Whitehead & Associates
Environmental Consultants

Craig Perrin
Town Planner
Cootamundra-Gundagai Regional Council

By email: craig.perrin@cgrc.nsw.gov.au

30 July 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 (Stages 1 and 2 only)

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

And the following documents received subsequent to the initial review:

- Letter outlining request for approval of Stages 1 and 2 only, from DOTT Developments Pty Ltd, dated 2 July 2024;
- Revised Architectural Plans, July 2024, prepared by SN Architects;
- Response to Address Concerns in the Whitehead Consulting Review – 37 Annie Pyers Drive, Gundagai NSW 2722, prepared by OzziKleen, dated 26 July 2024;
- Response to Whitehead review - 37 Annie Pyers Drive, Gundagai NSW 2722, prepared by McMahon Earth Science, dated 25 July 2024; and
- Letter to Mr Michael Mason from Sharon Langman, on behalf of The DOTT Developments Pty Ltd, dated 29 July 2024.

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

Revised proposal

My original review was of documents supporting an application for three stages of development; Stages,1, 2 and 3.

The current application, and review, is amended to include Stages 1 and 2 only. This review now includes further documents provided in support of the revised application.

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 (Stages 1-3).

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* and *Average daily water use by property development type (Sydney Water)* 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, revised architectural plans showing the proposed development as comprising buildings B01, B02 and B03 (Stages 1 and 2 only) have been considered. These comprise two future food and drink premises (B01 and B03) and one future retail premises (B02).

Daily hydraulic loads calculated based on floor area and an average demand (L/m^2/day) from tables developed by Sydney Water determine the daily hydraulic load for the above three buildings (Stages 1 and 2 only) to be 2,217 litres per day.

Whilst these figures take into consideration the floor areas of the individual premises, they do not 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 for Stages 1 and 2 of the development 28 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.

It is noted that these figures reference commercial premises in New Zealand as AS/NZS1547:2012 is a joint Australian New Zealand Standard. These figures are considered appropriate for application in Australia too.

Criticism of the use of this figure by the McMahon review is inconsistent. Whilst suggesting that these figures are not appropriate as they are derived from New Zealand, the review goes on to use information drawn from the same New Zealand data footnote to justify use of lower values based on a Sydney Water methodology. Both AS/NZS1547:2012 and Sydney Water provide estimates. Suffice it to say that there needs to be demonstration that the figures used are robust and appropriate for this design. For these figures to be robust, I consider it important that visitor numbers for the facility be considered, more so than floor area.

At the proposed 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 and for economic operation of typical food and drink premises.

With visitation by 28 vehicles per hour (revised for Stages 1 and 2), and assuming just single person vehicle occupancy, wastewater generation at 15L/person would be 420L/hour and at 25L/person would be 700L/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.

An appropriate minimum figure for wastewater generation for an eight-hour day is 3,360L.

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 daily 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

In the LCA, two treatment options were proposed:

- Pumpout, and
- AWTS

with a preference expressed for pumpout.

Subsequent discussion with the applicant (Brendan Price, 24 July 2024) has indicated that the AWTS option is the preferred option and that approval for a pumpout system is not being sought.

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.

AWTS

A commercial AWTS provides a suitable option for wastewater treatment. 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.

The inclusion of balance and irrigation holding tanks will help regulate flows and is supported.

Given that the proposed development will include 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.

It is noted that, whilst not considered in the LCA, the higher Biochemical Oxygen Demand (BOD) of wastewater derived from food premises has been appropriately considered by the wastewater treatment plant suppliers.

A suitably designed and operated, serviced and maintained AWTS can typically manage odours satisfactorily.

Land application system

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.

It is, however considered unlikely that nutrients will be a limiting factor in the design of the effluent disposal area and that the area calculated by the water balance will form a satisfactory basis for the system design.

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.

Subsequent discussion with the applicant has confirmed that the trees are to be retained.

To avoid any adverse impact on trees, irrigation lines should not be installed within the dripline (under the canopy) of trees. Any such areas not used for irrigation should be compensated for in the determination of the overall irrigation area required.

Water and nutrient balance

A proposed effluent disposal area of 3,223m^2 is shown on the plans. This is considered insufficient for the daily hydraulic load of 3,360L identified above.

An appropriate and compliant area has been determined by use of a water balance.

Our water and nutrient balance (appended) identifies a requirement for an effluent disposal area of 5,643m^2.

Our water balance uses the same climate data, crop factors and rainfall runoff factor used in the LCA, but revises the daily hydraulic load (design wastewater flow) to the 3,360L/day considered an appropriate minimum for design.

The original LCA 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 in 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. Our revised water balance uses a DIR of 2.0mm/day for Category 6 medium clay soils, as indicated by Table M1 of AS/NZS1547:2012.

Improvements in soil permeability by amelioration suggested in the McMahon review do not present a sound and reliable basis for assured long term improvement of permeability, hence a more conservative DIR, appropriate for the medium clay soils identified in the proposed effluent disposal area should be adopted.

Our water and nutrient balance (attached), using a DIR of 2.0mm.day, identifies a requirement for an effluent disposal area of 5,643m^2.

The revised site plan indicates that sufficient area is available for this revised effluent disposal area.

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.

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

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.

Justification for the use of these documents has been provided in the OzziKleen response.

The statement refers to a proposed AWTS: 32kL septic tank + 2 x RP 100A SBR.

This proposed treatment system notes that it is an SBR (Sequencing Batch Reactor) which is considered appropriate to manage the variable loads of the site.

The inclusion of a 22.5kL balance tank is supported, as is a similar irrigation holding tank to enable balanced hydraulic loads to be dispensed to the effluent management area.

No data has been provided on expected effluent quality from 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.

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.

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. The wastewater management system is sized to manage the daily hydraulic load for Stages 1 and 2 of the development, based on 28 vehicles per hour.

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

A number of established trees are identified in the proposed effluent disposal area. Subsurface irrigation lines should 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 revised Architectural plans have been noted in undertaking this review.

Conclusions

The wastewater treatment and effluent disposal systems should be designed to manage a minimum daily hydraulic load of 3,360L/day which has been calculated on the basis of the number of vehicles visiting the site as outlined in the traffic study for Stages 1 and 2 of the development (only).

A sequencing batch reactor (SBR), aerated wastewater treatment system (AWTS) as proposed is an appropriate treatment system for a development of this type and should be able to manage odours adequately.

The treatment system should incorporate a balance tank and effluent holding tank as proposed.

A compliant effluent disposal area, sized by water balance using a DIR of 2.0mm/day to reflect the design limiting layer of the Category 6 medium clay subsoil, is 5,643m^2.

The capacity of the site is sufficient to accommodate the required effluent disposal area to the rear of the proposed buildings.

Irrigation should be subsurface to avoid the potential for human and animal contact with treated effluent at this public facing facility.

The irrigation area should incorporate appropriate signage to indicate that treated effluent is being irrigated.

Any further expansion of the site beyond the proposed Stages 1 and 2 would require expansion of the wastewater treatment system and effluent disposal areas and would require further approval.

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 28 vehicles per hour outlined in the traffic study for Stages 1 and 2 only.

Should a deferred commencement condition be required, suitable wording would be:

Wastewater: In the light of the changed design and scale of the development, now comprising Stages 1 and 2 only, a revised wastewater report and land capability assessment should be prepared to reflect the revised design. The revised report should incorporate the recommendations of this review.

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

Yours sincerely,

Joe Whitehead
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*

Water Balance

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Irrigation area sizing using Nominated Area Water Balance & Storage Calculations

Site Address:	**37 Annie Pyers Drive Gundagai NSW 2722**		
Date:		**Assessor:**	

INPUT DATA

Design Wastewater Flow	Q	3,360	L/day	Based on assumptions and expected wastewater generation as outlined in report 8903
Design Irrigation Rate	DIR	2.0	mm/day	Based on soil texture class/permeability and derived from Table 5.2 of AS1547:2012
Nominated Land Application Area	L	5,643	m^2	[1]
Crop Factor	C	0.8-1.0	unitless	Estimates evapotranspiration as a fraction of pan evaporation; varies with season and crop type[2]
Rainfall Runoff Factor	RF	1	untiless	Proportion of rainfall that remains onsite and infiltrates, allowing for any runoff
Mean Monthly Rainfall Data		Gundagai		BoM Station and number
Mean Monthly Pan Evaporation Data		Gundagai		BoM Station and number

Parameter	Symbol	Formula	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Days in month	D		days	31	28	31	30	31	30	31	31	30	31	30	31	**365**
Rainfall	R		mm/month	54.8	43.7	48.8	51.2	57.4	63.8	71.3	69.3	62.3	69.2	58.4	49.3	**699.5**
Evaporation	E		mm/month	234.4	185.9	152.2	87.2	48.8	31.7	34.7	51.5	78.9	124.9	167.3	216.8	**1414.3**
Crop Factor	C		unitless	1.00	1.00	0.90	0.90	0.80	0.80	0.80	0.80	0.80	0.90	0.90	1.00	
OUTPUTS																
Evapotranspiration	ET	ExC	mm/month	234	186	137	78	39	25	28	41	63	112	151	217	**1312.02**
Percolation	B	DIRxD	mm/month	62.0	56	62.0	60.0	62.0	60.0	62.0	62.0	60.0	62.0	60.0	62.0	**730.0**
Outputs		ET+B	mm/month	296.4	241.9	199.0	138.5	101.0	85.4	89.8	103.2	123.1	174.4	210.6	278.8	**2042.0**
INPUTS																
Retained Rainfall	RR	RxRF	mm/month	54.8	43.7	48.8	51.2	57.4	63.8	71.3	69.3	62.3	69.2	58.4	49.3	**699.5**
Applied Effluent	W	(QxD)/L	mm/month	18.5	16.7	18.5	17.9	18.5	17.9	18.5	18.5	17.9	18.5	17.9	18.5	**217.3**
Inputs		RR+W	mm/month	73.3	60.4	67.3	69.1	75.9	81.7	89.8	87.8	80.2	87.7	76.3	67.8	**916.8**
STORAGE CALCULATION																
Storage remaining from previous month			mm/month	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Storage for the month	S	(RR+W)-(ET+B)	mm/month	-223.1	-181.5	-131.7	-69.4	-25.2	-3.7	0.0	-15.4	-43.0	-86.8	-134.3	-211.0	
Cumulative Storage	M		mm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Maximum Storage for Nominated Area	N		mm	0.00												
	V	NxL	L	0												
LAND AREA REQUIRED FOR ZERO STORAGE			m^2	431	475	694	1155	2387	4675	5642	3073	1657	990	662	454	

MINIMUM AREA REQUIRED FOR ZERO STORAGE: 5,643.0 m^2

CELLS

	Please enter data in blue cells
XX	Red cells are automatically populated by the spreadsheet
XX	Data in yellow cells is calculated by the spreadsheet, DO NOT ALTER THESE CELLS

NOTES

[1] This value should be the largest of the following: land application area required based on the most limiting nutrient balance or minimum area required for zero storage

[2] Values selected are suitable for pasture grass in Victoria

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