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Craig Perrin
Town Planner
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By email: craig.perrin@cgrc.nsw.gov.au

19 June 2024

Dear Craig,

Review of Wastewater Management Report and supporting documents for a proposed development at the Dog on the Tuckerbox site, 37 Annie Pyers Drive, Gundagai NSW 2722

This review has been undertaken by Joe Whitehead, Principal, Whitehead & Associates Environmental Consultants Pty Ltd.

I have reviewed the following documents:

- Land Capability Assessment - 37 Annie Pyers Drive, Gundagai NSW 2722, prepared by McMahon Earth Science, dated 11 March 2024;
- Statement addressing Concerns prepared by Suncoast Waste Water Management, dated 25 March 2024;
- Stormwater Management Strategy, prepared by Spiire, dated August 2023;
- DOTT Response to Council RFI Traffic, prepared by JMT Consulting, dated 11 April 2024;
- Tree Survey based on Arborists Report by Mark D. McCrone, prepared by SN Architects; and
- Architectural Plans, prepared by SN Architects.

This letter report presents the findings of the review. The following detailed comments are offered. Key points and recommendations are highlighted in grey.

Land Capability Assessment - 37 Annie Pyers Drive, Gundagai NSW 2722, prepared by McMahon Earth Science, dated 11 March 2024

The report presents a land capability assessment (LCA) for the proposed redevelopment.

Attachments include:

- Location maps and site plans;
- Borehole excavation locations;
- Borehole logs;
- Soil test results;
- Average daily water use tables; and
- Water balance

The major findings of the LCA are:

- A pumpout system is recommended, with a minimum of 44,674 litres capacity.
- An Aerated Wastewater Treatment System (AWTS) could be considered, with land application by drip or low pressure spray irrigation.
- An irrigation area of 3,047m^2 is required. 3,223m^2 is available.
- There are no major setbacks and limitations to note regarding siting a land application system, by reference to AS1547:2012.
- The chemical analysis and physical testing conducted characterises the site as having nil or slight limitations compared to the DEC (2004) guidelines, except for moderate limitations for cation exchange capacity in the topsoil that is inherent to the soil chemistry and texture: and pH, which may be ameliorated with the application of lime.
- The volume of wastewater from the proposed development is estimated to be 6,382 litres per day, based on the total floor area per development type and associated average water demand per unit area.

AS/NZS1547:2012 *On-site domestic wastewater management* and DEC (2004) *Use of Effluent by Irrigation* form the basis of the design approach.

Whilst primarily intended for onsite wastewater design for single households, consideration should also be given to DLG (1998) Environment & Health Protection Guidelines – On-site Sewage Management for Single Households.

Daily hydraulic load

The site is currently supplied by bore water and rainwater, however we understand that it is likely the site will be connected to reticulated water in the near future.

It is prudent that this design assume that reticulated water will be available during the life of the proposed onsite wastewater management system.

For the purposes of estimating the daily hydraulic load, architectural plans showing the proposed development as comprising two future food and drink premises, three future retail premises and one future pub premises have been used.

Daily hydraulic loads have been calculated based on floor area and an average demand (L/m^2/day) from tables developed by Sydney Water. The daily hydraulic load is determined to be (for all stages of the proposed development) 6,382 litres per day.

Whilst these figures take into consideration the floor areas of the individual premises, they do not consider possible additional outdoor seating, especially for the pub (beer garden etc.), nor do they take into consideration traffic flows and consequent visitor numbers, which for a location such as that proposed, is particularly significant.

Peak loadings, particularly for busy days such as weekends, public holidays and school holidays should be considered along with the need for incorporation of flow balancing if onsite treatment is proposed. Shock loads of the sort generated by arrival of multiple coachloads of patrons in quick succession can readily overload an AWTS. Typically, such uneven load generation is managed by incorporating balance tanks into the design, to ensure loads are spread and are within the operational capacity of the treatment and land application systems.

Conservative wastewater load calculations should consider traffic flows, likely number of vehicles stopping under a scenario where the facility provides the primary reason for vehicles to stop at the

location, i.e. to use toilets and for refreshments, that all vehicles stopping will use the facilities, and that the vehicle occupancy will be a minimum of one person and typically two or more persons.

The accompanying traffic report indicates that at full development 129 hourly traffic movements can be expected.

AS/NZS1547:2012 presents wastewater generation figures of 15L/person/visit for tearooms/lunch bars with restroom facilities for facilities with rainwater supply, and 25L/person/visit for tearooms/lunch bars with restroom facilities for facilities with reticulated water supply.

At these rates the estimated figures of approximately 750L/day for food and drink premises would represent 50 persons per day at 15L/person or 30 persons/day at 25L/person. Such figures are very low for expected visitation for economic operation of typical food and drink premises.

With visitation by 129 vehicles per hour, and assuming just single person vehicle occupancy, wastewater generation at 15L/person would be 1,935L/hour and at 25L/person would be 3,225L/hour. For eight or more hours per day of operation, the resultant daily figures significantly exceed the proposed daily hydraulic load presented as estimates in the LCA.

Appropriate additional information on the above should be requested to enable comparison with the figures presented in the LCA and for appropriate daily hydraulic load estimates to be determined.

As the nature of the development and the occupancy of the various premises is at present uncertain and the nature of development such that daily hydraulic loads are likely to be variable, it is recommended that installation of a flow meter, with regular quarterly reporting of wastewater flow data to council, is made a condition of any approval. That way, actual figures can be established to assist with ongoing system management.

Treatment system

Two treatment options are proposed:

- Pumpout, and
- AWTS

with a preference expressed for pumpout.

No reference has been made to the installation of grease arrestors. It is recommended that grease arrestors with a minimum capacity 1,500L should be installed at each of the commercial food premises.

Pumpout

The proposed pumpout system capacity has been estimated at 44,674 litres, which is equivalent to seven days of estimated daily hydraulic load as outlined in the LCA.

Concern over the adequacy of this daily hydraulic load estimate to represent likely wastewater generation has been expressed above.

Once a satisfactory revised daily hydraulic load is established, that volume should be used to determine the required pumpout system capacity.

For a pumpout system, both a septic tank and collection well are required.

No consideration has been given to the sizing of the septic tank. This will be determined by the daily hydraulic load.

Consideration should be given to the capacity of the pump truck servicing the pumpout system, as this will have a bearing on the size of collection well required and the frequency of pumpout.

The proposed design should incorporate adequate reserve capacity to cater for breakdown or service interruption. This should be for a minimum of 48 hours of hydraulic load.

Adequate access to the collection well and dedicated parking space for the pump truck will be required.

Council should seek assurance that an appropriate pumpout service provider can be engaged and a reliable service contract entered into.

Council should require that records of pumpouts are provided to Council to ensure that this aspect of system operation can be appropriately monitored.

Whilst a properly managed pumpout system can satisfactorily manage wastewater generated at such a facility in a compliant manner, the cost of a pumpouts is likely to be a significant financial burden on the site operators.

Council should satisfy itself that the operators are aware of the likely costs and that the financial impost is not likely to result in operational difficulties and consequently regulatory headaches for council.

AWTS

Whilst a commercial AWTS provides one option for wastewater management, such systems are very dependent on relatively uniform flows to operate well and require careful design to enable them to manage variable flows of the sort expected at this site.

Given that a number of the proposed premises will be food and drink premises, the design and selection of a suitable treatment system should consider the higher organic loads associated with wastewater derived from such premises. No consideration of the Biochemical Oxygen Demand (BOD) of food premises derived wastewater has been made in the LCA.

Confirmation of the capacity of the selected treatment system to cope with higher strength wastewater should be sought.

Given the expected variability of flows, it is highly likely that an AWTS system will require flow balancing to enable the variable flows which are likely to be generated to be transferred to the treatment plant at a uniform rate. Similarly, flow balancing may be required following the treatment system to ensure that the peak flows do not result in poorly treated effluent being loaded onto the land application area at too high a rate.

Much more detailed consideration of load generation, daily hydraulic loads, their variability and preferably comparison with equivalent data from one or more similar operations is required to form the basis for design and approval of a suitable system for this site.

It is unlikely that an AWTS solution can be provided which allows readily for incremental growth of the facility and consequently the wastewater load, other than by system duplication. Equally, it should be recognised that any one AWTS will have a limited and defined operating window (upper and lower daily hydraulic load limits). Thus, it is important to carefully select a system which is sized to manage both the initial load generated by the first stage of development and is suitable for managing a

growing load as the facility develops further. AWTS can experience problems with both underloading and overloading.

Insufficient consideration has been given to these aspects of operation in the LCA.

Land application system

An effluent disposal area has been determined for the estimated daily hydraulic load of 6,382L/day. The suitability of this estimate has been questioned above. More detailed and accurate estimation of daily hydraulic load, taking into consideration vehicle visitation to the site, is likely to demonstrate that a larger daily hydraulic load should be assumed for design purposes.

In an area with open access, in close proximity to a visitor facility such as that proposed, surface irrigation is not considered appropriate. Subsurface irrigation is recommended.

Data on a number of site and soil characteristics is provided in Attachment E, but the slope of the proposed effluent disposal area is not defined. Slopes are described in the introduction to the LCA as being “very gently inclined”. Confirmation of available topographic maps and visual inspection of Google street view suggest gradients are relatively low. If the slopes are less than 10%, no reduction in Design Irrigation Rate (DIR), as recommended in Table M2 of AS/NZS1547:2012, is considered necessary.

No nutrient balances are presented as part of the LCA. Typically, nutrient balances for nitrogen and phosphorus would be provided.

Such nutrient balances should be sought along with confirmation that the required areas for nutrient assimilation are available, either within the defined hydraulic area or as downslope sacrificial nutrient buffers.

Anecdotal evidence of contamination of water in nearby bores as a consequence of land application of effluent on the site is raised in the LCA. It is likely that this has been due to a combination of; limited treatment, most probably absence of disinfection, and hydraulic overloading of soils. Thus, it is important to ensure that any proposal incorporates a suitably high level of treatment (minimum advanced secondary treatment), disinfection and irrigation at an appropriate DIR which considers the hydraulic capacity of the soil and provides sufficient area for nutrient assimilation.

Although not considered in the LCA, the NSW Guidelines (DLG 1998), recommend 250 metre buffers to domestic groundwater bores. AS/NZS1547:2012 recommends a risk assessed buffer of between 15 and 50 metres to bores and wells. In this case, four bores are described on neighbouring properties. The exact distances from the proposed effluent disposal area are not defined, nor their locations shown on the plans.

More detailed information on the location of these bores, along with a risk assessment as outlined in Appendix R of AS/NZS1547:2012, should be requested to demonstrate that the buffer distances to these bores are compliant.

The aerial photographs indicate that the proposed effluent disposal area contains some established trees which would result in partial shading of the effluent disposal area.

To allow for effective evapotranspiration from the proposed effluent disposal area these trees would have to be removed.

Water and nutrient balance

For the estimated daily hydraulic load of 6,382 L/day, an effluent disposal area of 3,047m^2 has been determined by means of a water balance.

The water balance uses appropriate climate data and suitably conservative crop factors and rainfall runoff factor. We have checked the water balance calculations and they are satisfactory.

The water balance uses a DIR of 3.5mm/day. This is a DIR recommended in AS/NZS1547:2021 for Category 4 soil (clay loam).

Soils investigations undertaken at the site show four boreholes have been sampled. Only one borehole, Borehole 1 is on the proposed effluent disposal area. A second borehole, Borehole 2 is adjacent to the proposed effluent disposal area. The other two boreholes, Boreholes 3 and 4, are a significant distance away from the proposed effluent disposal area.

Whilst all four boreholes show clay loam topsoils, these are underlain by clay subsoils, in the case of Boreholes 1 and 2 by medium clay at depths of 0.5 – 0.6 metres. The medium clay represents the design limiting layer, within 0.6 metres of the point of application. The point of application is at the surface for spray irrigation or at 0.10-0.15 metres for subsurface irrigation, thus, the DIR should be based on this Category 6 medium clay subsoil. Were the DIR to be amended to 2.0mm/day for Category 6 medium clay soils, as indicated by Table M1 of AS/NZS1547:2012, the equivalent water balance spreadsheet would indicate that an effluent disposal area of 10,718m^2 would be required. This is approximately three times the proposed area. With an allowance for required buffers to property boundaries, water bodies and buildings, it is unlikely that sufficient irrigation area is available within the proposed site layout.

Corresponding effluent disposal areas based on the estimated daily hydraulic loads presented in the LCA and a DIR of 2.0mm/day (for medium clay) are as follows:

- Stage 1: 2,566m^2
- Stage 2: 3,724m^2

Statement addressing Concerns prepared by Suncoast Waste Water Management, dated 25 March 2024

I do not have details of the Council EHO's concerns to which this statement responds.

This statement refers to documents which do not apply to NSW; On-site Wastewater Systems Code, April 2013, which is a South Australia Health document, and The Wastewater Regulations and the Department of Health and Ageing (DHA) wastewater code, which also refer to South Australia.

It appears that this statement has not been prepared specifically to apply to this application and this site, but has used a generic introduction which is not relevant in this case.

The statement refers to a proposed AWTS: 32kL septic tank + RP 100A SBR.

Presumably this system selection has been the manufacturer's response to a request for a system suited to the demands of the proposed development.

It has been noted above that the daily hydraulic load should be reviewed, more clearly defined and the system sizing better supported. As a consequence, this system sizing would need to be reviewed in line with the revised daily hydraulic load. A 32kL septic tank would be appropriately sized for the estimated daily hydraulic load of 6,382 litres.

The proposed system notes that it is an SBR (Sequencing Batch Reactor). An SBR is designed to treat wastewater in batches and, as such, is better suited to the variable loads of the site.

The details also describe a 22.5kL balance tank. Whilst a balance tank is required. The size should be confirmed once the daily hydraulic load is revised.

The details of the design should also incorporate suitable balance tank sizing to demonstrate that the overall system has capacity to manage peak flows at busy times such as public holidays and school holidays etc.

No peak influent flow was provided in the LCA, yet the statement confirms the adequacy of the system sizing based on the estimated daily hydraulic load. Again, this should be reviewed in the light of a revised daily hydraulic load.

No data has been provided on likely effluent quality for the proposed treatment system, however, it is likely that effluent treated to advanced secondary standard will have minimal adverse impact on flora and fauna in and close to the proposed effluent disposal area.

However, as expressed above, the proposed DIR significantly exceeds that recommended for the limiting layer in the soil profile (medium clay).

Stormwater Management Strategy, prepared by Spiire, dated August 2023

The Stormwater Management Strategy does not appear to have separately considered the proposed effluent disposal area.

From a stormwater/wastewater interaction perspective, it is important that upslope run-on water be diverted around the proposed effluent disposal area and that any potential runoff from the proposed effluent disposal area be captured so as not to contribute to stormwater flows or contamination of stormwater.

It should be confirmed that nutrients are adequately assimilated in the proposed effluent disposal area, or that a suitable downslope nutrient assimilation buffer is provided.

DOTT Response to Council RFI Traffic, prepared by JMT Consulting, dated 11 April 2024

The details of the traffic modelling have been noted in this review. Because the wastewater management system is most likely to be developed as a single system to cater for all stages of development, the peak traffic volumes should be considered in confirming the number of vehicles visiting the site and the consequent daily hydraulic loads for the wastewater system.

Tree Survey based on Arborists Report by Mark D. McCrone, prepared by SN Architects

Five established trees are identified in the proposed effluent disposal area. A further eight trees contribute to shading of the proposed effluent disposal area with their canopies overhanging the proposed effluent disposal area. Other more distant trees may be contributory to partial shading of the proposed effluent disposal area depending on the season and time of day.

It is possible for subsurface irrigation lines to be laid so as to avoid the root zone of trees. Good practice is to not lay subsurface irrigation lines under the canopies of established trees. Where such

areas are avoided, an equivalent area should be added to compensate for any loss of effluent disposal area.

Architectural Plans, prepared by SN Architects

The Architectural plans have been noted in undertaking this review.

Conclusions

I have expressed concern over some aspects of the accuracy of the LCA report.

- I recommend that Council seek revision of the estimated daily hydraulic load;
- I recommend that the DIR for calculation of the required effluent disposal area be amended to 2.0mm/day to reflect the design limiting layer of the Category 6 medium clay subsoil.

The capacity of the site is insufficient to accommodate an on-site wastewater management system to service the whole development; stages 1, 2 and 3, assuming an increased daily hydraulic load is determined in line with vehicle visitation. It is similarly likely that, with appropriately determined daily hydraulic load, the site has insufficient capacity to accommodate an on-site wastewater management system for stages 1 and 2 of the proposed development. Whilst again daily hydraulic load should be reviewed and will most probably result in a requirement for a larger effluent disposal area than proposed, it is possible that the site has sufficient capacity an on-site wastewater management system to service stage 1 of the proposed development. Recommended effluent disposal areas based on the estimated daily hydraulic loads presented in the LCA and a DIR of 2.0mm/day are 2,566m^2 for stage 1 only and 3,724m^2 for stages 1 and 2.

The system as proposed has presented insufficient evidence that it could cope with peak loads generated at busy times and by the arrival of a number of buses in quick succession. A system which can cater for such peak loads requires flow balancing with appropriately sized balance tanks before and possibly following the treatment system. An SBR system would be a suitable option to manage such variable loads.

The AWTS system proposed only has capacity to manage growth over time up to the design limit of the system. Similarly, an effluent disposal area of defined size does not have capacity for growth above that design load without increasing the effluent disposal area size. For such expansion of the effluent disposal area additional available space meeting buffer requirements must be available.

Should proposed changes to the intersection on the Hume Highway result in increased visitor numbers arriving at this site in advance of other options in the locality, it is likely that an increase in effluent load will result. This review has considered the peak of 129 vehicles per hour and flagged that such vehicle numbers will most likely result in far greater effluent volumes than outlined in the LCA.

Some tree loss is most likely required to allow effective operation of the proposed effluent disposal area.

The uncertainty associated with undertaking of proposed shell building development in the context of the on-site wastewater management system is that occupancy is unknown at the planning stage and consequently effluent volumes and strength cannot be accurately determined. As a result, it is prudent to design based on projected vehicle and person visitations and/or on confirmed (measured) actual flows from similar developments where traffic volumes are known. It is equally important to

limit occupancy and operation to activities which are expected to generate wastewater volumes which are within the capacity of the installed treatment system and available land application area.

If you have any questions or require any further information or explanation, please do not hesitate to contact me.

Yours sincerely,

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Principal

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References

DEC, 2004. *Use of Effluent by Irrigation*

DLG, 1998. *Environment & Health Protection Guidelines – On-site Sewage Management for Single Households*

Standards Australia, 2012. AS/NZS1547:2012 *On-site domestic wastewater management*