

2 WATER MANAGEMENT

This has not been part of our scope of works. However, we provide the following indicative information on irrigation water requirements.

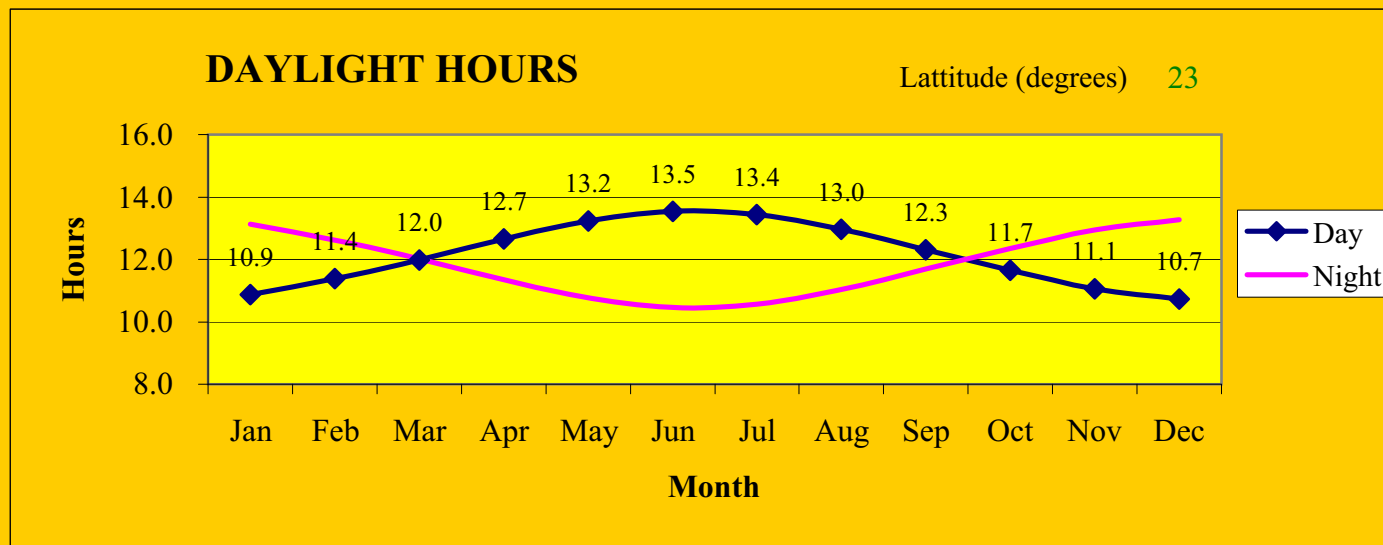
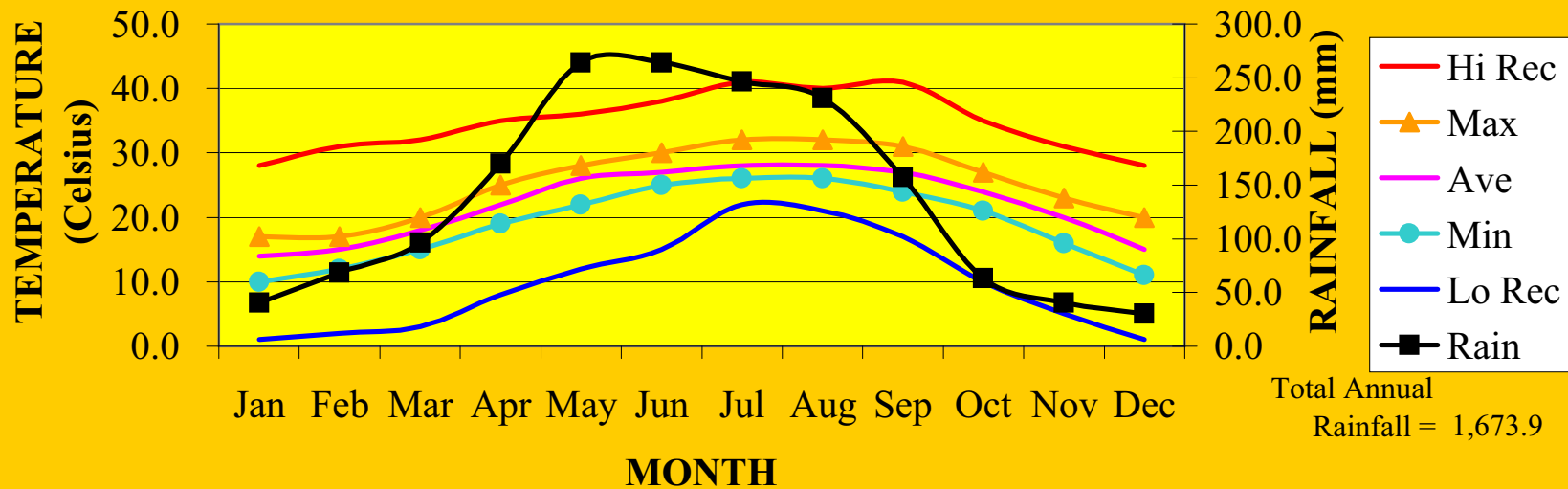
See separate report.

IMPORTANT NOTES:

The calculations are based on several assumptions as noted below. While the figures are indicative, a variation of 50% (perhaps more) on these estimates may occur due to differences to actual conditions and our assumptions. This analysis is a limited overview of the water demand only. The water supply and storage elements of the water balance equation are not included. A more detailed and accurate analysis (ie, water balance study) is time consuming and not within our scope of works.

- 2.1 **Climate data** used is minimal. Only averages are used which does not provide any indication of ranges or variability from year to year. There will be significant differences between a wet and dry year.
- 2.2 **EvapoTranspiration** has been estimated on the basis of available climate data and our experience.
- 2.3 **Rainy Days** (days on which irrigation is not required) has been calculated using an empirical formula. There will be some inaccuracy for this particular site. Even in months where rainfall exceeds ET, there will still be some irrigation required since the rainfall is not evenly distributed on each day of the month. The number of Rainy Days factors this into our calculations.
- 2.4 **Irrigation efficiency** will be affected by watering practices, which depend on factors such as the person in charge and the soil structure.
- 2.5 **Hand watering estimates** are typical but will vary with landscape design and management objectives.
- 2.6 **Management decisions** will have a large impact. The desire to maintain a level of green in the turf or the implementation of water conserving strategies to minimise water use may double or halve the water used.
- 2.7 **Construction schedules** are most likely to be different. A 12 month turfing program with a 4 month grow in period has been assumed. This is not likely (and may not even be practical) to be the actual construction schedule but is included for indicative purposes only. That is, to indicate the difference in watering requirements during construction and after establishment.
- 2.8 **Evaporation and seepage** from water bodies has not been taken account of.
- 2.9 For **simplicity of calculation**, the number of sprinklers has been evenly divided between all the holes. While there are obviously large differences between the number of sprinklers on a par 3 and par 5, it does not significantly affect the overview (particularly considering the overall inherent inaccuracies).

AVERAGE MONTHLY CLIMATE DATA



ESTIMATE OF WATER USE DURING CONSTRUCTION AND AFTER ESTABLISHMENT (Refer to important assumptions affecting validity of calculations)

Peak ETo	mm/day	7.5
	mm/month	232.5

Peak Application	mm/day	6.0
	Inches/week	1.65
	m ³ /day	5,329

No Holes of Golf	27
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DAILY AUTOMATIC IRRIGATION WATER USE

Description	Unit	Sprinkler Types											Total
Sprinkler Type		Tee	Fwy	Grn	Grn Sup.	Grn	Grn Sup.	Rough	Rough	Practice	Practice	Practice	
No of Sprinklers	No	324	839	55	55	93	93	771	158	6	86	1	2,481
Spacing	m	21.0	21.0	24.0	24.0	21.0	21.0	21.0	21.0	30.0	24.0	24.0	
Spacing Patern	Sq/Tri/Si	Triangle	Triangle	Triangle	Triangle	Triangle	Triangle	Triangle	Triangle	Square	Triangle	Triangle	
Sprinkler Arc	Degrees	360.0	360.0	360.0	180.0	360.0	180.0	360.0	180.0	360.0	360.0	180.0	
Application (Peak)	mm/day	6.0	6.0	6.0	1.5	6.0	1.5	6.0	6.0	6.0	6.0	6.0	
Irrigated Area (Nominal)	Ha	12.4	32.0	2.7	1.4	3.6	1.8	29.4	3.0	0.5	4.3	0.0	91.2
Irrigation Volume (Peak)	m ³ /day	742	1,923	165	21	213	27	1,767	181	32	257	1	5,329
Irrigation Volume (Average)	m ³ /day	(Not including Hand Watering)											1,905
Irrigation Volume (Water Conserving Strategy)	%	80%	50%	100%	0%	100%	0%	25%	25%	50%	50%	50%	
	m ³ /day	594	961	165	0	213	0	442	45	16	129	1	2,565

MONTHLY WATER USE ESTIMATES

Month	Unit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL	AVERAGE
During Construction															
Grown in - No Holes	No	3	6	9	12	12	12	12	12	12	9	6	3		
Application	mm/day	3.0	3.0	4.2	5.4	7.2	8.4	9.0	9.0	7.8	6.0	4.8	4.2		6.0
Established - No Holes	No	0	0	0	0	3	6	9	12	15	18	21	24		
Application	mm/day	2.0	2.0	2.8	3.6	4.8	5.6	6.0	6.0	5.2	4.0	3.2	2.8		4.0
Golf Irrigation	m ³ /month	6,513	10,066	23,625	31,973	46,420	57,473	74,604	82,894	84,670	82,894	66,315	60,374	627,820	52,318
Hand Watering (20%)	m ³ /month	1,303	2,013	4,725	6,395	9,284	11,495	14,921	16,579	16,934	16,579	13,263	12,075	125,564	10,464
Total	m ³ /month	7,816	12,079	28,350	38,368	55,704	68,967	89,525	99,472	101,604	99,472	79,578	72,449	753,384	62,782
After Establishment															
Application	mm/day	2.0	2.0	2.8	3.6	4.8	5.6	6.0	6.0	5.2	4.0	3.2	2.8		4.0
Golf Irrigation	m ³ /month	39,078	30,197	47,249	47,960	59,683	64,657	74,604	74,604	69,275	71,052	59,683	57,197	695,240	57,937
Hand Watering (10%)	m ³ /month	3,908	3,020	4,725	4,796	5,968	6,466	7,460	7,460	6,928	7,105	5,968	5,720	69,524	5,794
Total	m ³ /month	42,986	33,217	51,974	52,756	65,652	71,123	82,065	82,065	76,203	78,157	65,652	62,916	764,764	63,730
Base Climate Data															
Highest Recorded Temp.	Celsius	28.0	31.0	32.0	35.0	36.0	38.0	41.0	40.0	41.0	35.0	31.0	28.0		35
Ave. Max Temperature	Celsius	17.0	17.0	20.0	25.0	28.0	30.0	32.0	32.0	31.0	27.0	23.0	20.0		25
Average Temperature	Celsius	14.0	15.0	18.0	22.0	26.0	27.0	28.0	28.0	27.0	24.0	20.0	15.0		22
Ave. Min Temperature	Celsius	10.0	12.0	15.0	19.0	22.0	25.0	26.0	26.0	24.0	21.0	16.0	11.0		19
Lowest Recorded Temp.	Celsius	1.0	2.0	3.0	8.0	12.0	15.0	22.0	21.0	17.0	10.0	5.0	1.0		10
Rainfall	mm/month	40.6	68.6	96.5	170.2	264.2	264.2	246.4	231.1	157.5	63.5	40.6	30.5	1,674	139
Eto Estimate	mm/day	2.5	2.5	3.5	4.5	6.0	7.0	7.5	7.5	6.5	5.0	4.0	3.5	60	5
	mm/month	77.5	70.0	108.5	135.0	186.0	210.0	232.5	232.5	195.0	155.0	120.0	108.5		153
No Rainy Days	No	9	11	12	15	17	17	17	17	15	11	9	8	158	13

ESTIMATE OF WATER USE - See Important Assumptions

Estimated Annual Water Use in cubic metres (after establishment) = 764,764

