data points (four), however, these are still considered useful to illustrate the general groundwater flow direction across the site. They also support the hydrogeological conceptualisation of groundwater flowing from higher elevations in the south of the site toward Darwin Harbour to the north. The potentiometric surface will be updated to better reflect local-scale complexity after additional bores recommended in the WMP are installed.
	p	Groundwater model	Groundwater flow direction in the shallow aquifer is presently undetermined, as only two bores have been installed within this unit. The flow direction should be subject to review upon completion and monitoring of the new bores as proposed.	The flow direction in the shallow aquifer will be determined based on groundwater level monitoring undertaken in shallow bores installed as is proposed in the WMP.
	q	Groundwater model	The rapid response to rainfall exhibited at monitoring bore GWB10 may be due to how the bore was constructed. This bore was installed in a swampy area. In addition, the top of the well screen is just 0.5 m below ground surface (bgs). For these reasons, the observed downward head gradient at this location might be simply due to ingress of surface water into GWB10. For this same reason too, groundwater quality results from this bore may not be truly representative of groundwater quality within the shallow aquifer. Lastly, groundwater monitoring bore GWB10 does not meet the minimum construction standards for water bores in Australia, which specifies a minimum of 1 m of casing between ground surface and the production zone being monitored. This limitation should be discussed in the WMP and associated groundwater modelling/assessment reports. In addition, GWB10 should be decommissioned and replaced with a new monitoring bore.	This bore will be decommissioned and groundwater levels in the shallow aquifer determined using data from additional shallow bores installed as outlined in the WMP. All future bores will be installed conforming to the minimum construction standards for water bores in Australia.

Review sub-section	Ref	Relates to	Review comment	Response
	r	WMP	The southern boundary of the groundwater model domain (which is assumed to correspond to that of the surface water catchment divide) differs significantly from that presented in the WMP (Figure 3-2, Section 3.2). It is unclear as to which boundary is correct and how will this difference affect the estimation of groundwater inflows into the pit. Furthermore, if the catchment boundary specified in the groundwater model is correct, this suggests that the ephemeral streams located to the south of the mining lease may, in fact, be affected by mining operations. This should be clarified in the relevant documents.	The southern boundary of the groundwater model is based on an ephemeral drainage line rather than a surface water catchment divide. Consequently, differences in the exact location of the southern catchment divide in the groundwater and surface water studies will not affect model estimates of pit inflows from the groundwater modelling.
	s	WMP	Given a north-northeast inferred groundwater flow direction, groundwater monitoring bores GWB06 and GWB07 are located cross-gradient to the mine footprint, not up-gradient, as stated in Section 3.3.1 of the WMP. This should be clarified/amended in relevant documents.	This has been amended in the WMP.
	t	WMP	The upper Quaternary aquifer is poorly characterised, from both a water quality perspective, as well as from a basic hydrogeologic understanding. Only two bores have been installed within this unit, one of which is poorly constructed and the second which has been compromised by cement. In addition, groundwater flow gradients within the shallow aquifer are poorly understood. Following installation of the proposed bores within this unit, efforts should be made to more adequately characterise groundwater flow direction and groundwater quality.	Agreed, the shallow aquifer will be better characterised following installation (and monitoring) of the new bores as outlined in the WMP. This characterisation will be included in a future update of the WMP.

Review sub-section	Ref	Relates to	Review comment	Response
	u	Aquatic Ecology and WMP	One sampling event was conducted (May 2017) and at an only limited number (4) of locations. Results from this sampling showed that macroinvertebrate and fish species within the streams are typical of watercourses in the NT and are relatively similar across all sites. Justification as to why one or more additional rounds of sampling are unnecessary should be provided in the WMP.	Surface water and groundwater quality monitoring will be the primary method for detecting any downstream impacts from mining. Water quality monitoring provides more rapid feedback for triggering management responses. Changes to macroinvertebrate assemblages in response to mining impacts would be too slow for triggering the need to implement management actions; especially given the short 2-year life of the mine. The macroinvertebrate study has served its purpose in determining that the downstream receiving watercourses are typical of ephemeral streams and in un-impacted reference condition. Results of the survey may be used as a baseline in future if post-mining monitoring is required to determine any long-term impacts.
	v	Aquatic Ecology and WMP	No sampling was conducted in the stream course located downstream of the Observation Hill Dam (OHD). Justification as to why this is unnecessary should be provided in the WMP.	A sampling location downstream of OHD "Site BP" was included in the GHD study as a control site. This could act as a baseline site for monitoring OHD impacts in the future. However, as explained in the point 3.2 (u) above, it is not expected that aquatic ecology studies will be repeated in future as surface water and groundwater quality monitoring will be the primary methods for detecting impacts and triggering management actions. Aquatic ecology surveys have limited value for this project and are more suited to detecting long-term impacts.
	w	WMP	In Section 3.3.2 of the WMP, medium potential GDEs were noted downstream of the OHD. Raising the OHD wall by 1.5 was shown to significantly reduce discharge to the drainage course	Raising the Observation Hill Dam wall extends the time it takes for the dam to fill and spill once wet season rains start in November/December. Once full, the dam is modelled to remain

Review sub-section	Ref	Relates to	Review comment	Response
			downstream of the OHD. If the dam wall is to be raised, and flows decrease, how will the GDEs be affected?	above its previous capacity of 364 ML until at least the mid-dry season in July/August (see Figure 15 in EnviroConsult 2018b), and therefore, will be supplying the same amount of seepage and groundwater aquifer recharge until this time. Baseline surveys of riparian vegetation cover and condition downstream of Observation Hill Dam are being undertaken in March 2019, that include ground-based surveys and the recording of aerial imagery using a drone. The results of these surveys will map the extent of any sensitive vegetation types, such as GDEs, monsoon vine forest etc. and establish a baseline for future monitoring of impacts.
	x	Water Balance Groundwater model and WMP	In the hydrologic studies, a 2 m DEM was utilised in determining ground surface topography. Yet, within the groundwater modelling study, a different model of topography was utilised. Use of these different data sets may be the reason for the difference in the delineation of the southern catchment boundary (noted in point n above). The WMP should comment as to how this difference could affect flows, including runoff and groundwater inflows into the mine pit.	The southern boundary of the groundwater model is based on an ephemeral drainage line rather than a surface water catchment divide. Consequently, differences in the exact location of the southern catchment divide in the groundwater and surface water studies will not affect model estimates of pit inflows from the groundwater modelling.
	y	WMP	Raising the spillway elevation of the Observation Hill Dam (OHD) will cause inundation of lands previously above dam level. What are the implications of this inundation to aquatic ecology and native habitat around the OHD?	The majority of the terrestrial vegetation inundated by raising the Observation Hill Dam wall is described as *Pandanus spiralis, Lophostemon lactifluus, Livistona humilis* Low isolated trees (see Chapter 2 in Supplementary EIS). A smaller area of woodland vegetation communities comprising *Eucalyptus* species will also be inundated. No aquatic habitats will be inundated. The habitat loss associated with the proposal is expected to have a limited impact to fauna because the affected habitat types are well represented in the surrounding areas, with no other industrial development in close proximity that would deter use of these habitats.
	z	WMP	Raising the spillway height of the OHD by 1.5 m, as a potential option proposed in the WMP, will reduce flows immediately downstream of the dam by up to 69%. This value exceeds the NT Water Allocation Framework flow reduction guideline of ≤ 20%. The WMP should address possible mitigation strategies to meet	The risk to downstream ecosystems associated with the modelled reduced flow volumes is considered low as outlined in Section 4.2 of the WMP. Immediately downstream of any dam, flows will be reduced by 100% until the dam fills and overflows. In the case of the OHD, the current dam wall reduces flows by 100% in

Review sub-section	Ref	Relates to	Review comment	Response
			this guideline.	November and December. Raising of the dam wall will further decrease flows by around 30-80% in January to March, and 100% in April, as overflow of the dam will cease earlier than it currently does. The Water Allocation Framework guideline is not directly applicable to the areas immediately downstream of OHD, as this guideline is intended to be applied to river systems. The focus of the impact assessment and mitigation documented in the EIS is on the catchment outlet to Charlotte River, approximately 3km downstream of the OHD, where flows could be reduced by between 10-30%, of which 10-15% is attributable to raising of the dam wall. Baseline assessment of the riparian areas is being undertaken in March 2019, so that impacts to these habitats can be assessed in future if required. Impacts to stream flows downstream of the OHD will be minimised by only pumping water from OHD as required for topping up the site water supply. The modelling of impacts to stream flows is based on the worst-case scenario of all water being sourced from the OHD, whereas the water balance indicates that most of the sites water requirements will come from dewatering of the pit and extraction from the Mine Site Dam.
	aa	WMP	Construction of an alternative dam, e.g. the Mine Site Dam, results in a modelled decrease in flow volumes in that stream course of up to 37%. This value exceeds the NT Water Allocation Framework flow reduction guideline of ≤ 20%. The WMP should address possible mitigation strategies to meet this guideline	Updated modelling indicates flow volumes immediately downstream of the mine site will be reduced by up to 30%; or less if discharge of clean water from sediment dams is taken into account. Again, the Water Allocation Framework guideline is not directly applicable to the areas immediately downstream of the mine site, where stream flows are ephemeral. The ephemeral streams do not support any notable environmental values that are likely to be affected by the modelled decrease in flow. Further downstream at the point of discharge to the hinterland mangroves of West Arm, the early season decrease in flow is around 14-23%, which is not of a magnitude expected to have any impact on the ecological integrity of the mangrove environment or receiving waters habitats. Baseline assessments of the mangroves are being undertaken in March 2019, so that impacts to these habitats can be assessed in future if required.

Review sub-section	Ref	Relates to	Review comment	Response
	bb	Groundwater model	There is no hydrogeological data in the area of the proposed Mine Site Dam. Consequently, the impacts of this dam on the groundwater flow system is undetermined. However, it is recognised that two new monitoring bores are proposed in the area of the Mine Site Dam.	The MSD may cause a loading effect on groundwater i.e. increase groundwater recharge (mounding) underneath the dam. This could change the particle fate modelling undertaken for potential contaminants migrating in groundwater from the TSF. Simon Fulton to provide a description for how the MSD may change the groundwater flow regime for inclusion in the WMP. This can be updated with new data following installation of the new bores in April 2019.
	cc	Groundwater model Water Balance WMP	Construction of the Mine Site Dam (MSD) is not considered in the CloudGSM (2018) groundwater modelling report, the Water Balance Report (EcOz, 2018b), the Inundation Study (EnviroConsult, 2018c), nor the GHD (2017b) aquatic ecology report. It is unclear what affect, if any, that construction of the MSD will have on the groundwater flow systems, the water balance, inundation and aquatic ecology. The WMP should comment on how construction of the Mine Site Dam may affect the conclusions drawn within these studies.	The EnviroConsult (2019) modelling and water balance (Appendix A) now include the MDS.
	dd	Groundwater model Water Balance	Likewise, Mine Water Dams 1 and 2, the sedimentation ponds, and the raw water dam are also not considered in the CloudGSM (2018) groundwater modelling report, the Water Balance Report (EcOz, 2018b), the Inundation Study (EnviroConsult, 2018c), nor the GHD(2017b) aquatic ecology report. What affect, if any, will construction and use of these storages have on the groundwater flow system, the water balance, inundation and aquatic ecology?	As above.
	ee	WMP	In Table 2-1 of the WMP, it is stated that Mine Water Dam 2 acts a contingency for holding excess water dewatered from the pit to avoid “Dry” Season release from MWD1. Should this be “Wet” Season instead of Dry?	No, the dam has been designed to hold excess water over the dry season to avoid dry season releases to a system that receives no flow at that time.
	ff	WMP	In the original ToR, there was to be no discharge of water to the environment. However, within the WMP, water from Mine Water Dam 1 (MWD1) will need to be discharged at a rate not to exceed 50 L/sec. The change from the TOR to the EIS should be made transparent and reasons for the offsite discharge requirement	These changes were made transparent in the Draft EIS. Specifically, Table 1-1 in chapter 1 summarised all project changes that occurred between the NOI and EIS. Water discharges are listed in this table, along with the reason why the discharge requirement has arisen. Whilst the EIS ToR did not

Review sub-section	Ref	Relates to	Review comment	Response
			should be explained.	require address of discharges, as a result of the project changes, these were detailed in Chapter 2, Section 2.12.3 of the Draft EIS. Updated details are provided in the Supplement and the Water Management Plan.
	gg	WMP	Section 2.4.1 should include discussion on the Sedimentation dams, including volumes and inputs.	This has been added to the WMP, see Section 2.5.
	hh	WMP	It appears that water within the sedimentation ponds may be periodically discharged to the environment. The WMP should state where this water will be discharged.	See Section 2.5 of updated WMP.
	ii	WMP	Table 4-2 of the WMP appears to be missing the reduction to flows if the OHD wall is raised by 1.5 m. Only no dam and existing dam scenarios are included. This table should be revised to include the missing information.	Table 4-2 has been amended.
	jj	WMP	It is clear that, during the wet season, there will be a reduction in stream flow downstream of the MSD in excess of the NT Water Allocation Framework guideline of less than or equal to 20%. It is noted that these reductions "could alter the quality and/or species composition of the riparian zone" but that "the riparian habitat along this waterway is relatively sparse and not an example of a rare, highly diverse, or significant habitat for threatened species in the region". This argument may not hold much validity and the mine proponent should seek other means by which stream flows could be maintained above the noted threshold. It is probably presumptuous to ascertain that the riparian zone is of limited ecological value.	As indicated previously, the NT Water Allocation Framework guideline is intended to be applied to rivers, not minor ephemeral watercourses. The riparian zone of the ephemeral creek line has been assessed in ecological surveys, and it is evident that there is no riparian vegetation or instream habitats that indicate a high level of ecological value. Stream flows are important to the ecological integrity of the mangrove environments approximately 2 km downstream. At this location, flows will be reduced by 12-23%, which is considered unlikely to cause a measurable impact on the mangroves. This is adequately discussed in Section 4 of the WMP.
	kk	WMP	In Section 4.4 of the WMP, why is increased discharge from the Mine Site Dam (MSD) during the Wet Season decoupled from a similarly predicted reduction in discharge?	Impacts from reduced flows from surface water extraction from the MSD, are assessed in isolation from the assessment of impacts from increased flows from MWD1 discharge due to the differing water quality characteristics i.e. discharge from MWD1 contains groundwater removed from the pit and it is possibly not appropriate to consider this as an 'environmental flow'.

Review sub-section	Ref	Relates to	Review comment	Response
	ll	WMP	Laboratory parameters for surface water sampling locations should include total metals as well as dissolved metals	This has been added.
	mm	WMP	Laboratory parameters for all sampling locations, including surface water and groundwater, should include ionic balance, pH and TDS.	Ionic balance is not typically used as an indicator of impacts to water quality associated with mining. pH and TDS are measured in-situ in the field, this is best practice. If samples were sent to a lab for pH they would be well outside the 6-hour holding time.
	nn	WMP	Proposed bores GWB13 and GWB14 appear to be within the footprint of the MSD and may therefore need to be relocated.	See updated groundwater bores to be installed in Section 10 of WMP.
	oo	WMP	Turbidity triggers: the turbidity trigger of 75 NTU taken from the INPEX project, may not be appropriate for the Grants project. INPEX which was a very large footprint project that included wet season construction. The turbidity limit in that project was also subject to a design (major) storm event rather than a blanket trigger, and also subject to adjustment from performance review of monitoring results. Adjust the Grants project turbidity limit and assign a design storm event based the final turbidity trigger adopted by INPEX and approved by NTEPA following review of monitoring data (background and discharge) from that project.	As outlined in Section 2.5.2, turbidity in the sediment basins will be reduced as much as possible, but final discharge from the sediment basins is not always expected to achieve the very low turbidity levels in the receiving drainage lines. As such, the discharge standard recommended for sediment basins in IECA (2008) is adopted: 90th percentile NTU reading not exceeding 100, and 50th percentile NTU reading not exceeding 60. Once discharged, the turbidity of water from the sediment basins is expected to reduce rapidly with dilution in the receiving drainage lines, combined with the filtering effect of the vegetation growing within the drainage lines. The assessment criteria outlined in Table 10 3, applying to all routine surface water monitoring sites downstream of the mine will still apply for turbidity. That is, the turbidity of the sites downstream of the sediment basins (GWS SW1 and GDS SW2) are expected to remain below 20 NTU.

Review sub-section	Ref	Relates to	Review comment	Response
3.3 Conformance of Water Balance with MCA WAF	a	Water Balance	A Contextual Statement is not included in the Water Balance Report. While some contextual information is provided, e.g. climate data in Section 4, the Contextual Statement should provide additional information such as site geology, hydrogeology and topography, catchment details, regional water resources, and water policy and rules applicable to the proposed mining operations. While this information is provided elsewhere in the WMP, and its ancillary documents, a standalone Contextual Statement should be included within the Water Balance report;	Contextual statement has been added.
	b	Water Balance	The Water Balance Model report (Section 3.1) assumes a 25-month operational life of the mine. Yet, in Section 1 of the WMP, the life of the mine is indicated to be 2 to 3 years (Section 1. WMP), a difference ranging from -1 to +11 months. The correct timeline should be made consistent in all updated reports;	All groundwater modelling, surface water modelling and water balance now use the same most up to date mine design and timing.
	c	Water Balance Groundwater model and WMP	It is noted that a variety of different climate data are used in the various technical reports, i.e. the groundwater modelling study, the hydrologic studies and, again, in the Water Balance report. Ideally, the same climate data should be used in each study as using variable data introduces unnecessary uncertainty in the results;	All modelling now uses SILO data.
	d	Water Balance	The Water Balance Model uses 50th percentile climatic data from the Darwin Airport weather station. However, the MMP Structure Guide specifically states that the Water Balance Model should include scenarios of successively drier, or wetter, than average seasons, as well as extreme weather events. This should be addressed in updated reports.	The water balance now includes these scenarios.
	e	Water Balance	Figure 2 should use the colour guidelines specified in Section 3.1 of the MCA WAF. In addition, for consistency with the WMP, the Environmental Dams should be re-labelled as Sedimentation Dams. Lastly, the “Sedimentation” or “Environmental” should include rainfall as an input.	Colour guides have been used. Sediment basins now include rainfall.

Review sub-section	Ref	Relates to	Review comment	Response
	f	Water Balance Groundwater model	The stated pit area (12.6 hectares) in Section 5.1.1 of the Water Balance Report differs from that (14 hectares) stated in the groundwater modelling report. This inconsistency should be corrected and addressed, as pit area will directly affect the amount of rainfall entering the pit and, therefore, the amount of water that requires dewatering.	All groundwater modelling, surface water modelling and water balance now use the same most up to date mine design and timing.