REVIEW OF ERAMURRA SOLAR SALT PROJECT – GROUNDWATER EFFECTS ASSESSMENT AND SEEPAGE MODELLING V3.

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DATE | 6/12/2023

Proprietary Information Statement

Document Information

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Reviewed by:		**Date:**
Approved by:		**Date:**
Client distribution:		**Date:**

Revision History

Revision	Revision Status	Date	Prepared	Reviewed	Approved
1.0	Final	6/12/2023	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 from the Cape Preston East Multi-Commodity Port between Eramurra Creek along the western edge and Devil Creek on the eastern edge. The project area will contain 90km^2 of concentrator 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. There is also potential for groundwater impact from a number of project activities. The aim of this memo is to review the 3rd iteration of the seepage modelling report, namely:

- LWC-1001511-RPT-001-2_tracked changes_20231117.docx

Review Summary

The 3rd iteration of the groundwater seepage modelling report is substantially improved and refined from the initial version. Suggested changes to the seepage modelling report from the previous reviews, have now been included/addressed and have been individually checked during this final review. There are a few comments still not addressed as indicated in the detailed comments of this review but these are generally related to clarity of images and text and do not affect the veracity of the seepage impact assessment which is now considered broadly fit for purpose. Some minor typographic errors have also been identified as part of this review as noted in the Detailed Comments section.

The two main remaining technical issues relate to the conceptualisation of Devil Creek Pool as an expression of groundwater (I believe it is while CDM Smith remain unconvinced) and a softening the language around model predictions of depth to groundwater. The use of a 2m evapotranspiration (ET) uniform extinction depth in the model is generally maintaining groundwater levels to that depth. However, in reality the ET extinction depth will be variable (as a function of soil and vegetation type) across this area hence groundwater rises may be greater (i.e. closer to the surface) than currently predicted. This would potentially increase the severity impacts over those predicted herein, but the predictive uncertainty analysis gives confidence that the spatial scale of impacts is robust.

Regardless as the project moves into an operational phase more data will be collected and the model refined. In that context particular attention should be paid to collecting (and incorporating) additional data to better define the variable ET depth across the project area. This is a key control on predictions of impact severity in the model.

Detailed Comments

Note that my previous comments are marked as such and any comments specific to V3 of the seepage modelling are marked as comment2. The red text is the tracked changes in the document provided for review.

Page 15 – Typo 15stratigraphy

Page 19 - An area of naturally occurring pools (Devil Creek Pool) has been identified to exist within Devil Creek to the east of the Project area and is considered further in this assessment. This value is not being considered as an aquatic GDE, but within cultural values.

Previous Comment - Due to the site not having any species of biodiversity significance? Some clarification required as to why this site is not considered an aquatic GDE as intuitively it is one. Looking at the Water observations from Space (WOfS) data (see below) I think it does need to be assessed as an aquatic GDE.

Comment2 - This comment has not been fully addressed. Devil Creek Pool is inundated 100% of the time according to WOfS. At this point it is important to note that the WOfS data could be interpreted as indicating that the ground surface is either inundated or saturated 100% of the time, which regardless indicates that groundwater discharge is occurring at this location. It must be an Aquatic GDE if it is 100% inundated/saturated in this landscape. Returning to this comment at the end of the review it is clear that this feature is not being assessed in the aquatic GDE section but is being assessed (for impact potential) within cultural values. It would be clearer if it was stated that this is a potential aquatic GDE being assessed for impact within cultural values.

Page 20 - Remote sensing investigations (CDM Smith, 2023; Appendix C) suggest this EV is not a permanent water feature and is unlikely to *currently* receive *substantial* groundwater inflows.

Comment2 – Note the suggested additions in italics, I think the groundwater input is still up for debate regardless of remote sensing in Appendix C (which wasn't included in this version). I agree however that it is not a highly groundwater dependant feature like Devils Pool. With rising groundwater from seepage this may change as alluded to in the CDM Smith last sentence.

Page 25 - Figure 5-1 Previous Comment - Colours for EVs/features are different than in previous Figure 4-1, keeping consistent colours will help comparison and readability. Also, the yellow Euc. forest is hard to see in some parts of the figure versus the yellow 5m mounding contours. Mounding verses Euc. forest is a key potential impact via waterlogging. Minor issues around readability

Comment 2 – eucalypt forest is still yellow and hard to spot versus the yellow contour lines.

Page 28 - Under the mean sea level rise scenario, the mean of the 100 calibrated model realisations shows 3~~3~~3% of algal mats area, 2~~4~~9% of samphire shrubland area and less than 1% of mangal community area will experience more than 0.5 ~~-~~m groundwater level rise outside of the evaporation ponds.

Comment2 – The percentages for algal mat and samphire don't appear correct. There are larger areas than quoted predicted to experience more than 1m of rise on Figure 5-1. Also note that if you are going to quote impacts relative to the 0.5 contour that should be shown.

Page 35 - **EV8 – Noorea Soak**

Within the vicinity of Noorea Soak the mean of the 100 calibrated model realisations shows no change in salinity during the operational period in either the mean sea level or sea level rise operational scenarios. Similar to the direct effects predicted for groundwater level increases, these results are likely due to the very low permeability of the basement rock for which the soak is located (i.e. the saline plume cannot move quickly through the basement rock).

Comment2 - Although I agree this is what the model shows it only can represent the hydrogeological environment as conceptualised in the model. If this lithology is more heavily fractured than currently assumed impacts could be different, hence why I recommend monitoring and including it. I don't think a change is required this is more FYI for Leichhardt.

Page 46 – Ev

Comment2 – 2 typos should be capital V.

Page 46 - EV2 – Groundwater dependent terrestrial vegetation (GDE Atlas)

The modelling predicts an unsaturated zone will remain.

Comment – Mostly because the ET extinction depth is set to 2m, if extinction depth was less the groundwater rise would likely be greater. Need to be careful as assuming that a model can predict a future reality in this context is problematic, will need to confirm with monitoring and adjust the model once there is some more data on this critical aspect.

Page 46 - ~~e~~Eucalypt species are also likely to be threatened by increases in groundwater salinity, should these species access groundwater for periods of time. Eucalypts are highly resilient to changes in weather patterns and adaptable in terms of their water sourcing (i.e. soil water vs groundwater, or both) and therefore, will likely be able to exist without a groundwater supply for sustained periods*, unless unanticipated waterlogging occurs*.

Comment2 - Should note that this is the case unless unanticipated waterlogging occurs, see suggested addition in italics above.

Page 49 - It should be noted that little is known about the current condition of this EV and whether the pools represent permanent expression of groundwater or if such a connection exists. A review of Google Earth historic aerial imagery indicates the pool does not contain water permanently and is therefore not currently likely to be supported by groundwater. However, the rise in predicted groundwater levels caused by mounding (increase of around 3 -m) could increase the chances of groundwater intersecting~~connection at~~ this EV. ~~ and therefore,~~ The predicted increase~~s~~ in salinity ~~to the levels predicted~~ will likely alter the role of Devil's Pools in providing a source of water to associated ecology~~could threaten Devil's Pools~~. ~~-~~Ongoing environmental monitoring of this EV is recommended.

And

Page 51 – Devil's Pools will likely be threatened by significant increases in groundwater salinity. Little is known about the current condition of this EV and whether the pools represent permanent expression of groundwater or if such a connection exists and therefore, it is unknown whether these

pools will be affected by an increase in recharge, groundwater levels and changes in groundwater flow.

Comment2 – The WOfS dataset shows 100% inundation/saturation and should be quoted. Must be an expression of groundwater at least part of the time over part of its extent.

Page 61 - Extinction depth defines the depth below which groundwater ET ceases to occur. In this study, the extinction depth has been set to the typical value of 2 m and assumed to remain constant spatially and temporally.

Previous Comment - This is conservative as in sand dominated areas it will be less (0.5m unless vegetation is accessing groundwater). Note previous comment on the uniform extinction depth.

Comment2 – My underlined conservative statement is in terms of the ET depth being greater than it will be in sand dominated areas without vegetation. This will result in an underprediction of impacts. I've made this point clearly a number of times and don't need to reiterate here and my comments herein should demonstrate why.