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Water By Design
Email: glenn.b@hlw.org.au

Attention: Glenn Browning

Dear Glenn

RE: MUSIC MODELLING GUIDELINES CONSULTATION DRAFT

Thank you very much for the opportunity to provide feedback on the *MUSIC Modelling Guidelines November 2018 Consultation Draft*. As promised, this correspondence provides comments/ suggestions for this guideline.

I trust this is suitable for your current purposes.

Please contact me if you have any questions, or if you would like to discuss anything further.

Yours faithfully

Brad Dalrymple
Principal Environmental Engineer

Suggestions

- Section 3.2 reads “For all development applications use the 10 year modelling period provided in Appendix A and adopt a six-minute time-step.”
    - This paragraph is inconsistent with subsequent paragraph, which describes alternatives
    - Appendix A only provides recommended climate data for SEQ and Whitsunday region.
    - Other modelling periods (and time-steps) are appropriate when not assessing the treatment performance of a stormwater management strategy. For example, water balance modelling (with catchment modelling) undertaken using MUSIC would typically require longer modelling periods at larger (e.g. daily time-steps)
    - I would suggest that this text be re-worded as appropriate.
- Section 3.3.2 reads “All source nodes (lumped or split), are not default nodes in MUSIC and should be reconfigured according to these guidelines”.
    - It is unclear what is meant hear.
    - I would suggest that this text be re-worded as appropriate, e.g.
        - “The default MUSIC source node properties for rainfall/ runoff and pollutant export characteristics are not consistent with the values recommended in these guidelines, and should be appropriately revised”.
- Section 3.3.2 reads “The area of each surface type within the relevant catchment must be measured from development layout plans”
    - This is only applicable if modelling is for new development, and may not be applicable to the other modelling scenarios (e.g. those given in Table 3-5).
    - I would suggest that this text be re-worded as appropriate,
- Tables 3-4, 3-6 and 3-7:
    - These values are the same as that given in the previous (2010) Water By Design *MUSIC Modelling Guidelines*.
    - I would suggest that the proportion of roof and the impervious areas for typical developments is significantly higher than these given ‘typical’ values.
    - I would suggest that they be reviewed (with recent ‘real world’ data/ imagery) and revise, as appropriate.
- Table 3-7:
    - It is unclear why the ‘preferred minimum’ values would be above the lower end values for the ranges given in the adjacent column
    - The imperviousness range and preferred minimum values for public open space seem excessively high. There are many examples of public open space (for existing areas and new development) with an imperviousness of 0%.
- Section 3.3.4 reads “Use the rainfall runoff parameters specific to your region, presented in Appendix A, to model development applications unless …”
    - See above comments for Section 3.2
- Section 3.3.5 reads “The serial correlation coefficient will not have any effect on the pollutant loads generated”
    - This statement is incorrect and should be removed

- Table 4-3:
  - The recommended values given are all based on references over ten years old. I would be surprised if there is not more recent data that would be suitable to use/ specify.
  - I would recommend that the values be reviewed (and, if appropriate, revised)
- Section 4.2.3: Water authorities would be able to provide recommended water demand values for different commercial/ industrial land use types. I have previously obtained this information from Unitywater, but I am sure others would also be able to provide this information upon request. It may be useful to at least recommend these as potential sources (or provide their values in this guideline).
- Table 4-4 (And section 4.3.4):
  - Wetland Total Nitrogen k and C* values. I have provided previous correspondence in relation to this matter. As per this, I would highly recommend that the MUSIC default values be retained.
- Table 4-6:
  - *Extended detention depth:* A single value of 0.3m is given. It is recommended a range be given. For example, the Water By Design *Bioretention Technical Guidelines* recommends a range from 0 to 300mm.
  - Saturated hydraulic conductivity (mm/hr): The text states "200 mm/hr (but also run 50 mm/hr for sensitivity and present results)". We believe this should be revised to 'typically 200mm/hour" (as described further below).
  - Overflow weir width (metres): The text states "Typically greater than or equal to surface area (m^2)/10". This is rarely the case for bioretention basins in the real world. Suggest the recommended value should be the same/ similar to that given for wetlands (see Table 4.4).
- Section 4.5.2:
  - The text reads "Use a loamy sand as the filter media for all bioretention systems, with a hydraulic conductivity of 200 mm/hr. For sensitivity testing, simulate the bioretention system in MUSIC using a hydraulic conductivity of 50 mm/hr and present the results with the development application"
    - As discussed in our recent workshop, I believe that this statement will significantly limit future innovation for bioretention systems over the likely life of these guidelines (likely 5 to 10 years) and should be revised. As an example, we are trialling many different types of filter medias at a development project in SEQ, with plans to undertake plant vitality, hydraulic conductivity and treatment performance monitoring to assess the performance of these different systems – and identify a suitable filter media for wider application at the site (and likely external areas). The given statement would likely limit the application of potentially superior filter media mixes (that may not be 'sand loam' … 'with a hydraulic conductivity of 200mm/hr"
    - I recommend that the text be revised to read "At the time of writing, bioretention systems typically apply a sandy loam media with a typical hydraulic conductivity of approximately 200mm/hour"
    - I also see limited value in undertaking the sensitivity testing, and would recommend reference to it be removed.
  - Regarding TN content in the filter media, the text states that "when modelling to demonstrate compliance with the objectives, adopt the larger of 400mg/kg, or the actual value of total nitrogen in the filter media as testing" (and to adopt the actual value when not demonstrating compliance). Similarly, for orthophosphate content of filter media, the text states that "when modelling to demonstrate compliance with the objectives, adopt the larger of 30mg/kg, or the actual value of orthophosphate in the filter media established through testing" (and to adopt the actual value when not demonstrating compliance).

  - Similar to the above, I believe that this statement will limit future innovation for bioretention systems over the likely life of these guidelines. It also seems inappropriate to have two different recommended procedures for modelling the same system.
  - I recommend that the text be revised to recommend actual values (if known through testing), or adopt the given 400/30 values (if unknown).

- Section 4.6: I do not believe a separate 'bioretention swale' section is appropriate, and section 4.5 (on bioretention systems) is adequate.
- Section 4.8.1:
  - The text reads "The proposed reduction efficiencies are justified by rigorous scientific testing and results are published in a credible engineering/scientific journal."
    - As discussed, we do not believe that there is sufficient scrutiny within the vast majority of engineering/ scientific journals (e.g. of monitoring methods and results) to add significant value to performance claims of proprietary products.
    - We believe it would be far more appropriate for this guideline (and specifically this section) to be consistent with the recommendations of Brisbane City Council, which require performance claims to be reviewed (and if appropriate endorsed in writing) by independent peer reviewers.
- Table 4-9:
  - High flow bypass: a value of "100 m^3/s (unless secondary routing defined)" is given
    - This is inconsistent with the text given in section 4.12.1 (re high flow bypass).
    - It is also anticipated that this assumed value would not be representative (as the system will bypass even for small flow-rates) significantly over-estimate the treatment performance of these systems.
    - We would recommend a value given consistent with the likely actual high flow bypass of the system, or simply refer to Section 4.12.1.
- Section 4.1.13: See above text re publishing in journals.
- Section 4.9: When modelling proprietary filters within detention tanks, the sediment basin node is to be used. However, the 'k' values associated with this system should have no additional treatment (i.e. k value set to zero). Selection of parameter values (default or otherwise) shall not be used to claim additional stormwater treatment when none materially exists.
- Section 5:
  - Section 5.1 cites values for real discount rate and inflation rate that are extremely old. It's very easy to obtain more recent values from the Reserve Bank of Australia that could be cited/ referenced here.
  - I believe it would be appropriate (and useful) for the guideline to provide typical unit cost rates for typical treatment devices. I could assist in this regard, if appropriate.
- Section 8: With the exception of the DesignFlow and Healthy Land and Water documents, there are no references cited from the last ten years. This indicates a lack of recent scientific research included within the update of these guidelines.

Appendix A: These are the same recommended stations, modelling periods, and PET data given in the previous guideline for SEQ. I would be surprised if more suitable climate data is not available. Furthermore, it is my understanding that the Caloundra station (and associated modelling period) includes errors – and it is subsequently likely that other stations may include other errors.