Environment Plus

Reconnaissance Vegetation Survey
Beta Nutrition Pty. Ltd. Facility
Lake MacLeod

JUNE 2021

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1 Background

A reconnaissance vegetation survey was undertaken by Dr. James Tyler from 2:00pm to 5:00 pm on Wednesday 9th June 2021 in support of a Clearing Permit Application for a 4.66-hectare area centred on a naturally revegetated Borrow Pit adjacent to existing facilities.

Dr Tyler is familiar with Lake MacLeod from his time as Site Biologist with Dampier Salt from 1980-1984 when he undertook baseline flora and fauna studies. At that time, he discovered a new Genus of plants (*Murchisonia*) and a number of new species including *Dichopogon tyleri*. His Paper on "Vegetation surveys near Lake MacLeod" published in 1987 was used as a reference in this survey with identified species checked against listings in Flora Base for current names.

2 Introduction

Beta Nutrition Pty Ltd (BNL) is developing a Beta-carotene aquaculture facility on their Aquaculture Lease (Aquaculture Licence Number 1580, Lot 3000 on deposited Plan 52557) on southern Lake MacLeod (refer Figure 1). The unicellular green algae *Dunaliella salina* will be cultured in raceway ponds to produce Natural Beta-carotene.

A pilot facility has been in place immediately adjacent to and on the northern side of the blow-holes road since 2007. BNL are now preparing to expand the facility into a large-scale production facility (refer Figure 2). This development will require the removal of about 1.5 hectares of mainly regrowth vegetation within a 2.68 hectare clearing envelope (refer Figure 5). This area is immediately adjacent to the existing facility and clearing is required to allow construction of a lay-down area, shed and access road (refer Figure 5). The area to be cleared is comprised of areas of low lying hard-pan with regrowth samphire, flanked by mounds of pushed- up lake sediment that is currently heavily grassed with Buffel Grass (refer Figure 7), There is a small area of remnant low woodland dominated by *Acacia tetragonophylla* (refer Figure 11).

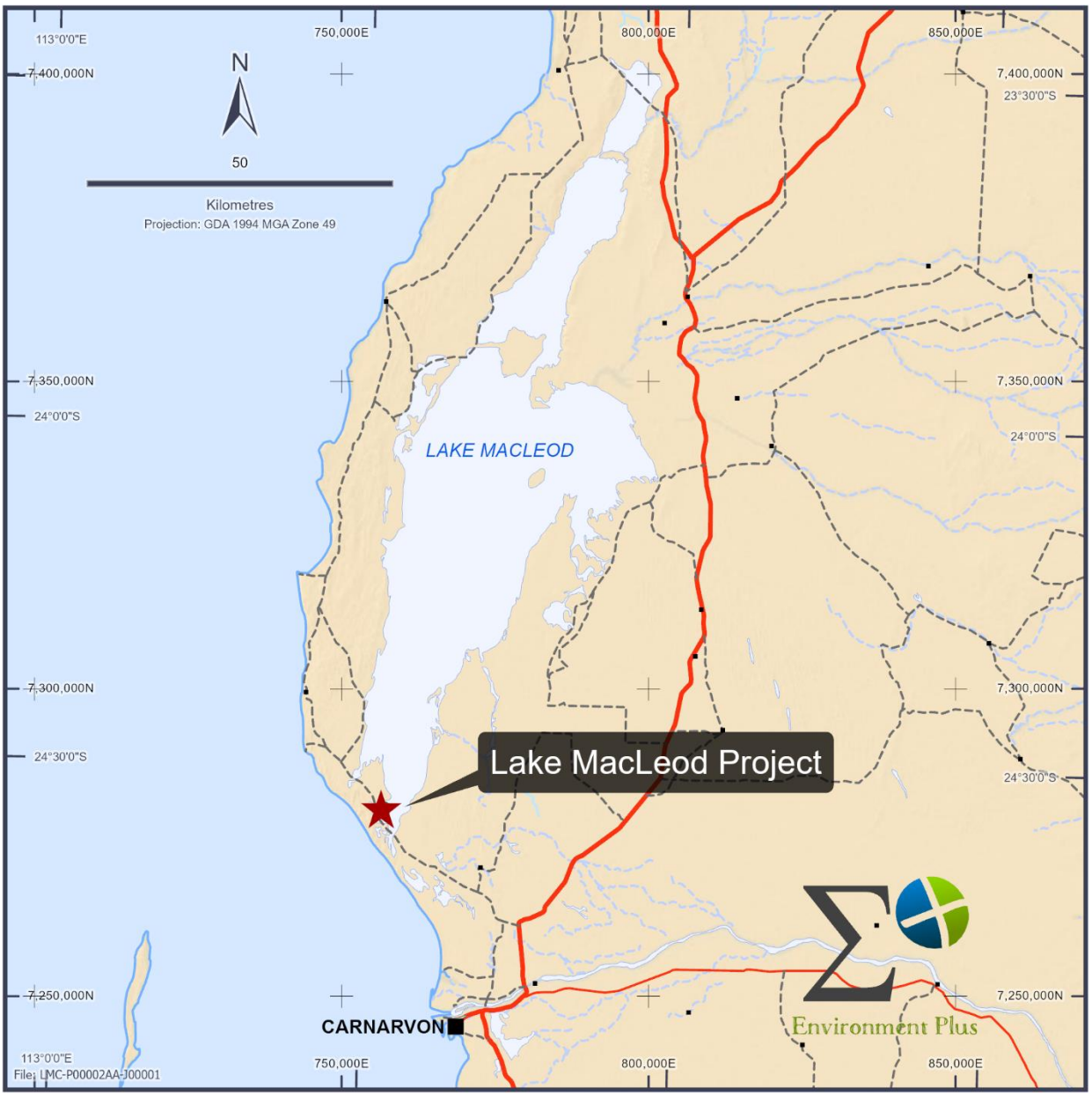


Figure 1: Location of Beta Nutrition Pty. Ltd. Aquaculture Facility on southern Lake McLeod

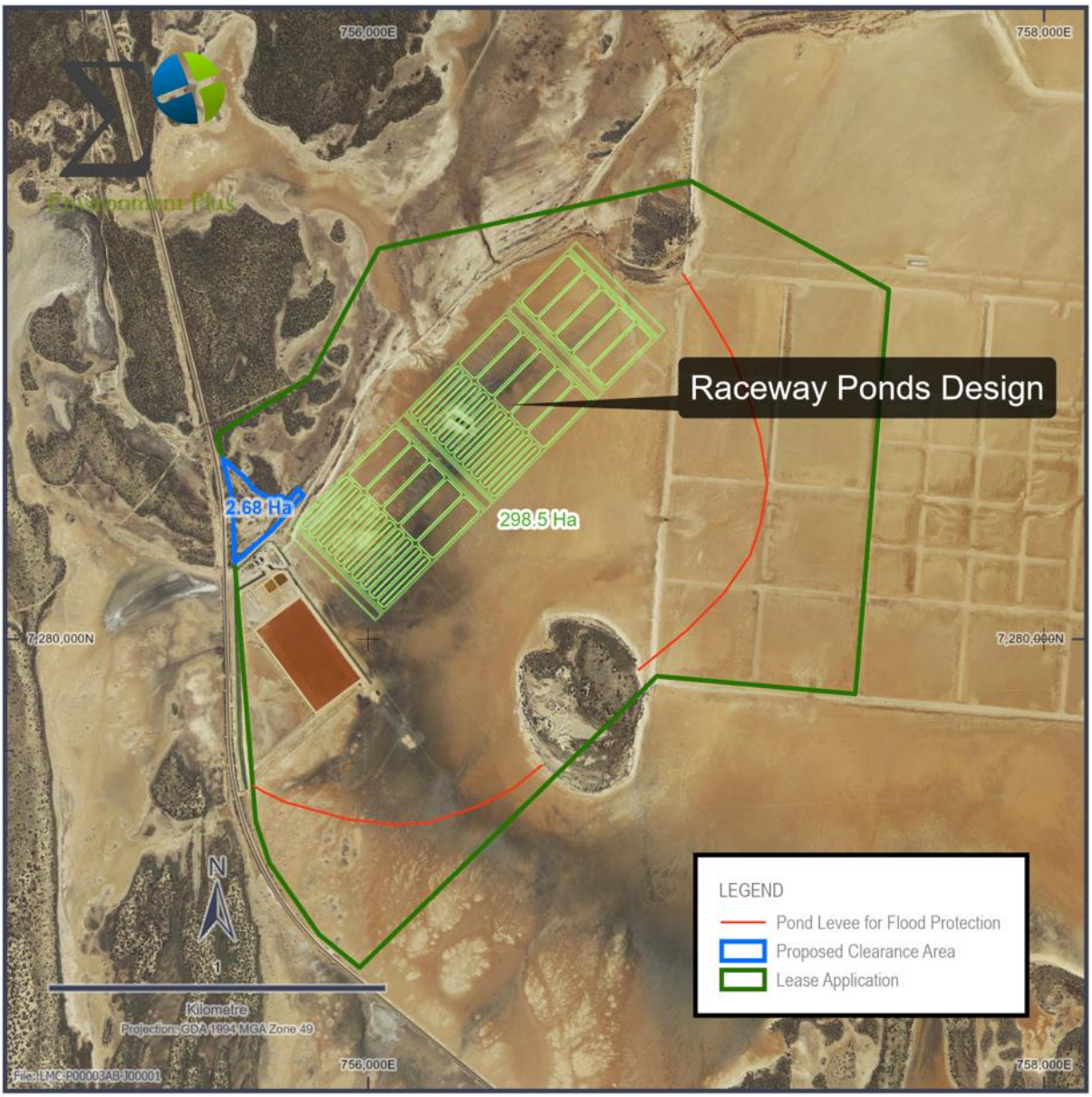


Figure 2: Planned Beta Nutrition Pty. Ltd. raceway pond system with indicative flood levees (pale blue lines) within the 298.5 ha lease

The required clearing is necessary to expand existing facilities into a previously disturbed area for the purpose of construction of a lay-down area, shed and accommodation unit. Clearing remnant vegetation in the NW corner of the proposed clearing envelope will be minimised (refer Figure 5). This area is adjacent to the proposed accommodation area and its retention will provide aesthetic value to future residents.

3 Requirement for a Land Clearing Permit

Lake MacLeod is classified as an Environmentally Sensitive Area (ESA) on the interactive map provided by the Department of Water and Environmental Regulation ([https://cps.dwer.wa.gov.au/main.html#[{%22xclass%22:%22app.map.Main%22},{%22xclass%22:%22app.Content%22}]](https://cps.dwer.wa.gov.au/main.html#[{%22xclass%22:%22app.map.Main%22},{%22xclass%22:%22app.Content%22}]). The 5-hectare exemption for purposes such as infrastructure establishment does not apply within Environmentally Sensitive Areas. It is unclear whether the proposed clearing area (refer red dot on Figure 3) falls within the Environmentally Sensitive Area zone or not. If the Environmentally Sensitive Area ends at the edge of the lake then the area would arguably fall outside of this ESA zone but a clearing permit application is nevertheless being submitted.

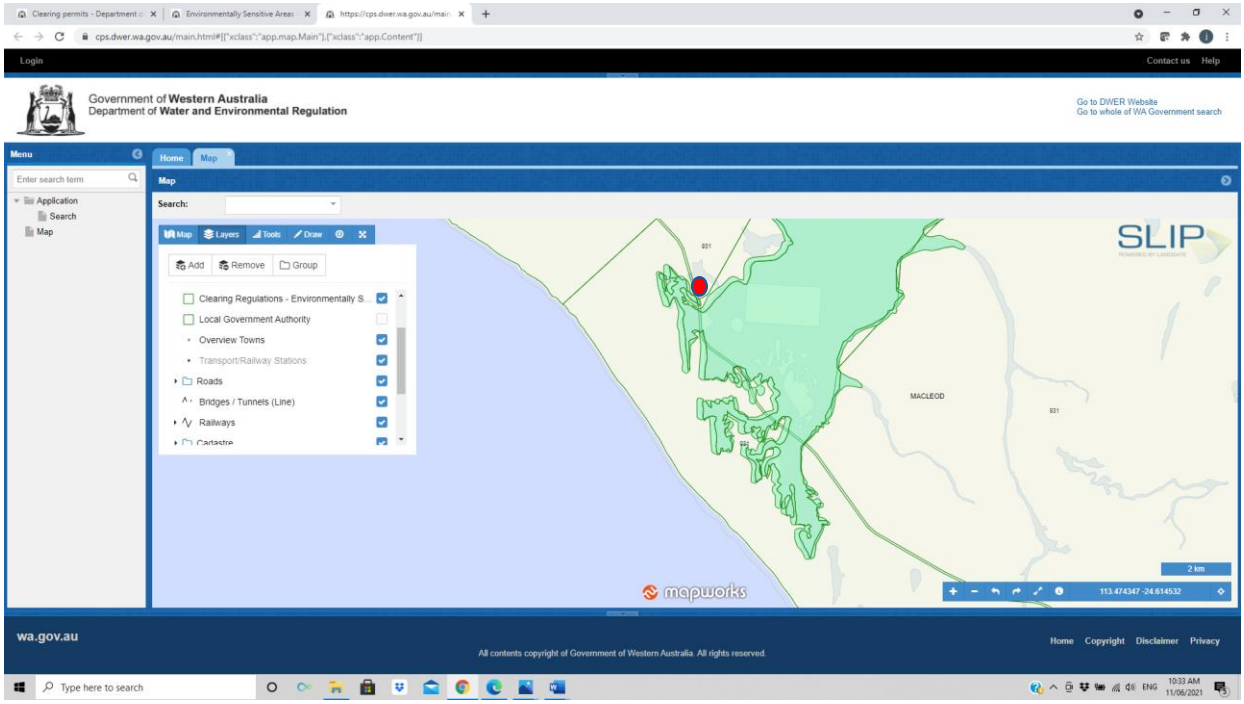


Figure 3: Lake MacLeod is classified as an Environmentally Sensitive Area.

The area proposed for clearing is an old borrow pit that has partially revegetated naturally but which contains a significant area of bare ground (refer Figure 4 and Figure 5) and pushed up mounds. The proposed clearing is intended for use as a lay-down area and for the establishment sheds and other as well as enabling the rehabilitation of the unsightly borrow-pit in highly visible area adjacent to the blow-holes road.

Figure 4: The clearing envelope contains large bare areas from the old borrow-pit.

Figure 5: Proposed clearing envelope that avoids intact vegetation and enables rehabilitation of an old borrow pit comprised of bare ground and push up mounds.

4 Vegetation Communities

The structure and components of the vegetation communities near Lake MacLeod are driven by both hydrology and soil type.

4.1 HYDROLOGY

There is a near surface (ie. normally about 1m below the lake surface) saline (ie. brine density > 1.04 g/cm^3 or 1.5 times seawater salinity) aquifer underlying the Beta Nutrition Pty. Ltd. site.

This Quobba Sands Aquifer is replenished from subterranean inflow from the Indian Ocean which is 2km south of the Project site and separated from it by the Bejaling dunes.

The lake is also subject to episodic flooding with a saline flood sheet largely originating from inflows from the Minilya and Lyndon River systems at the northern end of the lake. This saline flood sheet can reach the Project site under extreme flood events such as occurred in 2010.

4.2 SOILS

The underlying soil is largely comprised of fine calcite and gypsum sand originating from the Lake MacLeod evaporite basin which in places can be overlain with drifting dune sand from the Bejaling Dunes to the south.

4.3 VEGETATION COMMUNITIES

The bare lake surface of lake MacLeod is fringed with a band of samphire on ground that is slightly elevated above the lake surface and consequently less water-logged. As the elevation increases, as a consequence of drifting gypsum sand off the lake to the north and drifting dune sand from the south, the vegetation transitions from samphire to Frankenia/Saltbush and then to Acacia woodland.

The natural landscape of the Project area is comprised of patches of bare lake bed, low-lying samphire and higher elevation Acacia shrubland with an understory of saltbush. This pattern persists around the 288,000-hectare Lake MacLeod which is the world's largest evaporative basin natural salt-lake.

The area proposed for clearing is on land that was largely previously disturbed as a borrow-pit and avoids natural woodland (refer Figure 5). It comprises low areas of fine gypsum sand and some patches of regrowth samphire (refer Figure 4 and Figure 9) along with pushed up material along road verges in particular that is dominated by Buffel Grass (*Cenchrus ciliaris*) (refer Figure 6). The dominant woody species on the remnant undisturbed vegetation on the northern end of the proposed clearing envelope is *Acacia tetragonophylla* at a height of about 1.5 m (refer Figure 10). The vegetation communities within the proposed clearing footprint are widespread outside of the footprint (refer Figure 8).

The proposed infrastructure footprint within the proposed clearing envelope (refer Figure 5) should avoid most of the natural vegetation in the northern section of the area. A strip of 30 m adjacent to the blow-holes road (refer Figure 11) will also not be cleared.

Figure 6: Pushed up mound dominated by Buffel Grass (Cenchrus ciliaris)

5 Flora Survey

5.1 SURVEY METHOD

The proposed clearing envelope is small and a high-level reconnaissance survey was undertaken with a focus on identifying any rare and endangered flora and assessing the significance of the proposed clearing.

A visual survey of the flora was undertaken on foot with photographs taken of all observed species. The relatively small size of the proposed clearing envelope in combination with extensive open areas, and the relatively homogenous vegetation pattern within the vegetation zones enabled good visual coverage. Species not in flower were identified based on local knowledge, the use of a species list compiled in previous surveys in the area (refer Tyler 1987) and checked against Flora Base for current names.

5.2 DESCRIPTION OF THE LOCAL VEGETATION

Nineteen species were present within the clearing envelope and did not include any threatened species (refer Table 1).

The low-lying marsh areas are dominated by Shrubby Samphire (*Tecticornia halocnemoides)* which also dominated the undisturbed marshland to the north of the proposed clearing envelope (refer Figure 7). Other species observed in this low-lying marsh area include Marine Couch Grass (*Sporobolus mitchellii)*, Glasswort (*Tecticornia indica*), Pygmy Purslane (*Calandrinia glanulifera*) and Common Sea-Heath (*Frankenia paucifolora*).

Figure 7: Low lying area dominated by Halosarcia halocnemoides with *Sporobolus mitchellii* on the higher ground

Mounds of pushed up lake sediment largely comprised of fine gypsum sand were heavily grassed with Buffel Grass (refer Figure 7) and the natural shrubland (refer Figure 8) was dominated by Kurara (*Acacia tetragonopylla*) (refer Figure 8) with occasional Limestone Wattle (*Acacia sclerosperma*).

Figure 8: Shrubland on higher ground with Acacia tetragonophylla the dominant woody plant.

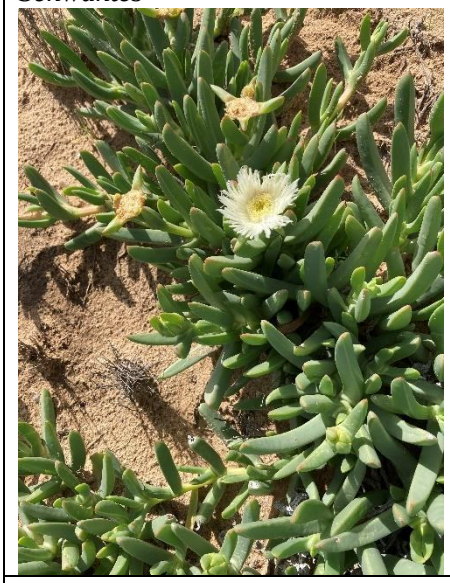
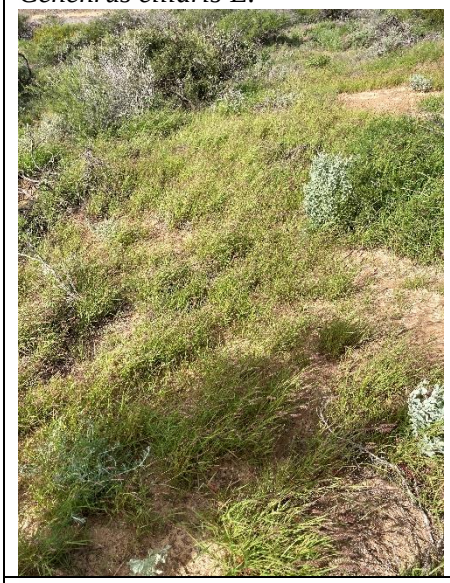
The dominant understory species in this community was Thick-leaved Fan-flower (*Scaevola crassifolia*) along with Grey Saltbush (*Atriplex cinerea*), a mallow (*Lawrencia densiflora)*, Flannel Bush (*Solanum lasiophyllum*) and Angled Pig-face (*Carpobrotus rossii*). Saltwater Primula (*Samolus junceus*) was present at the edge of mounds. The mounds flanking the blow-holes road were heavily grassed with Buffel Grass (*Cenchrus ciliaris*) (refer Figure 9).

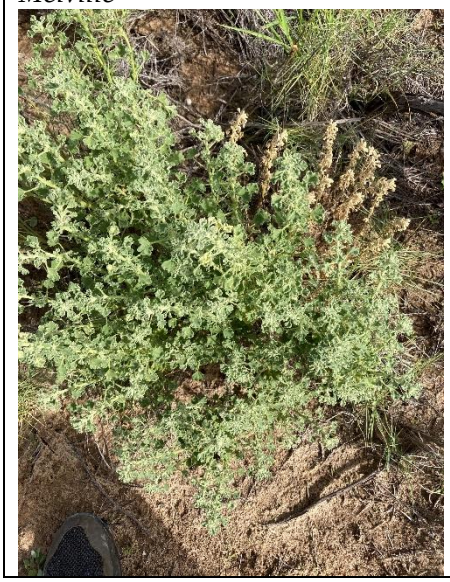
Figure 9: A 30m strip of roadside vegetation dominated by Buffel Grass will not be cleared.

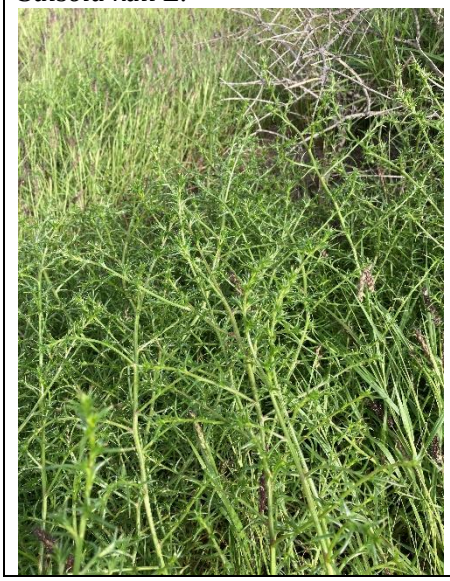
Table 1: Observed species (unverified) using Tyler 1987 species list as a reference

Species	Common name	Conservation Status	Comment
Acacia sclerosperma F.Muell. 	Limestone Wattle	Priority three	One seen in proposed clearing envelope but very common nearby.
Acacia tetragonophylla F.Muell. 	Kurara	Not threatened	The dominant woodland shrub

Species	Common name	Conservation Status	Comment
Atriplex cinerea Poir. 	Grey Saltbush	Not Threatened	
Calandrinia granulifera Benth. 	Pygmy Purslane	Not threatened	

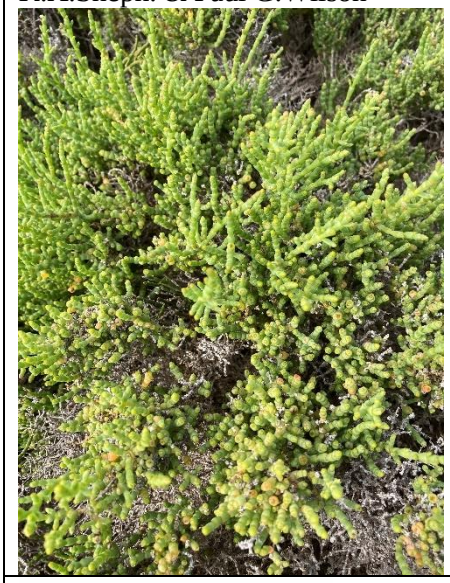
Species	Common name	Conservation Status	Comment
Carpobrotus rossii (Haw.) Schwantes 	Angled pig-face	Not threatened	
Cenchrus ciliaris L. 	Buffel Grass	Not threatened (Alien)	Dominant weed on roadside mounds
Corchorus elachocarpus F.Muell. 	Thin leafed Corchorus	Not threatened	

Species	Common name	Conservation Status	Comment
Frankenia pauciflora DC. 	Common sea-heath	Not threatened	
Lawrencia densiflora (Baker f.) Melville 		Not threatened	Not in flower

Species	Common name	Conservation Status	Comment
Myoporum montanum R.Br. 	Native Myrtle	Not Threatened	The only Lake MacLeod Myoporum in Flora Base.
Roepera fruticulosa (DC.) G.Don	Shrubby Twin Leaf	Not threatened	
Salsola kali L. 	Prickly saltwort	Not threatened	

Species	Common name	Conservation Status	Comment
Scaevola crassifolia Labill. 	Thick Leafed Fan Flower	Not Threatened	Dominant species
Samolus junceus R.Br. 	Saltwater Primula	Not threatened	

Species	Common name	Conservation Status	Comment
Solanum lasiophyllum Poir. 	Flannel Bush	Not threatened	
Sporobolus mitchellii (Trin.) S.T.Blake 	Marine Couch Grass	Not threatened	

Species	Common name	Conservation Status	Comment
Tecticornia halocnemoides (Nees) K.A.Sheph. & Paul G.Wilson 	Shrubby Samphire	Not threatened	
Tecticornia indica (Willd.) K.A.Sheph. & Paul G.Wilson 	Glasswort	Not threatened	

Species	Common name	Conservation Status	Comment
Trichodesma zeylanicum (Burm.f.) R.Br. 	Camel Bush	Not threatened	

6 Clearing Strategy

Previously undisturbed native vegetation is confined to a small area along the NE corner of the proposed clearing envelope. This will be left intact as far as is possible. A 30m wide strip of revegetated land adjacent to the blow-holes road would also be left intact (refer Figure 9).

The revegetation strategy would focus on recontouring the area by flattening the previously pushed-up mounds of lake sediment into the low-lying areas and potentially trucking in additional material to create a flat elevated area suitable for a lay-down area and shed (refer Figure 5). Any vegetation removed in during earthworks will be separated from the earth and placed on top to prevent wind-blown erosion and to facilitate revegetation.

7 High Level Assessment under the 10 Clearing Principles

The Proposal should not be precluded by any of the 10 land clearing principles.

This conclusion is largely based on the Clearing Permit that was granted to Dampier Salt on the 17/03/2011 for a nearby 45 hectare borrow-pit (Clearing Permit Decision 4203/1). The Dampier Salt proposal completed by Outback Ecology was for a much larger area in a much less disturbed environment but the key findings are applicable.

7.1 NATIVE VEGETATION SHOULD NOT BE CLEARED IF IT COMPRISES A HIGH LEVEL OF BIOLOGICAL DIVERSITY

There has been no Threatened or Priority Ecological Communities recorded within the Dampier Salt application area (Outback Ecology Services, 2011; GIS Database). There has also been no Declared Rare or Priority Flora species recorded within the application area (Outback Ecology Services, 2011; GIS Database). The Priority 3 Flora species *Lepidium biplicatum* and *Stackhousia clementii* have both been recorded nearby but are not expected to occur within the application area due to differences in habitat preference (Outback Ecology Services, 2011).

No Lepidium or Stackhousia species were observed in the proposed Beta Nutrition Pty. Ltd. clearing area during the high-level survey. Only 19 flora species were observed on the area to be cleared indicating low biological diversity.

7.2 NATIVE VEGETATION SHOULD NOT BE CLEARED IF IT COMPRISES THE WHOLE OR A PART OF, OR IS NECESSARY FOR THE MAINTENANCE OF, A SIGNIFICANT HABITAT FOR FAUNA INDIGENOUS TO WESTERN AUSTRALIA.

The Dampier Salt application encompassed 5 habitats of:

- Mudflat
- Samphire Low Shrublands
- Saltbush/Frankenia Low Shrublands on sandy plains
- Frankenia Low Shrublands on calcrete

- Acacia Tall Shrubland on calcrete

The Outback Ecology Proposal concluded that the proposed clearing would not have a significant fauna impact.

The proposed clearing envelope at Beta Nutrition Pty. Ltd. is limited to the first three of these habitat types and is additionally highly disturbed and of small area. It is also heavily impacted by feral animals with abundant rabbit, feral goat, fox and feral cat prints along with abundant rabbit droppings (refer Figure 10) across the proposed area to be cleared.

Figure 10: Piles of rabbit droppings in proposed clearing envelope

7.3 NATIVE VEGETATION SHOULD NOT BE CLEARED IF IT INCLUDES, OR IS NECESSARY FOR THE CONTINUED EXISTENCE OF RARE FLORA.

No rare flora was observed in the survey (refer Table 1). The Outback Ecology Flora Survey undertaken for the Dampier Salt Borrow Pit Application between 3 and 10 September 2010 did not identify any DRF (Outback Ecology Services, 2011).

No rare flora was observed on the proposed area to be cleared at the Beta Nutrition Pty. Ltd. site during the reconnaissance survey on the 9th June 2021 (refer Table 1).

1. Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community.

The Outback Ecology assessment concluded that the proposed Dampier Salt clearing was not at variance to this principle.

This also apples to the Beta Nutrition Pty. Ltd. area which is additionally highly disturbed.

7.4 NATIVE VEGETATION SHOULD NOT BE CLEARED IF IT IS SIGNIFICANT AS A REMNANT OF NATIVE VEGETATION IN AN AREA THAT HAS BEEN EXTENSIVELY CLEARED.

Outback Ecology concluded that the Dampier Salt Proposal was not at variance with this principle. The application area falls within the Carnarvon Biogeographic Regionalisation of Australia (IBRA) bioregion in which approximately 99.8% of the pre-European vegetation remains.

7.5 NATIVE VEGETATION SHOULD NOT BE CLEARED IF IT IS GROWING IN, OR IN ASSOCIATION WITH, AN ENVIRONMENT ASSOCIATED WITH A WATERCOURSE OR WETLAND.

The central part of the borrow pit area proposed for clearing by Beta Nutrition Pty. Ltd. harvests rainwater (refer Figure 9) and was wet on the day of the survey due to the 60 mm of rain that fell on the previous two days but it is not connected to the Lake MacLeod lake bed and is neither on a water-course or a wetland.

7.6 NATIVE VEGETATION SHOULD NOT BE CLEARED IF THE CLEARING OF THE VEGETATION IS LIKELY TO CAUSE APPRECIABLE LAND DEGRADATION.

Outback Ecology concluded that the 45 hectares of clearing proposed for the Dampier Salt borrow-pits was not at variance with this principle which is also the case for the Beta Nutrition Pty. Ltd. proposal. The Beta Nutrition Pty. Ltd. proposal is additionally for a degraded area. With the exception of the infrastructure footprint the currently degraded landscape will be rehabilitated and will arguably be less degraded than it currently is.

7.7 NATIVE VEGETATION SHOULD NOT BE CLEARED IF THE CLEARING OF THE VEGETATION IS LIKELY TO HAVE AN IMPACT ON THE ENVIRONMENTAL VALUES OF ANY ADJACENT OR NEARBY CONSERVATION AREA.

The Dampier Salt borrow pit proposal was considered likely to not be at variance to this principle which would be the same for the Beta Nutrition Pty. Ltd. proposal. The application area does not lie within any conservation areas or DEC managed tenure. Lake MacLeod is an

Environmentally Sensitive Area but the most significant part of the lake is the permanent pools and inland mangroves located over 40 kilometres north of the application area. The proposed clearing at the Beta Nutrition Pty. Ltd. site will not significantly impact on the biodiversity values of Lake MacLeod.

7.8 NATIVE VEGETATION SHOULD NOT BE CLEARED IF THE CLEARING OF THE VEGETATION IS LIKELY TO CAUSE DETERIORATION IN THE QUALITY OF SURFACE OR UNDERGROUND WATER.

The clearing will have no impact on the quality of surface or groundwater. The site is underlain by the saline near-surface Quobba Sands Aquifer which is replenished from a subterranean connection to the Indian Ocean 2 km to the south through the Bejaling Dunes. The existing old borrow pit harvests some rain-water but it is insignificant with respect to the groundwater system.

7.9 NATIVE VEGETATION SHOULD NOT BE CLEARED IF CLEARING THE VEGETATION IS LIKELY TO CAUSE, OR EXACERBATE, THE INCIDENCE OR INTENSITY OF FLOODING.

This proposal is not at variance with this principle. The episodic flood sheets that occur on Lake MacLeod and primarily driven by inflows from the Minilya and Lyndon River Catchments at the northern end of the Lake. These floods sheets rarely reach the Project area located at the southern end of the lake. The clearing of vegetation in the old borrow-pit will have no impact on potential flooding of the blow-holes road. The blow-holes road is in itself a levee across the lake blocking stormwater flow from the south into the Project area.

8 Conclusion

The clearing of up to 1.5 hectares of vegetation in a highly disturbed area flanked by extensive areas of undisturbed natural habitat supporting similar vegetation is considered of low ecological consequence. It is not at variance with any of the 10 clearing principles. It is additionally necessary for the expansion of an existing facility into a significant commercial enterprise that will support employment in the Carnarvon Shire.

9 References

Dampier Salt Clearing Borrow-Pit Clearing Permit Decision 4203/1. 45 hectares. 17/03/2011

Tyler, JP, 1987. Vegetation surveys near Lake MacLeod. Kingia 1(10 49-74 (1987).