ERAMURRA SALT - ERAMURRA SALT PROJECT HYDROLOGIC ASSESSMENT: REVIEW.

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Document Information

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1.0	Final	17/10/2022	RV	RF	RF

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Introduction and Aim

Leichhardt Salt Pty Ltd is an independent, majority-Australian owned Solar Salt Project headquartered in Perth, Western Australia, with operations 55 kilometres (km) outside Karratha, Western Australia. The project occurs in the Cape Preston East Multi-User Port between Eramurra Creek along the western edge and Devil Creek on the eastern edge. The project area will contain 90km^2 of concentration pond area, 20km^2 of crystalliser area and 2km^2 bitterns in addition to the plant processing area. To produce salt, rows of concentrator evaporation ponds will be constructed including a perimeter embankment. This will alter existing the surface water flows from waterways as well as tidal flooding of the project land parcels.

The aim of this memo is to review:

- W-AO-04_Hydrology Report DR003.pdf - Eramurra Salt Project Hydrologic Assessment Leichhardt Salt September 2022

The review summary is provided immediately below. Following this a more specific review of the report generally is presented with comments by page number. Note that page numbers correspond to the pdf file's page numbers, not the page numbers in the report text. The two previous versions of this report have been reviewed, the document under review is version 3 (DR003).

Summary

The hydrologic modelling is fit for purpose and has been undertaken to a high-level using industry standard techniques given the limited gauging data available. The modelling has been calibrated against data collected during Cyclone Damien but this is not presented and another report referenced. Comments on the previously reviewed reports have been suitably addressed.

The modelling predicts only very minor impact potential as generally flood heights are modest and velocities do not exceed the value where rock armouring is required (>2m/s). The area is already a highly turbid hydrological environment so the minor predicted changes in site hydrology will not be likely to cause any significant changes in suspended sediment loads. Model sensitivity to all parameters has been sufficiently demonstrated giving improved confidence in results over previous report versions.

No assessment of the reduced surface water flow to the ocean against environmental water requirements is made but this can be undertaken in another report. Current modelling is only of a 10% AEP event which is predicted to cause a 25% flow volume reduction. Note that the impact of a 1EY/63.2% AEP event is likely of concern as well as the effect of the project on a 10% AEP and larger events.

The authors have recommended the hydrologic modelling is revisited once more local flow gauging is available to see if any adjustments are required. I agree this is warranted and in line with best practise. The operational procedures for the ponds and their internal design have not been presented as they were not part of the scope.

As a final point the report references that the pond designs are current as of May 2022 and that the impact assessment won't reflect any changes in pond design since then. In a covering letter for these reports, when submitted to the EPA, it would be appropriate to note if any changes to these designs have occurred or are proposed to occur.

Specific Comments

Page 12 - Gauge results from loggers onsite were compiled and assessed against rainfall records for the period from 8-10 February 2020. The maximum recorded 24-hour rainfall depth of 150 mm was found to be equivalent to the 1 in 10 AEP event. Some calibration of results was undertaken, with additional recommendations issued for further gauging efforts (LWC 2021).

Comment - I can't find any of this presented in the report. Would be good to see a calibration hydrograph but if the report referred to has this content then no significant issue.

Page 15 - Roughness coefficient sensitivity analyses were conducted for the Cyclone Damien event modelling in 2020.

Comment - Minor typo see insertion underlined.

Page 20 - In order to conservatively reflect maximum impacts, drains have not been included in the current project conditions model.

Comment - It is possible that the drains will locally increase flow velocities to a minor extent but given the very low velocities modelled I don't see this as an issue. Drains and bunds will need maintenance (check for scour, sedimentation etc) so rock armouring can be installed in any isolated areas where required. It is made clear by the author that another report on the detailed design and operating procedures for the ponds will be required.

Page 22 - The increase in peak flow rate is approximately 10% and the decrease in flow volume is approximately 25% for a 2-day simulation window.

Comment - Although this seems like a relatively small reduction, are there any biodiversity assets that might be impacted by this? What happens to ocean discharge in a 1-year ARI event? Will this impact any environmental assets? I'm presuming this will be addressed in other reports.

Page 22 - The adopted sea level rise is based on recommended 2110 levels outlined in the WA Environmental Protection Authority's Environmental Factor Guideline for Coastal Processes (WA EPA, 2016).

Comment - Appropriate use of the guideline and suitable practise for incorporating sea level rise.

Page 22 - Afflux maps are shown with a 10cm threshold for display.

Comment - Maps show >5cm in area tabulation figures (5-13 for example).

Page 39 (and other pages) - Table 5-1 (as well as text and figures)

Comment - It is unclear why the ARI terminology isn't consistent (i.e. 1EY and then 10% AEP etc). 1EY = 63.2% AEP. Minor issue.

Page 57 - Although these velocities fall below the Austroads threshold for requiring armour rock, the placement of coarser material such as Class A or B1 rock may be beneficial in preventing erosion of the bunds and preventing adverse impacts, particularly along areas where the flow path has been constricted or where localised runoff concentrates on embankment slopes.

Comment - Strongly agree and note my comment above for page 20.

Page 59 - The flood models do not account for any proposed changes to the pond configuration since the May 2022 design iteration.

Comment - Have any changes occurred or are any changes likely? Just a comment needed, could be in a covering letter.

Page 59 - This assessment covers individual storm events with durations up to 12 hours; the determination of freeboard levels for the design of bund heights, overflow spillway capacities, and water quality assessments require long-term water balance analyses that are beyond the scope of this flood study.

Comment - Good that this is specifically stated in this version and I presume this will be addressed in a pond detailed design study.

Page 59 - The modelled results do not account for groundwater interaction; however, saturated conditions without initial or continuous losses have been assessed in the accompanying sensitivity analyses.

Comment - This is a suitable substitute for incorporation of explicit groundwater interaction at this stage of the project.

Page 59 - Under the assumption of completely saturated antecedent conditions (no initial or continuing losses), predicted water levels increase relative to the modelled scenarios with losses applied. The potential increase is highest (up to 500 mm) in the confined corridors between pond embankments.

Comment - I presume velocities didn't increase significantly? Would be good to be specific about this.