Concept Report

Caddens Hill Drainage & Stormwater

ProjectID: 14304

Topic: Water Budget **Date:** 15/11/2017

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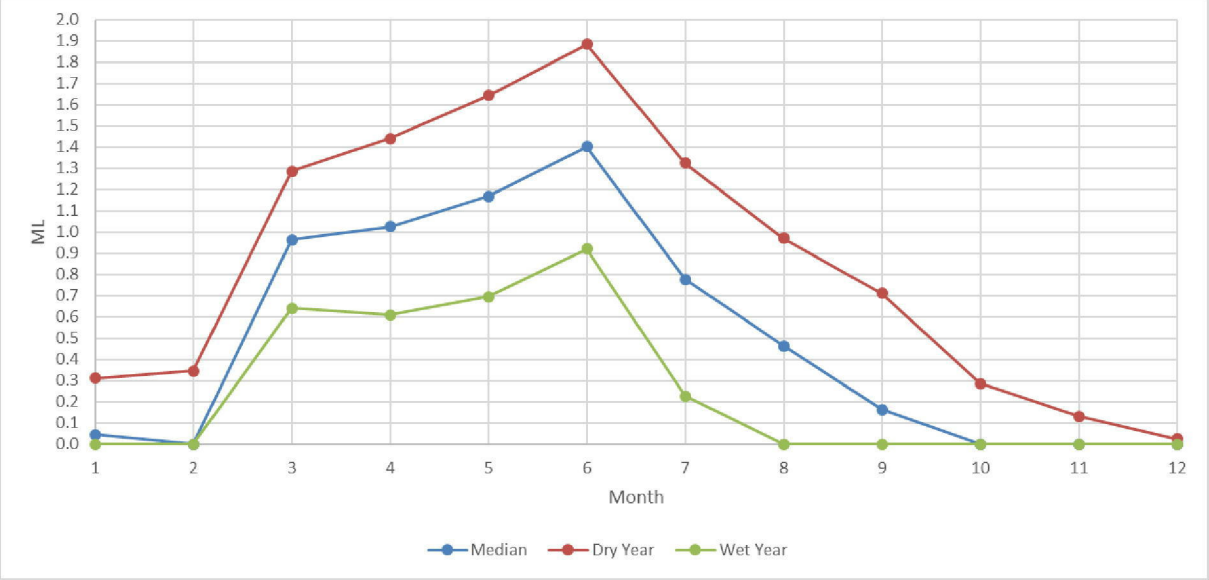
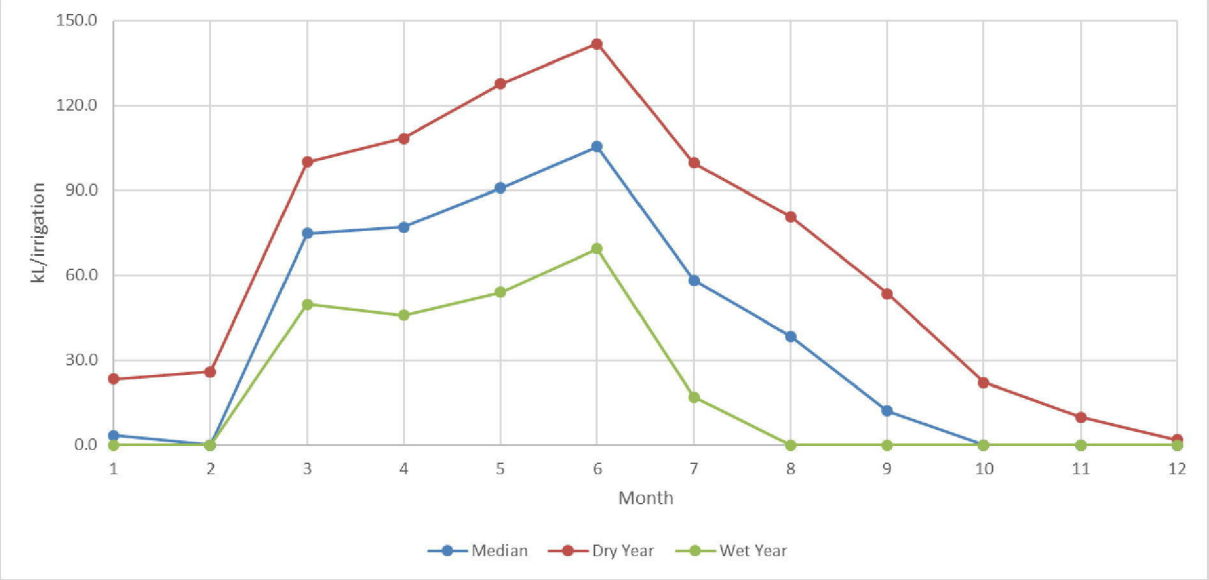
#	Note
1	**The Brief** Caddens Hill Oval in Western Sydney required the assessment of water use for irrigation. The irrigated area of the oval is 1.78 Ha. The water use assessment is needed to determine suitable irrigation supply infrastructure. It is also intended that drainage water is recycled through the irrigation system. Irrigation can take place three nights per week for a period of 7 hours (11pm – 6am).
2	**Climate and Crop Data** Climate Data for the site has been collated from program called LocClim produced by the FAO. The program analyses weather data from nearby weather stations to provide median, 10% and 90% analysis of rainfall (P) and potential evapotranspiration (PET). Crop Coefficients (Kc) used are for warm season grasses and varied on a monthly basis. The data is further fine-tuned assuming the system will be operated to a high standard (S), uniformity of irrigation is at least 80% (N) and that 60% of rainfall (EP) is used by the turf. Crop usage is then defined by: ((PET x Kc x S) – EP) / N in mm depth of application.
3	**Water Demand** Using the above process, we find the oval is likely to require: 6 ML/a in a median year, 3 ML/a in a high rainfall (wet) year and 10 ML/a in a low rainfall (dry) year. This can be expanded to a monthly demand based on the varying crop coefficient. The graph below shows monthly demand from July to June with peak demand expected in December (month 6).



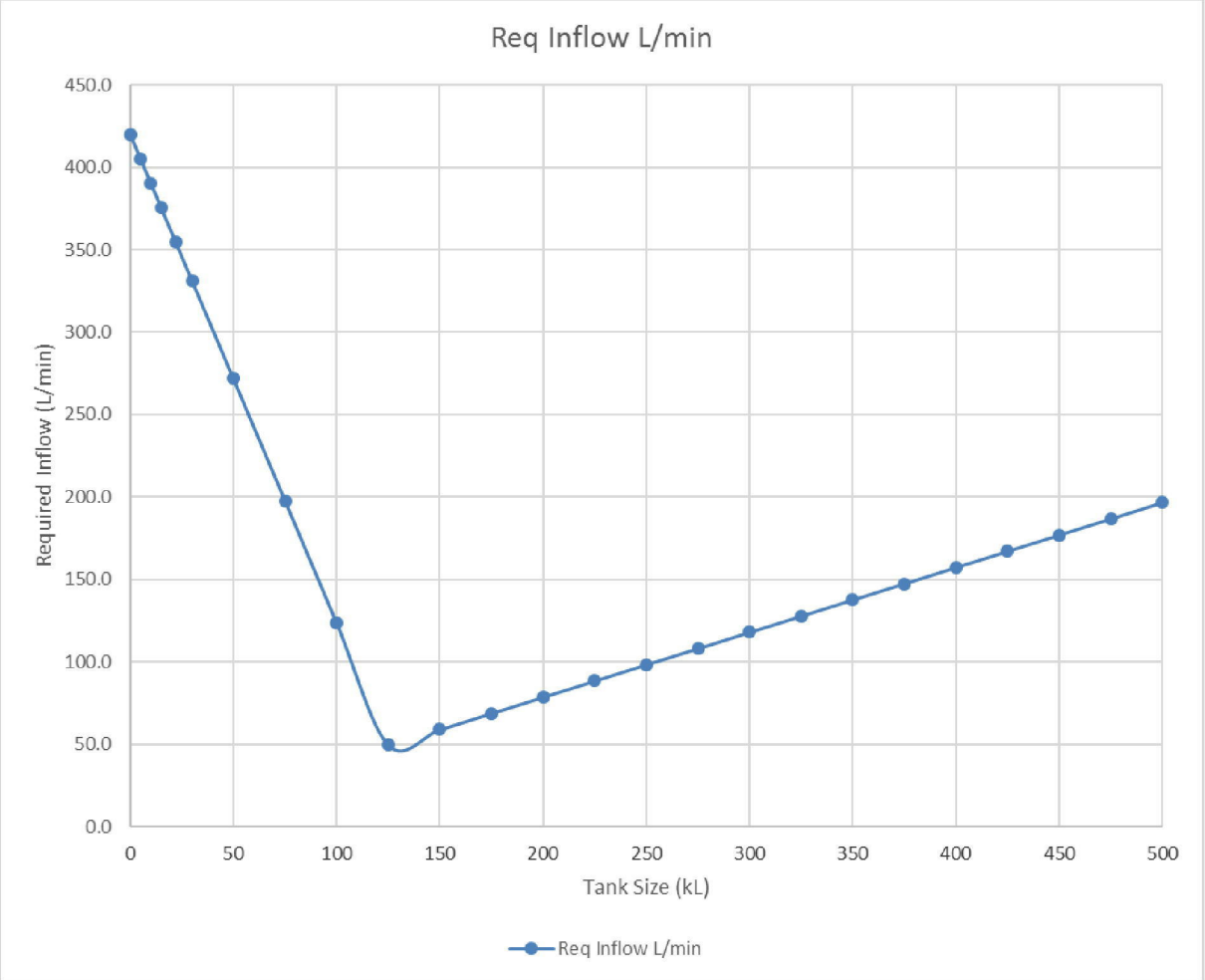
Assuming that irrigation can take place three nights per week we determine the likely irrigation application per night below.



Peak irrigation in a hot dry year is estimated to be 142 kL/irrigation. Assuming the irrigation flow rate of 420 L/min this can be achieved in 5.6 hours, achievable within the 7-hour window of operation.

4 **Tank Sizing**

Assuming that a maximum irrigation of 142 kL is applied in a 5.6-hour period, leaves a 42.4 hour replenishment period between irrigations (assuming 3 nights per week). A sensitivity analysis can be applied between inflow from water sources and tank size. The graph below shows the size tank required against the continuous inflow required, assuming the tank is full at the beginning of the irrigation and drained by the end. The analysis shows that the minimum continuous inflow required is 50 L/min with a minimum usable storage of 126 kL. If we assume 10% dead storage this indicates a minimum tank size of 140 kL. The next common size tank is 150 kL.



The amount of storm/drainage water that can be stored in the tank will depend on either:

- capacity of tank above 150 kL selected or
- inflow that can be provided from mains supply. i.e. if inflow can match irrigation demand, 420 L/min, then 100% of the tank volume can be reserved to store harvested runoff, if 80% of the tank volume was reserved for harvested runoff then a mains water inflow of 332 L/min would be needed to meet the irrigation demand when no runoff was stored.

5 **Summary**

Looking at the likely maximum irrigation demand and sensitivity analysis, 150 kL is an appropriate size tank to be constructed for managing the irrigation supply. This size tank can:

- store one irrigation cycle during peak demand,
- can be replenished by minimal inflow (50 L/min)
- offers capacity to harvest runoff if higher inflows from main supply are available.

A system that has an adjustable control level for mains water stored in the tank will allow operators to modify the storage depending on flow received from mains or likely water harvesting.