

**PACIFIC ENVIRONMENTAL  
AUSTRALIA PTY LTD**

POSTAL ADDRESS: [REDACTED]

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Nowra Office: [REDACTED]

[REDACTED]

[REDACTED]



[REDACTED] 10<sup>th</sup> January 2025

By Email: [REDACTED]

Dear Madam,

**Reference: Treated Effluent Re-Use- 268-278 Catherine Fields Road Catherine Field NSW.**

At your request we have reviewed the Amended Wastewater Management Report Section 6.11 (V5), as compiled by Martens. We have also reviewed the Geotechnical Report (May 2024 V04), prepared by the same company. These reports establish several factors that are relevant to establishing an efficient treated sewage re-use program at the site, being:

1. The available area for treated sewage e-use at Stage 4 is 7,986m<sup>2</sup>;
2. The waste contribution population is 980 students and 52 staff (full time equivalents);
3. The waste application rate reported is 20L/person per day (giving 1,032 x 20 = 20,640 L/day five (5) days per week);
4. The collection well capacity is to be 20,300L;
5. The on-site sewage treatment system (STP) is proposed to have a capacity of 22,000L per day over seven (7) days;
6. The re-use application method will be subsoil application;
7. The site soils are silty clay, with rock (extremely weathered ) varying from 0.6m to 1.3m BGL (ref Bores 113 and 114 respectively);
8. There is potential for intermittent flooding at the western border;
9. The perched water table was not observed at BH 114 at 1.6m BGL.

Our comments that relate to the Re-Use of Treated Effluent at the site are as follows:

## **GROUNDWATER**

The regional groundwater is expected to be at greater than 23m BGL -based upon the nearest groundwater bore (900m west of the site) and hence is not expected to be impacted by effluent reuse at the site. The perched water table can rise to 0.5m BGL during heavy rainfall and the area/region soils are reported as having "poor surface drainage and water logging can occur in low lying portions or where shale is close to the surface, creating "perched" water tables."

References:

- ◆ **Dewatering & Soil** *Dam Dewatering Assessment: 268 & 278 Catherine Fields Road* (Martens & Associates, 2022) Infiltration rates, dam water volume estimates, and contaminants of concern;
- ◆ **Site Remediation** *Remedial Action Plan: 268-278 Catherine Field Road* (Martens & Associates, 2022) Soil profile descriptions, previous site investigations, and validation criteria;
- ◆ **Civil & Drainage** *Revised Preliminary Overland Flow Assessment and FERP* (Urbis/Martens, 2023) Stormwater drainage design, post-development catchment plans, and flood mitigation;
- ◆ **Regional Mapping** *Soil Landscapes of the Penrith 1:100,000 Sheet* (Hazelton & Tille, 1990) Identifies the site as likely within the Blacktown soil landscape (residual soils with poor drainage).

AS/NZS 1547:2012 at Table R1 (in conjunction with Note 12) states that the distance from the base of the application system to the groundwater be or greater 0.6m. Allowing for an application depth of 0.3m, 0.9m is required to the perched water table. The distance appears to be available, except in wet weather. Further investigation of the depth of perched water table during wet and dry weather seems prudent.

## **WET WEATHER STORAGE**

During periods of rainfall and allowing for the following soil drying time of 24 hours, there would be a required a storage capacity of four (4) times the application rate. This is to allow for a combination of wet weather and mechanical or electrical failure at the site. The minimum storage should be two (2) times the daily production flow, if commercial tanker pump out is available in wet weather for up to five (5) days – after which the school may need to be closed, due to flooding or lack of commercial tanker availability. Note - typically, tankers are in short supply in wet weather. The Department of Environment and Conservation Use of Effluent by Irrigation December 2004 Section 4.2 Effluent Storage recommends that no overflows be acceptable in sensitive receiving area and monitoring of receiving areas be monitored.

## **FLOW RATES**

The calculated and reported, by Martens, flow rate is based upon calculations that are typical of education facilities – at 20L/day/person over five days per week. However, the applicant has mentioned weekend use of the site as well as a community hall. Our experience with Islamic customs indicates that eating and latrine cleanliness procedures increase the wastewater production to be well above that quoted 20L/person/day. In addition, the site apparently has a proposed kitchen and site showers.

## **STP**

The STP capacity, as proposed, would be suitable if the flow rate was 20,640L/day five (5) days per week. However, in light of the flow rates discussed above this would need revisiting to allow for higher flow rates. The STP will need to be either staged built or have sufficient operation management to allow for the proposed staged development.

## **EFFLUENT RE-USE LAND AVAILABLE**

The Sub soil application land proposed for Stage 4 of the development is stated at 7,986m<sup>2</sup>. Thus, the application rate, for 20,650L day or 14,743 L/day seven (7) days per week

(103,200L/week) is 1.846mm/day. This is a relatively low application rate and is recommended in light of AS/NZS 1547:2012 Table M; this Table does not recommend the use of shallow subsurface irrigation of effluent into topsoil through low pressure effluent distribution lines, all for medium to heavy clays. This suggests that high pressure systems would be equally not recommended due to the possibility of surface break out. If the flow rate were to increase (as discussed above) the land available will need to significantly increase and possibly even then not be suitable. The AS/NZS 1547:2012 Table 5.1 (at Note 3) indicates that the medium to heavy clays have poor soil drainage. Thus, the applied treated effluent would heavily rely on water uptake of a non-native grass cover. The daily uptakes would be:

Season	Grass (e.g., Kikuyu, Couch/Bermuda, Buffalo)	Required Re-Use Area m <sup>2</sup> *	Area provided at Stage 4 – m <sup>2</sup>
Summer (Peak)	3.0 – 5.0 L/m <sup>2</sup> /day	4914.3 - 2,948.60	7,986
Winter (Low)	0.5 – 1.0 L/m <sup>2</sup> /day	29,486- 14,743	7,986

\*Note: the re-use areas are based upon the Martens established flow rate and would need to be increased. The references used to establish the above are:

- ◆ **Lilydale Instant Lawn / Lawn Solutions Australia –**  
Industry benchmark for Australian conditions: recommends 25–30mm per week (avg 4.2 L/m<sup>2</sup>/day) in summer, dropping to "minimal to none" in winter (under 1.0 L/m<sup>2</sup>/day);
- ◆ **Hort Innovation / Western Sydney University -**  
Confirms that established Buffalo and Couch require approximately 25mm per week (3.5 L/m<sup>2</sup>/day) to maintain health, however they need daily monitoring during summer "scorching" periods where rates double;
- ◆ **Wherley et al. (2015) / ASABE -**  
Verified that warm-season grasses fluctuate from 0.5 mm/day in winter months to 5.0 mm/day during the summer growing season in lysimeter studies.

From the above it can be seen that the grass uptake would achieve 29% to 77% of the applied water, leaving the rest to soil transport. These figures assume that the Martens flow rates are adopted. And do not consider the additional sources of flow rate.

## NUTRIENT BALANCE

We have been unable to find a nutrient balance, in the supplied documents, associated with the effluent re-use soils. A nutrient balance may be the limiting factor in sizing the effluent re-use field.

## CONCLUSION

Based upon the review of the Martens Reports and the Australian relevant available

documents that assist in any review we have come to the following conclusions:

1. The treated sewage design flow rate is well less than that anticipated to be associated with an Islamic school;
2. The design parameters have been assessed without reference to the weekend and other ancillary use of the site;
3. The depth to the perched water table needs to be further investigated in the re-use area;
4. The STP needs to be designed with the updated flow rates incorporated;
5. A nutrient balance needs to be established for the re-use area;
6. The site soils are a limiting factor when sizing the re-use area and a very low application rate is recommended when assessing its size with a water balance as described by: The Department of Environment and Conservation Use of Effluent by Irrigation December 2004;
7. The application rate of treated wastewater needs to be reconsidered, due to the low take up rate of grasses in winter;
8. The wet weather storage needs to be increased to allow for increased flow and potential for mechanical breakdowns, as well as drying periods.

If you have any questions, please do not hesitate to contact Steve Smith on [REDACTED], Yours faithfully,

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Steve Smith



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