

Smart Water Fund Project



BOROONDARA
City of Harmony

City of Boroondara

Fytofoam Trial Preliminary Findings 2006

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1 BACKGROUND

The City of Boroondara manages numerous sports grounds which host the community's cricket and football games, as well as a variety of other sports activities throughout the year. Maintaining a healthy coverage of grass on the sports fields is critical to the success of these events as it reduces the number of on-field injuries.

However, ongoing water shortages make it difficult and costly to maintain the sportsgrounds, particularly during the dry summer months.

The City of Boroondara has undertaken to reduce water consumption by sportsgrounds in a cost-effective manner whilst maintaining healthy grass coverage for player safety.

The City of Boroondara was awarded a Smart Water Fund grant to implement an innovative water saving technique at the Camberwell Sports Ground, Greythorn Park and Gordon Barnard Reserve West (ovals).

2 PROJECT

The water saving technique involved inserting Fytofoam, a foam product made from organic chemical materials, into the root zone of the grass.

Grooves were cut into the sportsground playing surface and the Fytofoam product was injected into the soil.

Fytofoam is a amino-plastic substrate material in a liquid resin form, which when injected into the grooves cut into the playing surface, expands and hardens and forms a firm light weight foam.

Introduced into the root zone of the sportsturf, the open cell structure of the hardened foam assists with the absorption of water and nutrients (stored for plant access). The foam retains approximately 37% air, which is also beneficial for grass growth.

The objective of the foam is to release stored nutrients and moisture (received via previous irrigation or rainfall events) slowly into the soil.

It is anticipated that improved moisture absorption characteristics of the foam and the 'in-soil storage' of nutrients and moisture will promote healthy turf growth whilst reducing water consumption.

FytoGreen Australia (Fytofoam distributor and installer) has claimed that water savings of up to 30% are likely.

The purposes of the project is to assess the performance of the Fytofoam and review its 'water saving' capacity (along with other claimed benefits of reducing fertiliser requirement and compaction)¹.

The purpose of this report is to review the water consumption of the ovals to date and ascertain if the Fytofoam product significantly lessens the need for irrigation (ie saves water).

3 KEY ACTIVITIES

Activities undertaken to date include:

- Site application of Fytofoam product to trial sites (Camberwell Sports Ground, Greythorn Park and Gordon Barnard Reserve West) in September 2004.
- Review of historical water consumption for trial sites, plus one non-trial site, to establish benchmark indicators for ongoing comparison

¹ FytoGreen Australia brochure sourced from website <http://www.fytogreen.com.au/fytofoam/docs/Fytofoam%20Broch%20.pdf>.

- Ongoing recording of water meter figures on a monthly basis to review water consumption for each site (plus one non-trial site) and compare with climatic requirements

4 REVIEW METHODOLOGY

For the exercise of comparing irrigation water usage, the water consumption figures for the summer period only (ie October to March inclusive) were determined for the 2004/05 irrigation season (ie first season after implementation of Fyfoam and first season with relaxed water restrictions).

In addition to the trial sites, a non-trial site was also assessed as a ‘control site’ for comparison.

To determine the ‘applied’ irrigation volumes, the Yarra Valley Water meter reading records were used (for the period October to March inclusive). The check meter volumes for pavilions, etc (where fitted) were deducted from the gross meter readings for each site.

	Applied Volume (Oct, Nov, Dec, Jan, Feb, Mar) 04/05 Irrigation Season	Irrigated Area
Camberwell Oval	7,758 kL	14,775 m ²
Gordon Barnard Oval	7,703 kL	17,210 m ²
Greythorn Oval	2,711 kL	10,770 m ²
Rathmines Oval (Control Site - No Fyfoam)	5,656 kL	14,300 m ²

The table above summarises the volume of water applied to the sportsfields for the period indicated. Note: Rathmines Oval does not feature Fyfoam.

Further, the volume of water required to be applied by irrigation for the same period was determined by using Melbourne (City) rainfall and evaporation figures for the period indicated, along with an assumption of 0.65 as a crop factor (see below), 80% irrigation system efficiency factor and 50% effective rainfall factor. These factors are considered typical for sportsfield irrigation systems.

Irrigation Crop Factors

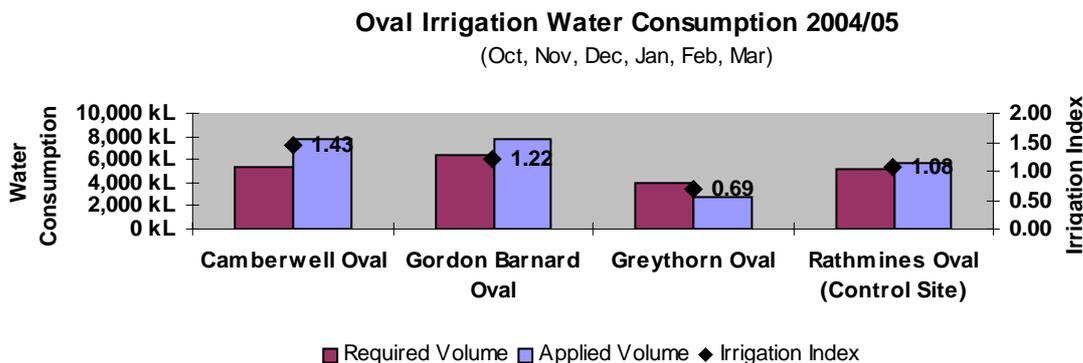
Turf Quality >>	Premier	Medium	Low Maint.
Cool Season Turf (CS)	0.90	0.80	0.70
Warm Season Turf (WS)	0.70	0.55	0.40

A crop factor of 0.65 provides medium to high quality warm season turf (most sportsfields) and low maintenance quality turf for the cool season grasses.

Based on the above criteria, the ‘required’ irrigation volumes have been determined and compared to the ‘applied’ volume (see below). The ratio between the two figures provides the ‘irrigation index’ indicator.

The closer the ‘irrigation index’ figure is to 1.0, the better the irrigation system has been managed to match climatic conditions. Figures less than 1.0 indicate the irrigation system has been receiving less than the required volume of water to achieve the nominated turf quality. Similarly, a figure greater than 1.0, indicates a degree of over-watering.

The following chart compares the ‘required’ and ‘applied’ volumes of irrigation water for each site, for the **2004/05 irrigation season**, as well as the resulting ‘irrigation index’.



For Camberwell and Gordon Barnard ovals, the ‘applied’ volumes are higher than the ‘required’ volume (ie irrigation index greater than 1.0). The control site (Rathmines Oval) is also slightly above 1.0, but only marginally.

It is anticipated that ‘irrigation index’ figures would (typically) be slightly higher than 1.0.

However, Greythorn Oval has an irrigation index significantly less than 1.0, indicating insufficient irrigation water was applied for the period (possibly resulting in less than optimum turf performance).

For the purpose of the trial review(s), the ‘applied’ figures for Camberwell, Gordon Barnard and Rathmines ovals should be adopted as ‘benchmark’ levels for on-going comparisons. However, the Greythorn figures may require further assessment once the irrigation season progresses.

2004/05	Required Volume	Applied Volume	Irrigation Index	Irrigated Area
Camberwell Oval	5,421 kL	7,758 kL	1.43	14,775 m ²
Gordon Barnard Oval	6,314 kL	7,703 kL	1.22	17,210 m ²
Greythorn Oval	3,951 kL	2,711 kL	0.69	10,770 m ²
Rathmines Oval (Control Site)	5,246 kL	5,656 kL	1.08	14,300 m ²

The above figures for ‘applied’ volume and ‘irrigation index’ represent the ‘benchmark’ indicators for the on-going comparisons over the 5-year study period.

Note that the ‘applied’ volumes will vary from year to year due to varying climatic conditions. However, management practices (ie adjustments of watering schedules) should try to achieve irrigation index figures as close as possible to 1.0.

An irrigation index of less than the ‘benchmark’ indicators whilst achieving satisfactory turf performance, could possibly indicate a positive influence (ie water reduction) associated with the Fytofoam product.

5 1ST SEASON RESULTS – IRRIGATION INDEX FIGURES

Water meter readings for each of the sites were carried out by City of Boroondara staff during the 05/06 summer season.

The intention is to record readings at the commencement of each month so as to develop a monthly pattern for assessment.

For the assessment of water consumption for the 05/06 irrigation season (to the 2nd March), a combination of Yarra Valley Water records and City of Boroondara meter readings have been adopted.

These readings do not provide a complete indication of the consumption for the entire irrigation season (ie October, November, December, January, February & March). However, they do provide sufficient data to enable a comparison of ‘irrigation index’ figures to be made (for a less than complete season).

The meter reading dates (period) for each site are as follows (ie not complete irrigation season):

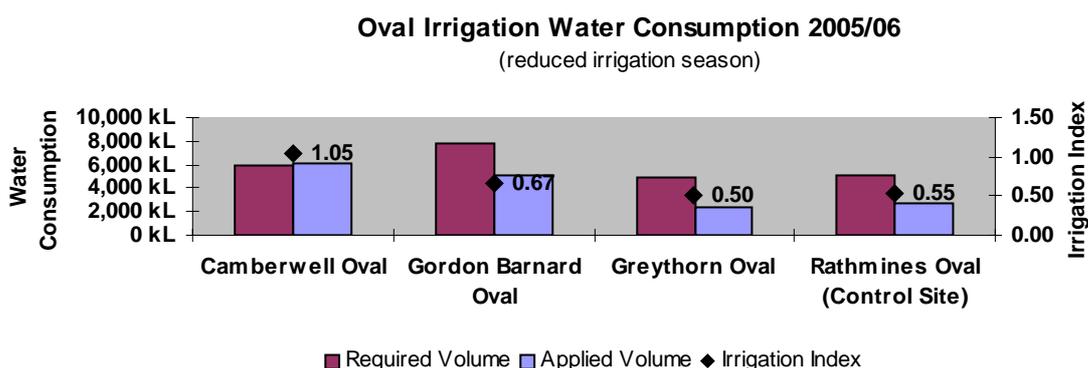
2005/06	1 st Reading	Last Reading	Period (Weeks)	Applied Volume
Camberwell Oval	02 Nov 05	02 Mar 06	17.1 Wks	6,132 kL
Gordon Barnard Oval	11 Oct 04	02 Mar 06	20.3 Wks	5,167 kL
Greythorn Oval	11 Oct 04	02 Mar 06	20.3 Wks	2,431 kL
Rathmines Oval (Control Site)	11 Oct 04	02 Mar 06	20.3 Wks	2,769 kL ²

As when establishing the ‘benchmark’ indicators, the volume of water required to be applied by irrigation for the same period has been determined by using Melbourne (City) rainfall and evaporation figures for the period indicated, along with an assumption of 0.65 as a crop factor (see below), 80% irrigation system efficiency factor and 50% effective rainfall factor.

Below are the results of the assessment (for the reduced irrigation period):

2005/06	Required Volume	Applied Volume	Irrigation Index	Irrigated Area
Camberwell Oval	5,850 kL	6,132 kL	1.05	14,775 m ²
Gordon Barnard Oval	7,742 kL	5,167 kL	0.67	17,210 m ²
Greythorn Oval	4,845 kL	2,431 kL	0.50	10,770 m ²
Rathmines Oval (Control Site)	5,068 kL	2,769 kL	0.55	14,300 m ²

The chart below compares the ‘required’ and ‘applied’ volumes of irrigation water for each site, for the **2005/06 reduced irrigation season**, as well as the ‘irrigation index’.



When compared to the previous seasons ‘irrigation index’ figures (see table below), a significant reduction in the figures for all the sites (including the non-trial ‘control’ site) is noted.

The ‘irrigation index’ figures have lowered by 27% (to as much as 49%).

² A mainline burst at Rathmines Oval may have slightly overstated resulting applied irrigation volumes. Similarly, recent surface works including topdressing and application of warm-season grasses may have affected the applied volumes.

2005/06	Irrigation Index	Irrigation Index	Reduction
	2004/05	2005/06	
Camberwell Oval	1.43	1.05	27% decrease
Gordon Barnard Oval	1.23	0.67	46% decrease
Greythorn Oval	0.69	0.50	28% decrease
Rathmines Oval (Control Site)	1.08	0.55	49% decrease

These reductions indicate significant shifts in either irrigation watering practices, or occur as a result of the introduction of Fytofoam (or combination of both).

However, it must be noted that the site within the largest reduction in 'irrigation index' (ie greatest water saving) is the control site, which does not feature Fytofoam. Possibly the recent surface works and introduction of alternative turf species (at Rathmines Oval) has resulted in anomalous results.

Hence, no conclusions should be made from the preliminary findings until such times that several seasons of irrigation have been reviewed to determine if a positive trends for water reduction (ie reduced irrigation index value) exists.

Note: A reduction in 'irrigation index' values does not always equate to a reduction in water consumption. Irrigation seasons having a higher irrigation requirement due to drier and warmer conditions (than normal) can consume a greater volume of water, even with a reduction in the 'irrigation index'. This is due to varying climatic conditions. An increase in water consumption does not always indicate a decrease in irrigation efficiency. Both water consumption and climatic conditions need to be assessed collectively.

6 1ST SEASON RESULTS – WATER CONSUMPTION

The water consumption figures obtained to date for the 2005/06 season cannot be compared directly to the previous years figures, as they represent different periods:

- 2004/05 October to March inclusive
- 2005/06 Mid October/Early November to February inclusive

However, in order to make 'some' comparisons, the 'irrigation index' figures can be used to extrapolate likely water consumption for similar periods (ie December, January & February combined).

It should be noted that the irrigation requirement for the December, January & February periods of the previous two seasons varies due to climatic conditions.

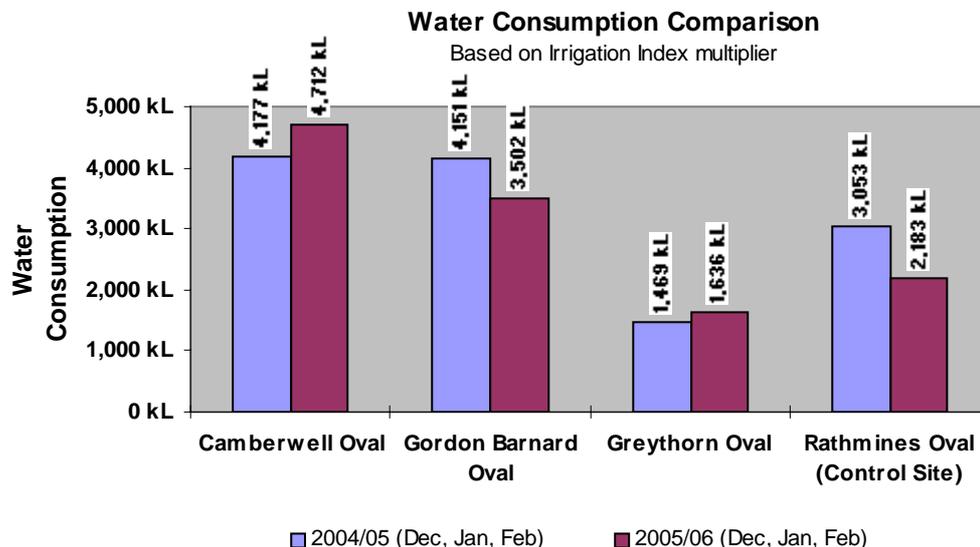
	Rainfall for Period	Evaporation for Period	Irrigation Requirement
2004/05 (December, January & February)	250 mm	436 mm	158 mm
2005/06 (December, January & February)	208 mm	534 mm	243 mm

From the above table, the 2005/06 season has been both drier (less rainfall) and hotter (more evaporation) than the previous year resulting in a 54% increase in irrigation requirement (to match turf needs to a similar performance standard).

However, water consumption for the same period has not increased by the same amount. In fact, only two sites increased water consumption, whilst the other two sites (including the non-trial site) actually decreased water consumption.

The chart below indicates the (likely) water consumption for each site, for the December, January & February period of the previous years. The figures stated are determined by multiplying the known 'irrigation index' figures for each season by the theoretical volumes required (based on actual climatic data for the same periods).

From the chart, a comparison between water consumption for the two seasons can be made. As indicated above, the actual irrigation requirement has increased, yet the water consumption figures do not reflect this (refer chart below).



The marginal shifts (upwards and downwards) in consumption volumes during a period when a 54% increase would have been anticipated, suggests either changes in irrigation watering practices, or are a positive result of the introduction of Fytofoam (or combination of both).

The City of Boroondara have indicated all other parameters regarding turf performance requirements have remained the same.

The less than anticipated increase water consumption, is reflected in the significant reduction in the 'irrigation index' figures stated herein.

7 1ST SEASON RESULTS – WATER SAVINGS

Comparing the (likely) applied volumes for each site using the 'irrigation index' figures for previous years provides an indication of the likely water savings. The following table indicates the (likely) effect of the changes in the 'irrigation index' figures.

Dec, Jan, Feb period only	Volume Based on 'Irrigation Index' figures for 2004/05	Volume Based on 'Irrigation Index' figures for 2005/06	Water Saving per Site	Total Water Saving for Trial Sites
Camberwell Oval	6,418 kL @ 1.43	4,712 kL @ 1.05	1,706 kL (27%)	5,203 kL (35%)
Gordon Barnard Oval	6,378 kL @ 1.22	3,502 kL @ 0.67	2,876 kL (45%)	
Greythorn Oval	2,257 kL @ 0.69	1,636 kL @ 0.50	621 kL (28%)	
Rathmines Oval (Control Site)	4,286 kL @ 1.08	2,183 kL @ 0.55	2,103 kL (49%)	

From the above table, there is a saving of approximately 5,203 kL (ie 35% collectively) in water usage for the three (3) trial sites (over the tree month period). It should be noted that the non-trial site also achieved a

significant water saving of 2,103 kL (in the same period). In fact, the non-trial site achieved the greatest water saving as a percentage shift (ie 49%).

As previously indicated, the estimated savings are based on the reduction in the 'irrigation index' indicator figures for each site. These figures are then applied to the climatic irrigation requirement (to ascertain a likely reduction in water use).

8 PRELIMINARY CONCLUSION

At this stage, no conclusions regarding the 'water reduction' effectiveness of Fytofoam can be made from the preliminary findings until such times that several seasons of irrigation have been reviewed to determine if a definitive trend exists (ie maintaining or reduced "irrigation index' indicators values).

Although there has been a reduction in water consumption compared to the climatic requirement (ie 5,203 kL) for the 2005/06 December, January & February periods, this cannot be confirmed as being conclusively attributed to the Fytofoam product.

The fact that the non-trial site is achieving better water reductions than the trial sites is an anomaly that should be reviewed further. Similarly, a more consistent approach to meter reading on a monthly basis should provide a more accurate indicator of the watering trends.

In addition to monitoring water consumption, the City of Boroondara has recently engaged Sportsturf Consultants Australia Pty Ltd to monitor turf quality for all sports sites within the Municipality including the Fytofoam trial sites. The monitoring of both water consumption and turf quality (throughout the 5-year study period) will provide a truer indicator as to the effectiveness of Fytofoam as a water saving measure.

End

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