City of Greater Geelong, Statutory Planning - Date Received 28/09/2026

VENANT SOLUTIONS

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Our Ref: L.M00635.002.00_WaterBalance.docx

9 September 2026

Loetis
Unit 4, 2-6 Rutland Street
Newtown VIC 3220

Attention: [redacted]

Dear Steve

**RE: 10-20 BATH STREET, LARA – WATER BALANCE MODELLING ADDENDUM REPORT**

## Background

Venant Solutions was engaged by L.Bisinella Developments to provide inputs to a response to an RFI from City of Greater Geelong's Environment Unit. Specifically the RFI requests information on increases in stormwater volume to the downstream environment and a response to the EPA Publication *Urban stormwater management guidelines (Environment Protection Authority - Publication 1739.1, 2021)* which sets targets for stormwater volume reduction.

In consideration of the performance objective on flow volume reduction in the EPA guideline, mitigation measures were assessed for effectiveness and in consideration of the EPA guideline acknowledgement that "*level of flow volume performance to achieve will depend on what is reasonably practicable".* Using Table 1 in the EPA guidelines the Site would be classified as an Other Area and with a mean annual rainfall of 457 mm (Avalon Airport) the performance objective is a 32% reduction in the mean annual impervious runoff. The following measures were assessed using a water balance model to initially establish their effectiveness and then were considered against the *reasonably practicable* test:

- No treatment (not a mitigation but run to quantify increase in the Mean Annual Runoff (MAR)
- Evaporation from proposed wetland
- Street-scape tree pits
- Evaporation pond
- Mandated rainwater tanks with re-use for irrigation
- Mandated rainwater tanks with re-use for landscaping and toilet reuse

## MUSIC Model Setup

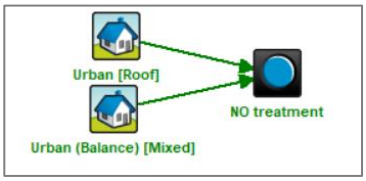
The original MUSIC model from the LOETIS modelling was reviewed and adapted to assess water balance options. The model uses 10 years of 6 minute rainfall data from Little River from 1992-2001. An update was made to the Source nodes to set Field Capacity at 50 (instead of 80) as per the current guidelines. Also, a secondary link high flow bypass from the GPT node was added. The MUSIC model schematics for each of the scenarios is shown in Figure 1.

The following section describes modelling assumptions made for each option assessed.

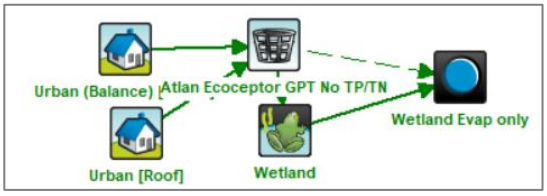
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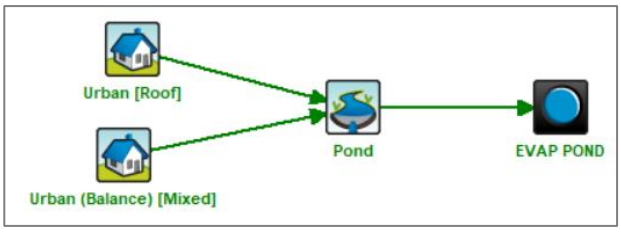

**No Treatment**



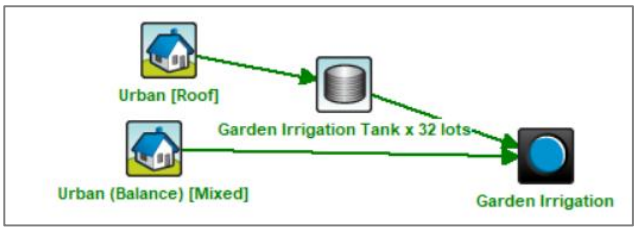

**Wetland Evaporation Only**



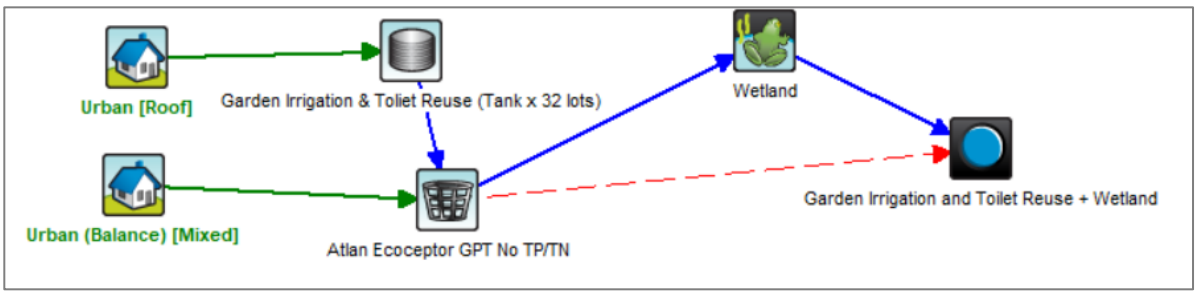

**Tree Pits Only**




**Evaporation Pond Only**




**Mandated Rainwater Tanks with Re-use for Irrigation**




**Mandated Rainwater Tanks with Re-use for Irrigation and Toilet Reuse**

**Figure 1 - MUSIC Model Schematics**

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# Mitigation Measures

## Wetland Evaporation

The wetland is sized at 297 $m^2$, as per the original model. The wetland node has an extended detention depth of 150 mm (as per original model), 125% evaporative loss as a % of PET (Potential Evapotranspiration) and 0 mm/hr exfiltration.

## Rainwater Tanks

A 2KL rainwater tank is assumed for each of the 32 lots. 2 re-use demands are placed on each tank: garden irrigation and toilet re-use.

For the garden irrigation, Melbourne Water MUSIC Modelling Guidelines suggest a default demand for a standard garden bed is 0.4 to 0.6 KL/yr/$m^2$. For the 300-600 $m^2$ lots, 22.5 to 45 $m^2$ of garden bed per lot (or 33.75 $m^2$ on average) was assumed. This gives 540 KL/yr in total for the 32 lots. This irrigation demand has been applied in the model using the PET – Rainfall distribution annually.

The internal re-use for toilet flushing is taken at ~ 133 L/day per lot, or 4.26 KL/day for the 32 lots.

## Street-scape Tree-pits

It was assumed that there would be 2 tree-pits along each street frontage, of dimension 1.5 $m^2$. For the 32 lots with an average 18m street frontage, the catchment for each tree-pit from a 4 metre road width is 18*4/2 = 36$m^2$.

The tree-pits were assumed to have a 100mm extended detention depth, fully unlined filter media perimeter and base, saturated hydraulic conductivity = 224 mm/hr, filter depth of 750 mm and 0 exfiltration.

## Evaporation Pond

The evaporation pond, as an exercise, was sized to achieve the 32% reduction in stormwater volume – without any other flow reduction in the treatment train. This was done in order to give an estimate of the required surface area to achieve runoff reduction through pond evaporation alone. To achieve the 32% flow reduction an evaporative surface of 3,200 $m^2$ is required which would result in the loss of about 9 lots. Therefore, this option has not been included in the breakdown of flow reduction contributions below.

# Flow Reduction Outcomes

The MAR without mitigation measures is 5.41 ML/yr. Table 1 lists the reductions achieved by each of the mitigation measures assessed. The preferred treatment option reflects the proposed design including mandated rainwater tanks and with a reduction in MAR of 35.6 % provides slightly more than the 32% reduction required.

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**Table 1 Flow Reduction Contributions from individual elements**

| Treatment Train Element | Reduction in MAR (ML/yr) | Flow reduction % (of total 5.41 ML/yr) |
|---|---|---|
| Wetland Evaporation (297 $m^2$) | 0.4 | 7.4% |
| Tanks: Toilet Flushing | 1.36 | 25.1% |
| Tanks: Irrigation | 0.54 | 10 % |
| Tanks: Toilet + Irrigation | 1.56 | 28.8% |
| Tree-pits | 0.16 | 3 % |
| **Preferred Treatment Train Option:** | | |
| Tank (Toilet + Irrigation) & Wetland | 1.93 (model output) | 35.6 % |

Yours sincerely,

[redacted]

Director