wave CONSULTING

M (+61) 0425 298 997
E info@waveconsulting.com.au
W waveconsulting.com.au

Memo: MUSIC template

Client	Wollondilly Shire Council
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Author	R. Catchlove, Z.Hughes-Miller.
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1. Purpose of this memo

To give a detailed account of the methodology and rationale behind Wave Consulting's recommended rainfall and potential evapotranspiration data to be utilised in a MUSIC template file for stormwater assessments within the Wollondilly Shire Council. An understanding the inputs of such modelling gives users greater confidence in the validity of its results.

This memo is designed to be stored on file at Council, and not distributed to the public or developers.

2. Method

There are two key pieces of data required to create a MUSIC temple, pluviographic rainfall and potential evapotranspiration (PET) data. Pluviographic rainfall records rainfall in six-minute increments allowing for much greater accuracy and validity when used in MUSIC's stochastically based models.

If a pluviographic rainfall record for the area of interest is not available a statistically representative and relevant record is required. Due to the impact of localised geographical variations on local climates, simply selecting the closest pluviographic rainfall data is not recommended and can result in invalid model results. A record with a similar mean and range of annual rainfall to the area of interest that is also a statistically large sample is desired.

Mean annual rainfall data available from the Bureau of Meteorology (BOM) can be analysed through geographic information system (GIS) software to determine the weighted mean and range of annual rainfall within the area of interest. This can be compared with pluviographic records to determine the most suitable data to use.

Similarly, monthly PET data available from BOM can be analysed through GIS software to determine the weighted monthly mean PET values for the area of interest. As these are 'potential' values it is entirely appropriate to convert monthly mean PET values into daily averages and use them across the duration of the modelling.

3. Choosing a rainfall pluviographic record

Wave Consulting didn't find any pluviographic data within the Wollondilly Shire Council local government area, and hence there is a need to find a representative pluviographic station nearby.

Analysis using GIS reveals that the mean annual rainfall for the area of interest within Wollondilly Shire Council is 990 mm/yr with a minimum of 774 mm/yr and a maximum of 1495 mm/yr. This was determined by using an Australian average rainfall raster layer sourced from BOM and calculating the weighted mean value within the polygon shape file that represents the area of interest.

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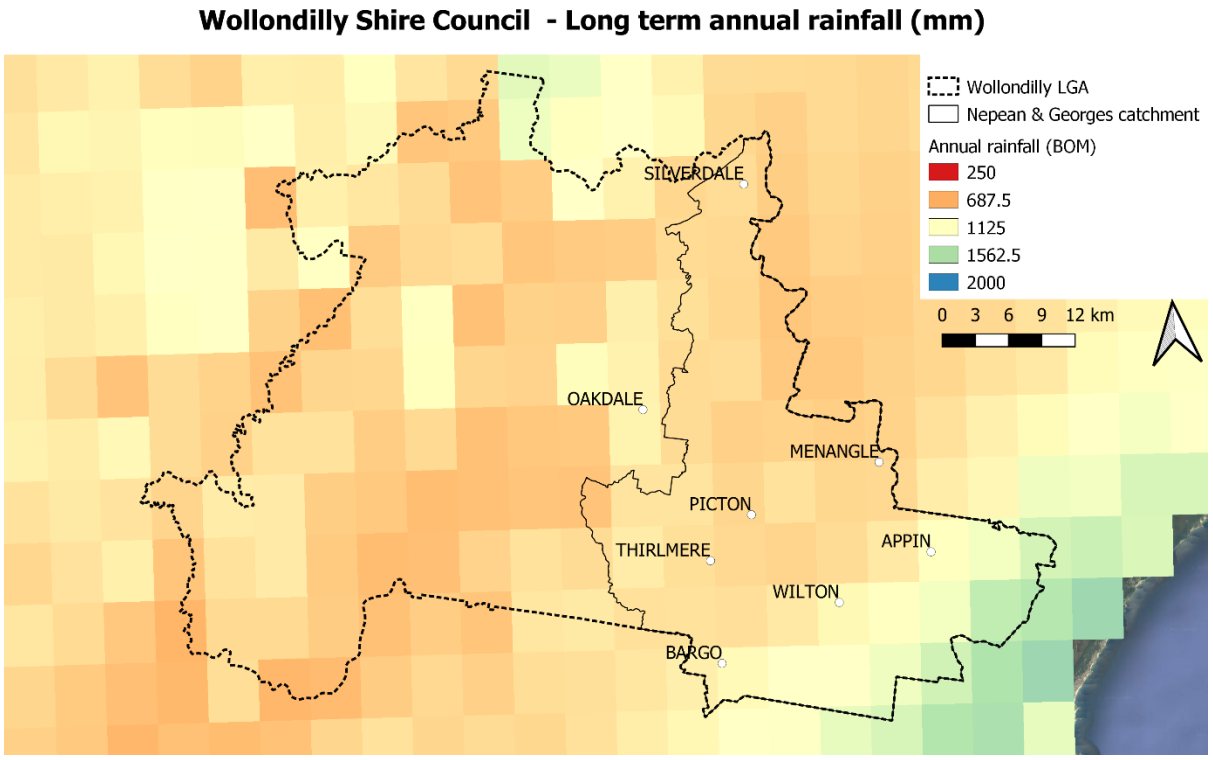

Figure 1. Area of interest overlayed on annual rainfall data

Using this data, a target band was set to +/- one standard deviation from the mean value of 990 mm/yr. Relevant pluviographic records were then analysed for their suitability. These results can be seen in Figure 3.

4. Determining potential evapotranspiration data

Similarly, analysis using GIS reveals the monthly mean PET values for the area of interest within Wollondilly Shire Council. This was determined by using an Australian monthly average PET raster layer sourced from BOM and calculating the weighted monthly mean values within the polygon shape file that represents the area of interest. Evapotranspiration is higher in summer, and lower in winter.

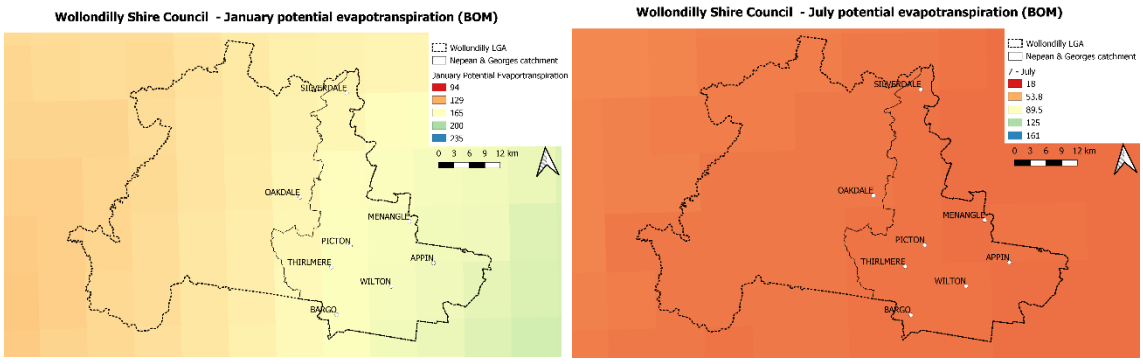

Figure 2. Area of interest overlayed on monthly mean PET data for two months (left - January, right - July)

5. Results

Eight pluviographic rainfall records (sourced from the Bureau of Meteorology and Water NSW) were analysed for their suitability, the results are presented below in Figure 3. Four data sets fell inside

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W waveconsulting.com.au

the target band. Rockwood station (no. 066164) was selected due to both it's statistical relevance and its sample size.

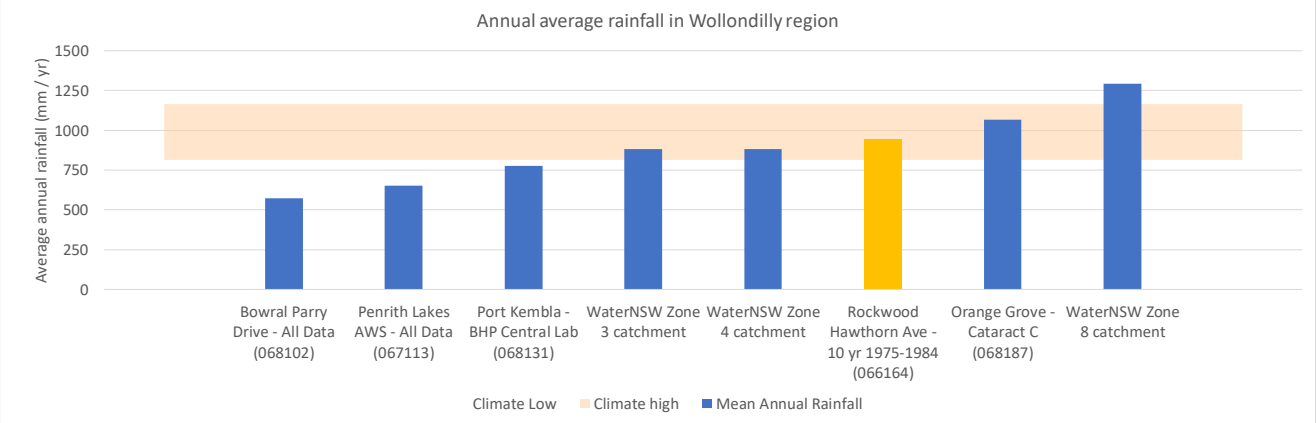

Figure 3. Pluviographic rainfall data with target climate band

The analysis of PET monthly mean values for the area of interest are presented below in Table 1

Table 1. Daily mean PET data

Month	Daily Mean PET (mm)
January	5.35
February	4.63
March	3.85
April	2.55
May	1.58
June	1.27
July	1.28
August	1.83
September	2.68
October	4.00
November	4.78
December	5.18

6. Use of MUSIC template

The wollindilly-music-template.sqz file that accompanies this memo is recommended to be placed online for users to download.

Other attributes (re sizing of rainwater tanks, infiltration trenches, bioretention and swales), should comply with the Wollondilly WSUD Guideline.