



Victorian Playing Fields Water Savings program

Discussion Paper Only

October 2010

FOR DISCUSSION ONLY

Summary

This paper has been prepared by IAL for discussion purposes only, seeking your comments by 15 December 2010 on a proposed joint initiative from IAL and IPWEA (Vic) for a Victorian Playing Fields Water Savings program to facilitate achievement of high water use efficiency on sports grounds.

The purpose of this Program is to work toward achieving sustainable irrigated open space across Victoria, where sustainable irrigated open space involves:

- Water use performance;
- Plant performance;
- Soil health performance; and
- Environmental management.

The Program will deal with water use performance as a first step, with the proposed performance benchmarks focusing on:

- Distribution Uniformity of the irrigation system (DU);
- Irrigation Index (Ii);
- Preparing and implementing an Irrigation Operation and Maintenance Plan;
- Preparing and implementing an Irrigation Event Schedule; and
- Water Use Application Rate (ML/ha/year)

Participants will need to measure and report performance against these performance benchmarks using prescribed methodologies that are designed to ensure rigour and integrity of the Program.

Performance that meets benchmark levels will be acknowledged via a Star Rating system.

Participants will need to enter into a formal agreement to measure and report on performance, and to use competent people in undertaking tasks under this Program. IAL and IPWEA will administer the program, including co-ordinating training needs, and providing Program reports to participants to enable them to gauge their relative progress toward acceptable performance benchmarks.

IAL will also discuss the proposed Program with Victorian water authorities with a view to obtaining support and their imprimatur for the Program.

We genuinely seek your feedback on this proposed Program, particularly whether it will assist you to progress toward performance benchmarks, whether it is practically reasonable for your organisation to undertake the proposed measurement and reporting, and whether the proposed formal agreement is acceptable to your organisation. Where you have an issue with what is being proposed please clearly explain the basis of your issue in your comments, together with a proposed solution to the issue that you feel may also be acceptable to other prospective participants.

Your comments are sought by 15 December 2010, with a view to formally commencing the program in April 2011.

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1. Background

IAL conservatively estimates that open space managers with average irrigation performance could readily make over 20 percent water savings through improved irrigation practice. In some jurisdictions there are policy, regulatory and/or funding frameworks to encourage the adoption of best practice open space irrigation including specification of expected performance benchmarks, requirements for irrigation event scheduling, implementation of an operation and maintenance plan, and regular performance auditing and reporting. However, in Victoria, there is no such framework at this stage. Irrigation Australia Limited (IAL) and the Victorian branch of Institute of Public Works Engineers Australia (IPWEA-Vic) have therefore jointly initiated the development of a *Victorian Playing Fields Water Savings* program with a view to implementing a co-ordinated approach to assist open space managers to progress toward best practice irrigation.

There are significant benefits for participants in participating in this Program, including:

- a structured and supportive means of making water savings through improved irrigation practice;
- better playing surfaces;
- on-going cost savings associated with water savings; and
- networking and comparing challenges and performance with other open space managers across Victoria.

IAL and IPWEA are very keen that the Program is developed in full consultation with participants to ensure that they:

- have ownership of the Program in which they participate;
- understand the rationale and content for the Program; and
- very importantly, that it meets the needs of participants, providing the right tools to help them progress toward best practice irrigation.

IAL and IPWEA held a workshop on 4 August 2010 with 16 participants from 10 separate local governments across Victoria, as an initial step in developing the Program, and to discuss how the program might be structured. A list of workshop attendees is provided at Attachment A.

This workshop resulted in general agreement for a Program vision and structure and to the preparation of this Discussion Paper to explore and recommend Program benchmarks, methods for measuring against performance benchmarks and reporting for these performance benchmarks. In addition to these matters, this Discussion Paper also proposes for discussion:

- an irrigation water use star rating scheme;
- content of a formal agreement for Program participants; and
- the establishment of a Program Steering Committee

IAL and IPWEA would like to formally commence the Program from April 2011. The steps required to commence the Program by this date are:

1. By 15 December 2010, workshop participants are requested to provide comment on this Discussion Paper to IAL at tim.gilbert@irrigation.org.au. While we encourage your comments to be wide ranging, the Discussion Paper includes recommendations and questions in highlighted boxes which we are specifically seeking your feedback on to help us to finalise the design of the program.
2. By end of January 2011 IAL and IPWEA will finalise a decision on the performance benchmarks, methodologies for measuring and reporting arrangements.
3. By early February 2011 IAL will write to prospective participants inviting them to formally join the program. This letter will advise you of the final program design, expectations of participants and seek a formal agreement between participants, IAL and IPWEA.
4. By 1 April 2011, participants will need to sign a formal agreement so that IAL and IPWEA can get administrative arrangements in place commensurate with the number of participants.

2. What Was Agreed at the Workshop?

The following matters were generally agreed by attendees at the 4 August 2010 workshop.

1. Program Vision

Attendees were generally comfortable with a Program vision being about “sustainable open space management”, where sustainable open space management encompasses not only efficient water use, but also the concepts of soil health, plant performance and environmental management which all need to be supported by organisational capacity.

Dr Bhakti Devi, formerly from the CRC for Irrigation Futures, has developed various definitions for sustainable urban irrigation. Perhaps the most relevant for this Program is:

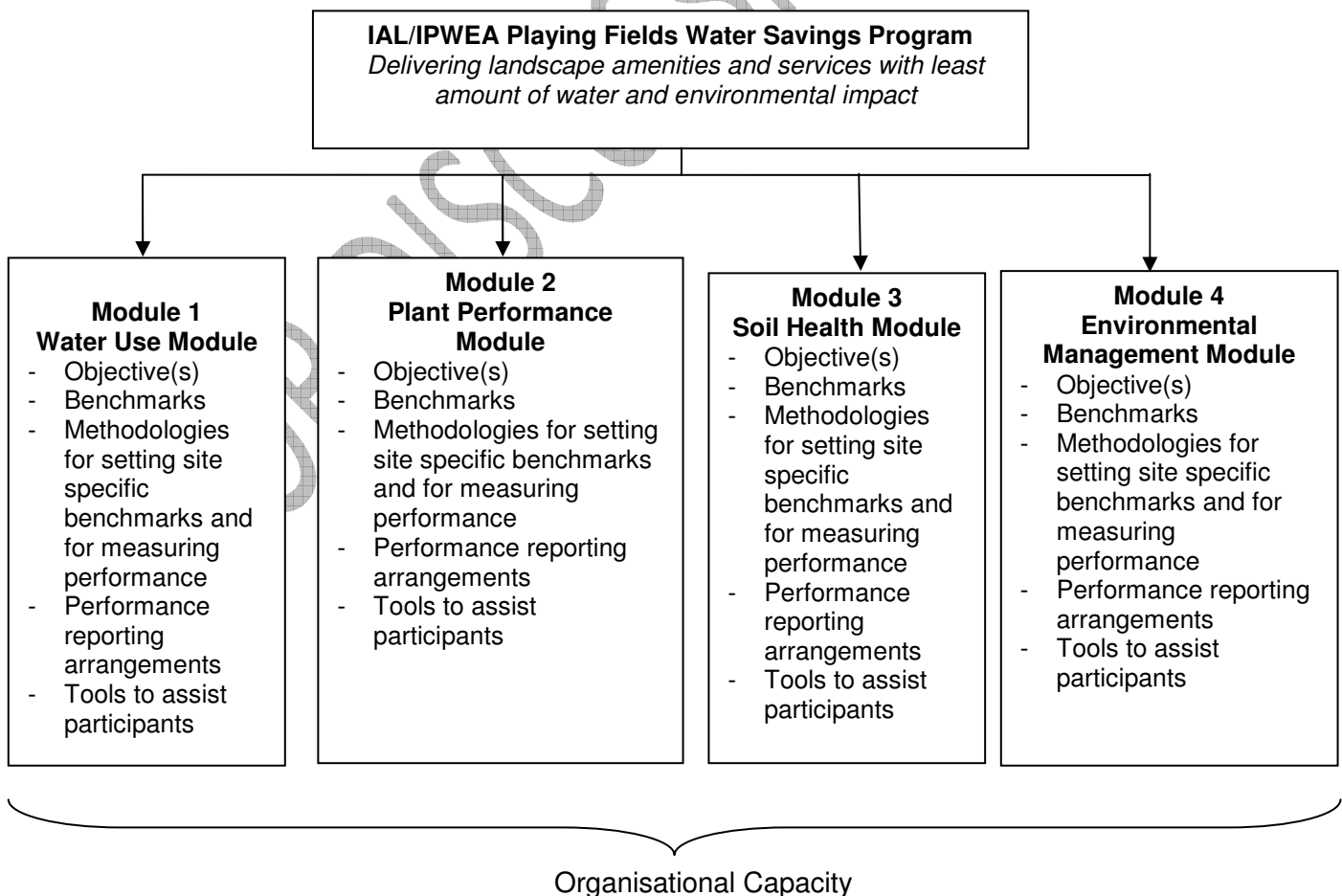
Delivering landscape amenities and services with least amount of water and environmental impact

Do you agree with this definition of sustainable open space management for the purposes of this Program?

2. Modular Program Approach

Attendees generally agreed that the Program should focus sequentially on each of the components of sustainable open space management listed above, to ensure both IAL/IPWEA and participants are not “biting off more than we can chew” at any point in time, and to avoid the Program being too overwhelming and complex for prospective participants in the first instance. Given this, the proposed structure of the Program is shown in Figure 1 below.

Figure 1 – Program Structure



3. *Develop the Modular Approach into a Star Rating Scheme*

Attendees generally agreed that the Program should have a robust star rating scheme to recognise organisations that achieve benchmarks established by the Program. The star rating scheme:

- enables immediate self promotion for those organisations already operating at benchmark performance levels;
- inspires progression toward benchmarks by organisations not currently performing at benchmark levels;
- provides a guide to the community about the performance of open space managers; and
- potentially provides a policy and regulatory tool for government and water retailers if the Program is robust.

4. *Robustness of Program*

Attendees generally agreed that to get support from water retailers, and for the Program to have meaning and integrity, that the program needs to have clear, technically sound benchmarks, consistent methodologies for measuring performance against the benchmarks, and capacity for independent audit of achievement of benchmarks.

5. *Initial Focus on Water Use*

Attendees generally agreed that the initial module should be designed around the water use component of sustainable open space management because of the current public focus on water use efficiency, and the potential cost savings from improved water management. In particular, the initial water use module should focus on irrigation performance, which is a function of:

- Irrigation system performance (hardware); combined with
- Irrigation system management (operator knowledge and capacity).

Note: Following the workshop, Geoff Connellan and Tim Gilbert discussed the star rating scheme for sustainable open space management, and suggest that we have a 5 star rating system for the Water Use Module in the first instance, and that we can have a separate, but concurrent Sustainability Rating Scheme developed once subsequent modules are progressively developed. Why? Because the development and achievement of benchmarks for soil health, plant performance and environmental management may be some years in the future, and we feel it is important that some meaningful recognition is immediately available for achievement against water use benchmarks.

Do you agree with a Water Use module star rating system in the first instance, with a Sustainability Rating scheme to be developed subsequently?

6. *Water Retailer Support*

Attendees generally agreed that water retailer support would give imprimatur to the program. IAL intends to pursue this support once the program design is more certain.

3. The Water Use Module

3.1 Water use Module Objective

The workshop participants generally agreed that we need to be clear about what we are trying to achieve through the Water Use module. Is the module purely about water savings, or are we trying to achieve specified playing surface outcomes with least water? Quite clearly, the purpose of open space management is to provide playing surfaces that are fit-for-purpose, where water is but one input to the achievement of this outcome.

It is recommended that the objective of the Water Use Module is therefore to achieve a defined fit-for-purpose playing surface with the least volume of water.

3.2 Base Information Required

3.2.1 Defining Fit-for-Purpose

Given this objective, the Water Use Module will need to define fit-for-purpose classifications, so that irrigation water requirements can be determined at each site to meet these fit-for-purpose outcomes.

SA Water has already developed fit-for-purpose classifications as part of its published Irrigation Open Space Program (IPOS) Code of Practice. These classifications are:

- Class 1: Elite Sports Turf – state and national competitions eg MCG
- Class 2: Premier Sports Turf – state and regional competitions eg A grade cricket, football/athletics
- Class 3: Local Sports Turf – local competitions, local sports grounds and community parks
- Class 4: Passive Recreation reserve – non-sports turf, neighbourhood parks etc.

Note that SA Water IPOS Code of Practice advocates the following crop stress factors for each of these classes:

- Class 1: $K_s = 1.0$
- Class 2: $K_s = 0.6$
- Class 3: $K_s = 0.5$
- Class 4: $K_s = 0.4$

It is recommended that this Program adopt these SA Water IPOS fit-for-purpose classifications and crop stress factors.

3.2.2 Measuring Irrigation Water Use (ML/year)

While Irrigation Water Use does not, on its own, relate to whether a fit-for-purpose outcome is achieved, it needs to be accurately measured to enable calculation of virtually every other water use benchmark, and to enable comparison of your own water use performance over time. Irrigation water use is therefore a fundamental measure for this program and needs to be accurately measured.

Program Requirements for Measuring Water Use

A meter will need to be installed to measure the irrigation water used at playing fields registered for this Program. That is, the meter must be located so that it is only measuring irrigation water use and not any ancillary uses such as club house – toilets, showers, canteen use etc.

It is recommended that this Program require irrigation water use metering at each playing field registered with the Program.

Reporting of Irrigation Water Use

The metered water use will need to be reported annually.

3.2.3 Measuring Site Rainfall (mm)

Rainfall at the site will need to be measured to enable calculations of effective rainfall to discern between irrigation performance and total plant water needs.

Program Requirements for Measuring Rainfall

Rainfall will need to be measured on-site by rain gauge, automated weather station or by an alternative suitably located weather station deemed acceptable by the IAL such as a nearby BoM station etc.

It is recommended that this Program require site rainfall measurement.

Reporting of Rainfall

Monthly records of site rainfall depth need to be kept by the participant.

While there are some complicated methods available for deriving “effective rainfall” from rainfall data, for the purposes of simplicity and consistent with SA IPOS, it is recommended that effective rainfall be assumed at 50% of total rainfall.

Any comment on this assumption about the relationship of effective rainfall to measured rainfall?

Do you have any other methods that may be simply and understandable for other participants?

3.2.4 Determining Plant Water Needs at each Site (ML/year)

Plant water requirements for the site will need to be calculated to enable you to develop an irrigation schedule and to calculate some of the proposed Program benchmarks.

Annual plant water requirements can be calculated by aggregating monthly plant water volume requirements for the site determined using the methodology set out in IAL's *Irrigation Efficiency Course: Resource Manual: 2010 Edition* (reference pg 79), or another methodology approved by IAL. Note your selection of a Landscape Coefficient will need to be justified in relation to the defined fit-for-purpose classification of the site.

The actual plant water requirements at your site can be refined over time based on refinement of crop factors such as microclimate factor, provided any changes are properly justified in the next Annual Return.

3.3 Proposed Water Use Module Performance Benchmarks

IAL is keen to include only critical benchmarks to ensure the Program remains practical and viable for participants. The more benchmarks included in the Program then the more resources required by participants to measure and report against those benchmarks. So, IAL is looking for benchmarks that are most critical to understanding good irrigation practice that ensures fit-for-purpose outcomes are achieved.

The Water Use Module performance benchmarks need to address three types of water use matters, namely:

- Irrigation system performance benchmarks (hardware);
- Irrigation system management benchmarks (operation); and
- Water Use (ultimate outcome).

It is recommended that critical benchmarks under these headings are:

- Irrigation System Performance benchmarks:
 - Distribution Uniformity
- Irrigation System Management:
 - Irrigation Index
 - Operation and Maintenance Plan
 - Irrigation Schedule
- Water Use:
 - Application Rate (ML/ha/year)
 - Comparison of Irrigation Water Use against Benchmark year

These proposed benchmarks are explained in more detail in subsequent sections of this Discussion Paper, with discussion about the purpose of each of these benchmarks, and how the benchmarks would need to be measured and reported.

The language about the methodologies is purposely quite strict, as the Program needs to have rigour if:

- the star rating system is to have integrity; and
- the Program is to be supported by water retailers.

Note that some of the benchmarks are Program benchmarks and would be applied equally to all participants, while other benchmarks would need to be determined by participants on a site specific basis at the commencement of the Program using the methodology specified.

Taking into consideration the measuring and reporting requirements for each proposed benchmark described below, which benchmarks do you think are reasonable to include in the Program?

Are the proposed performance benchmark levels reasonable?

Are the methodologies for measuring performance against the benchmarks reasonable?

Are the measuring and reporting requirements for each benchmark reasonable?

Can any of the proposed benchmarks be modified to make them more practical for you?

Are there any potential benchmarks that have not been described below, that would be useful in driving efficient water use or improved irrigation practice at your playing fields?

3.3.1 Irrigation System Performance Benchmarks

3.3.1.1 *Distribution Uniformity (DU)*

About DU

Distribution Uniformity (DU) is a key measure of the irrigation system performance, and the evenness with which water is applied to an irrigation area by the system. The higher the DU the less total water that is required to provide minimum adequate plant water to the worst performing parts of an irrigation system.

DU is a key measure for playing fields where the entire surface is typically covered by the same plant material with same or similar root zone profile. It is also a key measure that enables comparison of systems and system performance between sites because it is independent of geographic and climatic parameters.

DU is measured as the lowest quarter distribution uniformity (LQDU) which means the average of the lowest quarter of irrigation depth measurements divided by the average of all irrigation depth measurements across the site, multiplied by 1000. That is:

$$DU = (\text{Average lowest 25\% irrigation depth readings} / \text{average of all irrigation depth readings}) \times 1000$$

Setting a Program Benchmark for DU

The DU is a universal measure, and so a Program benchmark can be reasonably set. The Water Services Association of Australia and IAL's *Urban Irrigation: Best Management Practices in May 2006* advocates a minimum LQDU of 75%, and SA Water IPOS advocates a DU greater than 75%.

It is recommended that the Program DU benchmark be set as a minimum LQDU of 75%.

Measuring and Reporting DU

The DU can be determined by a suitably trained staff member, or by a consultant that is an IAL Certified Irrigation Designer or an IAL Certified Irrigation Agronomist. In either case, the DU must be determined in accordance with the methodology specified in IAL's *Irrigation Efficiency Course: Resource Manual 2010 Edition* (Evaluation Procedures) ie a catch can test.

The DU must be determined at least once every two years (bi-annually) or whenever there has been any significant change or upgrade to the irrigation system, its pumps or water supply.

IAL will accept the results

Note also that some other Water Use Module benchmarks will need to be amended according to actual DU measurement.

3.3.2 Irrigation System Management Benchmarks

3.3.2.1 Irrigation Index

About Irrigation Index

The Irrigation Index (II) is a measure of the overall effectiveness of irrigation practice, essentially comparing the actual water use against estimated plant water needs. There is some overlap with DU, but II will also account for other factors such as losses from percolation and surface runoff, so accounts better for overall irrigation practice.

The II is a ratio calculated by dividing the sum of irrigation depths and effective rainfall by the estimated depth of plant water demand at the site. That is:

$$II = (\text{Annual Irrigation Depth (mm)} + \text{Effective Rainfall Depth (mm)}) / \text{Estimated Plant Water needs (mm)}$$

Note that the irrigation depth will include the inefficiency inherent in DU performance.

An II ratio of 1.0 reflects perfect performance, an II ratio less than 1.0 indicates possible under-watering and potential for the fit-for-purpose outcome to be compromised, and an II ratio greater than 1.0 suggests water wastage.

Setting a Performance Benchmark for Irrigation Index

A reasonable maximum II ratio for this program is proposed as 1.3. In proposing this maximum II IAL has taken into account that there will inevitably be:

- minor losses through direct evaporation; and
- excess water applied due to imperfections in the irrigation system hardware (and thus a DU benchmark at 75% rather than 100%).

For the lower end of the II range IAL is proposing an II of 0.9. This lower II benchmark effectively permits a 10 percent error margin for under-watering. While subjective, this benchmark essentially discourages water use that doesn't enable the achievement of the defined fit-for-purpose management outcome. ie if you are going to use water, ensure it effectively achieves a desired management outcome or else any water used could be considered as wasted.

It is recommended that the Program benchmark for the Irrigation Index be set as a range between 0.9 to a maximum of 1.3.

Measuring and Reporting II

The II will need to be calculated and reported annually using:

- metered annual irrigation water use (divided by the irrigated area to provide an irrigation depth);
- rainfall depth measured over the same annual period (where effective rainfall can be assumed at 50% of total rainfall); and
- annual plant water requirements for the site (calculated as per section 3.2.4).

3.3.2.2 Irrigation System Operation and Maintenance Plan

About an Irrigation System Operation and Maintenance Plan

Poor design, operation and/or maintenance practices are key causes of low distribution uniformity and poor water use outcomes from irrigation systems.

The irrigation system design is obviously an inherent feature of existing irrigation systems. However, good, on-going operation and maintenance practice can be achieved by having a clear irrigation system operation and maintenance plan that provides instruction and guidance to staff about the irrigation system. Having an operation and maintenance plan is also about raising organisational capacity to achieve water use benchmarks and sustainable open space management.

Note that the Operation and Maintenance Plan would also provide IAL with information from participants about training needs, so that IAL is able to co-ordinate and address collective training needs.

Setting a Program Benchmark for an Operation and Maintenance Plan

The Program benchmark will be to have prepared a current Operation and Maintenance Plan for each playing field registered for this Program, where the Operation and Maintenance Plan addresses, at a minimum, the matters listed in Attachment B.

Measuring and Reporting

The measure of this performance benchmark will be:

- the existence of an Operation and Maintenance Plan addressing all matters listed at Attachment B; and
- the Plan is readily available to your irrigation staff, and they understand and use the Operation and Maintenance Plan; and
- clear records are maintained to demonstrate the implementation of this Operation and Maintenance Plan eg site diary or checklists.

It is recommended that a Program benchmark be set requiring participants to have an Operation and Maintenance Plan that includes the information set out in Attachment B, and records to demonstrate the Plan is implemented as a matter of routine.

3.3.2.3 Irrigation Event Schedule

About Irrigation Scheduling

Irrigation scheduling involves determining when and how much water should be applied by irrigation to ensure that the plant water requirements to maintain the fit-for-purpose outcomes are met, and to avoid excessive water wastage does not occur. Having an irrigation event schedule is also about raising organisational capacity to understand tasks required to achieve water use benchmarks and sustainable open space management.

Setting a Program Benchmark for an Irrigation Schedule

The Program benchmark will be to have a current irrigation schedule for each playing field registered for this Program, where the irrigation schedule is determined in accordance with one of the methods specified in Attachment C. The schedule must account for rainfall.

Measuring and Reporting

The measure of achievement of this performance benchmark will be:

- the existence of an irrigation schedule, or systems to check the correct schedule where the schedule is set by an automated approach (soil sensor or rain sensor);
- the irrigation system is set to the correct irrigation schedule (month or season) at any point in time.

It is recommended that a Program benchmark be set requiring participants to have an irrigation schedule determined in accordance with accepted methodologies listed in Attachment C.

3.3.3 Water Use Benchmarks

3.3.3.1 Application Rate

About Application Rate

There are at least two potentially useful measures of application rate for this program, namely:

- ML/ha/year; and
- ML/player hour.

The benchmarks for both these parameters would need to be set on a site specific basis, taking into account the fit-for-purpose classification of the playing fields, and site parameters like turf type, climate, and soil type.

IAL has given some consideration to ML/player hour as raised at the workshop. IAL appreciates that this measure enables the community to make the connection between the water use and the extent to which the field is used, and that it may be useful if the open space manager where there is a cap on water use at the site. The ML/player hour can then be used to directly show the community the number of teams that can play and train, or to explain restrictions to training regimes etc. However, while it may be a useful management tool for community relations, it is not recommended as a measure of water use for the purposes of this Program for two reasons:

- a) the objective of this Water Use Module is about meeting fit-for-purpose outcomes using the least water, not capping water use and thereby potentially limiting fit-for-purpose outcomes; and
- b) more importantly, it would be difficult to establish a robust and auditable measure of player hours, or relative impacts of various sports, age group differences etc.

Setting a Benchmark for Application Rate (ML/ha/year)

A site specific application rate will need to be determined, as it will relate to the fit-for-purpose classification, the soil type and local climate.

To set a benchmark for application rate the participant will need to:

- calculate annual water volume requirements for the site by aggregating monthly water volume requirements for the site determined using the methodology set out in IAL's *Irrigation Efficiency Course: Resource Manual: 2010 Edition* (reference pg 79), or another methodology approved by IAL. Note:
 - your Ks value needs to be appropriate for your fit-for-purpose classification of the site (see section 3.2.1);
 - the DU used in the calculation of application rate must be the actual current DU at the site, as determined from the most recent irrigation system audit undertaken at the site. Consequently, you will need to adjust your application rate benchmark following each irrigation system audit or where you have made improvements to DU following an audit.
- divide annual water volume requirements by the irrigated area (ha), where the irrigated area is determined by either direct measurement, GIS, irrigation system design drawings or from certified survey drawings, or another methodology approved by IAL.

This will provide the maximum application rate benchmark for your site, and form part of your formal agreement with IAL and IPWEA. This would need to be done at the commencement of participation in the Program for each playing field registered under the Program.

It is recommended that each Program participant set an application rate benchmark for each playing field registered under the Program using the methodology set out above.

Measuring Application Rate (ML/ha/year)

The actual application rate can be determined by dividing the aggregate of the metered annual volume of water use and effective rainfall volume by the irrigated area.

Reporting Application Rate (ML/ha/year)

Application rate must be determined and reported annually.

3.3.3.2 Water Use Against Benchmark Year

The comparison of your irrigation water use against a benchmark year will enable you to assess your progress in improving irrigation practice and water use at your playing fields.

The benchmark year should be set at the first full year for which you have reliable water use data for each playing field registered as part of this Program. For some, this may be after the first year of the Program using data from the installed site meter.

The comparison should be undertaken by dividing the current years metered irrigation water use by the water use in the benchmark year to determine the percentage decrease (or increase) in water use.

$\text{Change in water use} = \frac{\text{Current year irrigation water use (ML)}}{\text{Benchmark Year irrigation water use (ML)}} \times 100$

This should be calculated and reported annually.

3.3.4 Summary of Performance Benchmarks

Benchmark Type	Measure	Benchmark	Measurement Methodology	Frequency of Measuring	Frequency of Reporting
Irrigation System Performance	Lowest Quarter Distribution Uniformity	75%	Catch Can test - Irrigation System Audit	Biannually	Annually
Irrigation System Management	Irrigation Index	Ratio of water used to plant water needs is between 0.9 and 1.3	Calculated from: <ul style="list-style-type: none"> • Rainfall data • Irrigation water use • Plant water needs calculated using IAL's <i>Irrigation Efficiency Course: Resource Manual: 2010 Edition</i>, or another methodology approved by IAL. 	Annually	Annually
	Operation and Maintenance Plan	O&M Plan with information as per Attachment B	Plan is readily available to and understood by staff and there is evidence of routine implementation.	Annually	Annually
	Irrigation Schedule	Irrigation Schedule developed using Methodology at Table 1	Schedule determined using acceptable methodologies specified at Attachment C, and system is set to appropriate schedule at all times	Seasonally	Annually
Water Use	Application Rate	Site Specific set by dividing annual water volume requirements by the irrigated area	By calculation from: <ul style="list-style-type: none"> • Metered irrigation water use • Rainfall measurements and • Irrigated area 	Annually	Annually
	Comparison of Water Use Against Benchmark Year	Benchmark year	Calculated by determining the percentage change in irrigation water use relative to benchmark year, using water meter data.	Annually	Annually

3.4 Annual Reporting

The Program will need Annual Reports for each playing field registered under this Program to enable:

- you to assess your own progress;
- IAL to confirm and audit appropriate star ratings for each site if necessary;
- IAL to assess whole Program progress, and to report back to participants their performance against the collective performance of all participants in the Program.

IAL will prepare an Annual Report template for participant use. Be assured, the Annual Report will be brief and related only to information on benchmarks, and supporting information required to verify information in the Annual Report for the purposes listed above.

3.5 Proposed Water Use Module Star Rating Scheme

There are six benchmarks proposed for the Water Use Module in section 3 that relate to water use, irrigation system performance and organisational capacity. All these benchmarks, with the exception of Comparison of Water Use Against Benchmark Year, could be used as the basis of a Star Rating system for this Module, that support the Program structure and the objective for this Module. The reason that Comparison of Water Use Against Benchmark Year is not suitable for use in the star rating is that, if used, it could potentially reward poor initial performance.

The star rating system will:

- apply to individual playing fields/sites registered under this Program, and not to participant organisations;
- commence at the end of the first Program year, once the first Annual Reports have been assessed by IAL and a star rating confirmed for the site.

IAL is proposing a six star rating system which requires as pre-requisites:

- a meter and an approved method for rainfall measurement at the site;
- a minimum 65% DU before any further stars can be credited, as below this level the irrigation system is unacceptable.

Stars ratings would be issued by IAL on the basis of the information contained in the Annual Report. IAL would undertake some auditing of Annual Return information to ensure the on-going integrity of the whole star rating system.

The proposed star system is shown in the table below.

Table 1 – Proposed Star Rating Scheme

Compulsory	Stars	Benchmark	Purpose
Y	1	DU between 65% and 75%	Recognises good Irrigation System Performance, especially since there may be many existing systems that may be operating optimally, but due to inherent design flaws are operating with DU < 75% benchmark
N	2	DU above 75%	Recognises Irrigation System Performance at Program benchmark
N	1	Irrigation Index between 0.9 and 1.3	Recognises Irrigation System Management at program benchmark
N	1	Implementing a complying Operation and Maintenance Plan	Recognises good Irrigation System Management and Organisational Capacity
N	1	Implementing an acceptable Irrigation Schedule	Recognises good Irrigation System Management and Organisational Capacity
N	1	Meeting site specific application rate benchmark for preceding year	Recognises ultimate site specific Water Use Goals

So, for example, playing fields that have:

- a DU of 70% and an acceptable Operation and Maintenance Plan only. ★★
- a DU of 76%, an acceptable Operation and Maintenance Plan and an acceptable Irrigation Schedule ★★★★★
- a DU of 79%, an acceptable O&M Plan and Irrigation Schedule, a complying Irrigation Index, and meet their site specific application rate. ★★★★★★

Importantly, the star rating scheme would need to be owned by IAL, as the ability to confirm, issue and audit the star rating to an organisation needs to have independence. IAL may permit the star rating scheme to be used by others (such as water authorities) by IAL agreement.

IAL will develop some guidance on acceptable use of the star rating system which would need to be strictly complied with to preserve its integrity. The guidance would be around how and when the star rating scheme can be used eg after annual confirmation by IAL based on information contained in Annual Reports etc.

It is recommended that this star rating scheme be adopted as it is:

- **robust, being directly based on meaningful, consistently measurable and auditable benchmarks for water use at playing fields; and**
- **is simple to understand for participants, the public and to water authorities if they would like to support the Program.**

3.6 Formal Agreements with Participants

If the Program is to have integrity and robustness, then participation needs to be formalised through either Letter of Agreement or a Memorandum of Understanding (MoU) between the stakeholders. In either case, such an agreement needs to:

- define the playing fields covered by the Agreement – which gives participants the opportunity to include some or all of their playing fields, commensurate with their ability and willingness to participate;
- specify agreed performance benchmarks for each site;
- specify the actions to be undertaken by stakeholders;
- require participants to ensure that demonstrably competent people are undertaking the actions covered by the commitment – which means the people are either appropriately qualified, or hold relevant IAL Certification. This can either be through your own staff obtaining qualifications or Certification or through contracting in appropriate competency.
- specify consistent methodologies for collecting and reporting information for the Program, especially if it is to be linked to a credible public star rating scheme.
- require information collected by participants in audits, improvement plans etc to be made available to IAL for Program purposes only – ie would not be used for any other purpose without the express permission of the participants.

There has been some discussion with some participants post the 4 August 2010 workshop that such an agreement should be between participants and water authorities, as water authorities would provide more imprimatur to the Program. While this would be ideal, and while IAL intends to discuss the Program with water authorities once the Program is more precisely defined (following your feedback on this Discussion Paper), at this stage we do not have water authority support.

Nonetheless, for the purposes of this Discussion Paper, IAL has prepared a draft Agreement at Attachment D, for which we seek your comment.

Is the Agreement at Attachment D clear, understandable and practical for you as a Participant?

Are there things missing from the Agreement?

Is there a better format that you, as a prospective participant, would be more comfortable with, but that still maintains appropriate commitment and robustness for the Program?

4.0 Proposed Program Governance

The formal agreements will define the relative roles of individual participants, IAL and IPWEA. Essentially participants will be responsible for implementing actions to progress toward Program and site specific performance benchmarks, IAL and IPWEA will be responsible for administering the Program, and IAL will be responsible for administering the star rating scheme.

However, we are also keen for there to be an inclusive Program governance model that provides a mechanism for:

- review of Program from time to time;
- regular discussion and mulling of new ideas for the Program and collective participant needs;
- providing guidance to IAL and IPWEA to resolve any other matters that may arise in Program implementation.

We therefore recommend that we establish a Program Steering Committee to provide this review, regular input and guidance.

It is recommended that the Program Steering Committee be comprised of:

- One IAL representative;
- One IAL member representative;
- One IPWEA – Vic representative;
- Three current Program participants;
- One water authority representative;
- One Parks and Leisure Association representative

subject of course to agreement by each of these organisations.

Do you agree with the need for a Program Steering Committee?

Are the proposed functions of this Steering Committee appropriate? Are there more or different functions it could or should serve?

Are the proposed representatives appropriate?

Would you or your organisation be willing to participate on this Steering Committee?

**Attachment A
4 August 2010
Workshop Participants**

No	Name	Organisation	Position
1	Geoff Connellan	G&M Connellan Consultants	Principal
2	Michelle Ritchie	City of Port Phillip	parks&open space tech office
3	Nigel Fernando	Darebin City Council	Coordinator of turf management
4	Nick Mazerella	Darebin City Council	Manager Major Projects & Transport
5	Richard Dilena	City of Greater Geelong	Irrigation Officer
6	Marcus van Enk	JHL Civil Pty Ltd	Director
7	Vaughan Carlin	Transfield Services	Contract Manager
8	Anne Miller	City Of Greater Geelong	Water Management Officer
9	Greg Powell	Mornington Peninsula Shire Council	
10	Heath Gillies	Frankston City Council	Team Leader Active Reserves
11	Russell Beer	Shire of Melton	Parks Coordinator
12	Barkley Vincent	Ararat Rural City Council	Municipal Recreation Officer
13	Jason Hocking	City of Yarra	Coordinator Open Space Maintenance
14	Jamey Mullen	Latrobe City Council	Manager Recreational Liveability
15	Maree Keenan	City of Greater Dandenong	Parks Services Team Leader
16	Phil Robertson	City of Greater Dandenong	Operations Business Unit Leader
17	Fernando Garcia	Barwon Water	Senior Water Conservation Officer
17	Ross McKay	Rosebud Irrigation	IAL Southern Victorian Regional Chair
18	Anne Gibbs	IPWEA - Vic	CEO
19	Tim Gilbert	IAL	Industry Development Manager

ATTACHMENT B

Minimum Information Requirements in an Irrigation Operation and Maintenance Plan

System description

- Equipment inventory – type, manufacturer, date of installation, maintenance requirements, performance expectations, location of equipment specification information
- Spare Parts inventory
- Design performance measures/expectations

Routine Operation and Maintenance Activities

- Start up procedures
- Shut Down procedures
- Daily operational tasks – including record keeping/checklist
- Daily maintenance tasks – including record keeping/checklist
- Quarterly maintenance tasks – including record keeping/checklist
- Annual tasks – including record keeping/checklist

Performance Monitoring/Auditing

- When
- How/Methodology

System Performance Reporting

- To Whom
- When
- What to Report

Emergency Response Action Plan

- When
- Immediate Actions to Take
- Who to Contact
- Where can Professional help be obtained

Employee Training

- Inductions to this O&M Plan
- Minimum qualifications/competencies for each task
- Training Needs Analysis – where existing staff qualifications/competencies do not meet needs for each task, and where participant does not want to contract in external competency for these tasks.
- Where to Get Training

ATTACHMENT C
Acceptable Scheduling Methods and Relevant References

Scheduling method		Requirements	Online references on methodology
Plant stress symptoms		<ul style="list-style-type: none"> minimal 	Connellan G (2002) Efficient irrigation: A reference manual for turf and landscape
Soil water	Soil water sensor	<ul style="list-style-type: none"> on site calibration 	Agfact: AC27 Soil water monitoring: choosing the right device
	Soil suction sensor	<ul style="list-style-type: none"> soil calibration 	Giddings J(2005) Tensiometer tips, NSW Industry & Investment
	Feeling the soil	<ul style="list-style-type: none"> skilled person 	US Department of Agriculture: Estimating soil moisture by feel and appearance
Weather methods	ET models	<ul style="list-style-type: none"> soil water holding capacity crop coefficient daily weather water balance sheet 	Connellan G (2002) Efficient irrigation: A reference manual for turf and landscape Or IAL Irrigation Efficiency Course: resource Manual 2010 Edition
	Pan evaporation	<ul style="list-style-type: none"> soil water holding capacity crop factor daily pan data simple water balance model 	Connellan G (2002) Efficient irrigation: A reference manual for turf and landscape Or IAL Irrigation Efficiency Course: resource Manual 2010 Edition
Rain*	Rain gauge	<ul style="list-style-type: none"> can be used in all methods 	Literature is available from various manufacturers
	Rain switch	<ul style="list-style-type: none"> minimal water savings on sites watered less often than twice a week 	

*required by all methods of irrigation scheduling

ATTACHMENT D
DRAFT MEMORANDUM OF UNDERSTANDING



Memorandum of Understanding

between

Irrigation Australia Ltd

and

Institute of Public Works Engineers Australia Ltd (Victoria)

and

<Participant Details>

1. Purpose of Memorandum of Understanding

This Memorandum of Understanding sets out the basis for co-operation and partnership between Irrigation Australia Ltd (IAL), the Institute of Public Works Engineers Australia (Victoria) and <Participant details> to participate in a Playing Fields Water Savings Program.

2. Definitions

For the purposes of this Memorandum of Understanding:

IAL means:

Irrigation Australia Limited. IAL is Australia's peak irrigation industry group representing the whole of the irrigation industry services chain from research, to irrigation consultants, engineering designers, equipment suppliers, installers and irrigation operators. IAL's mission is to lead the industry to provide best practice irrigation to underpin healthy, sustainable Australian communities and lifestyles.

IPWEA (Vic) means:

the Institute of Public Works and Engineers Australia (Victoria). **Anne – a short spiel on IPWEA**

MoU means:

this Memorandum of Understanding.

Program means:

the Playing Fields Water Savings program – a joint initiative between IAL, IPWEA and participating open space managers.

the objective of this program is to assist open space managers to deliver sustainable landscape amenities and services through a series of Modules, the first being a Water Use Module.

Public Open Spaces means:

the following public open spaces under the management and control of <Participant details>:

- Site 1 – Location and description (including area(ha), type of irrigation system and fit-for-purpose classification)
- Site 2 – Location and description (including area(ha), type of irrigation system and fit-for-purpose classification)
- Site 3 etc etc

3. Objectives of the Water Use Module

The purpose of this MoU is to establish commitment to agreed processes for a Water Use Module which has an objective to assist participants achieve a defined fit-for-purpose playing surface with the least volume of water.

This Water Use Module objective will be achieved through:

- 1) specifying acceptable irrigation system and management performance benchmarks;
- 2) ensuring the tools and management systems needed to achieve and maintain specified irrigation system performance and management benchmarks are developed, available and understood by participant organisations;
- 3) linking participant organisations with either training for, or access to professional, competent irrigation services where necessary to achieve specified irrigation system performance benchmarks; and
- 4) refining the Program and tools based on feedback from Program participants.

Further Program Modules can be added at later stages of this Program at the agreement of all parties.

4. Functions and Agreed Actions

4.1 <Participant details> agrees:

General

- 4.1.1 for information and data collected under the terms of this MoU to be used to prepare Program related reports and materials for dissemination to other Program participants – but not to be used for any commercial purpose without the express permission of <Participant Details>.
- 4.1.2 to abide by any guidance or instruction provided by IAL in relation to the use of a star rating system for achievement of benchmarks under this Program.
- 4.1.3 to assist in preserving the integrity of the Program by measuring and reporting performance accurately.

Installations

- 4.1.4 to install and maintain meters to measure irrigation water use (only) at Public Open Space sites listed at section 2 of this MoU.
- 4.1.5 to install and maintain equipment to measure rainfall at Public Open Spaces listed at section 2 of this MoU, or to obtain rainfall data from an alternative, suitably located weather station deemed acceptable by the IAL.

Develop Site Specific Benchmarks for Application Rates

- 4.1.6 to undertake and record the results of a base audit of irrigation systems:
- 4.1.6.1 to determine current lowest quarter Distribution Uniformity (%) for irrigation systems at each Public Open Space site listed in section 2 of this MoU, in accordance with the methodology specified in IAL's Irrigation Efficiency Course: Resource Manual 2010 Edition (Evaluation Procedures),
 - 4.1.6.2 to determine benchmark year annual water use (ML/year) at each Public Open Space site listed in section 2 of this MoU;
 - 4.1.6.3 to determine plant water needs for each Public Open Space site listed in section 2 of this MoU using the methodology set out in IAL's Irrigation Efficiency Course: Resource Manual: 2010 Edition (reference pg 79), or another methodology approved by IAL.

Note: a base audit is not required if the participant has undertaken an audit of the irrigation system within the past 12 months prior to the commencement of this MoU, provided the audit was undertaken using an appropriate methodology.

- 4.1.7 to use the results of the base audits, and in consultation with IAL and IPWEA, set site specific performance benchmarks for each Public Open Space site listed in section 2 of this MoU.
- 4.1.8 to lodge with IAL and IPWEA, as an addendum to this MoU, a full set of performance benchmarks for each Public Open Space site listed in section 2 of this MoU. The set of performance benchmarks will be lodged in the format shown below in Table 1 below, together with the results of the base audit and calculations of site specific application rates.

Table 1: Irrigation System Performance Benchmarks

Public Open Space Site No.	Performance Benchmark			Annual Plant Water Needs (ML/yr)	Benchmark Year Water Use (ML)
	Lowest Quarter Distribution Uniformity (%)	Irrigation Index	Site Specific Application Rate (ML/ha/year)		
	75%	0.9 – 1.3			
	75%	0.9 - 1.3			
	75%	0.9 – 1.3			
	75%	0.9 – 1.3			

Operational Activities

- 4.1.9 to undertake all works and actions to progress toward the achievement of the performance benchmarks specified in Table 1 for each Public Open Space site.
- 4.1.10 where current performance determined from the base audit undertaken in accordance with 4.1.3 does not meet performance benchmarks for the corresponding Public Open Space site in Table 1, to develop an irrigation improvement plan to improve the system performance to meet the benchmarks. The irrigation improvement plan will:
- a. include dates for achievement of performance benchmarks set out in Table 1;
 - b. outline the measures that will be undertaken to achieve the performance benchmarks specified in Table 1; and
 - c. be submitted to the other signatories to this MoU – for the primary purpose of enabling other signatories to determine specific assistance they may be able to offer or assist to co-ordinate.

- 4.1.11 to develop and implement an irrigation system Operation and Maintenance Plan for each Public Open Space site listed in section 2 of this MoU, where the Operation and Maintenance Plan includes, but is not necessarily limited to, the matters listed in Attachment D1;
- 4.1.12 to develop and implement an irrigation event schedule for each Public Open Space site listed in section 2 of this MoU, using an acceptable methodology listed in Attachment D2.
- 4.1.13 to provide, in a timely manner after they come into existence, a copy of:
- a. base audit results/reports undertaken in accordance with this MoU;
 - b. any irrigation improvement plan developed as part of this MoU;
 - c. the results of any audit undertaken as part of this MoU;
 - d. operation and maintenance plans and irrigation schedules to the other signatories to this MoU.
- 4.1.14 to undertake an audit of the irrigation system at each Public Open Space listed in section 2 of this MoU at least once every two years and in accordance with the methodology specified in IAL's Irrigation Efficiency Course: Resource Manual 2010 Edition (Evaluation Procedures), and to use the results of these audits to:
- 4.1.14.1 report performance against the DU benchmark in the next Annual Report; and
- 4.1.14.2 adjust the site specific Application Rate performance benchmark using the results of that audit.
- 4.1.15 to ensure its staff have the competencies to undertake actions required under this MoU, or to otherwise engage Certified Irrigation Professionals where available and appropriate to undertake actions required under this MoU.

Annual Reporting Activities

- 4.1.16 to submit to IAL and IPWEA Annual Reports in the standard form template to be provided by IAL, using approved methodologies for measuring or calculating performance in the preceding year.

4.2 IAL agrees to:

- 4.2.1 develop and provide templates for:
 - a. Irrigation Improvement Plans; and
 - b. Annual Reporting.
- 4.2.2 co-ordinate, develop and/or deliver irrigation related training, to address training needs included in operation and maintenance plans submitted by <Participant Details> in accordance with 4.1.13. d. above to the extent that is practically and reasonably achievable.
- 4.2.3 prepare Program reports to enable <Participant Details> to compare its irrigation system and water use performance with the collective performance of all Program participants – the reports will not enable the performance of other individual participants to be determined.
- 4.2.4 administer a robust star rating scheme in relation to the achievement of performance benchmarks specified in Table 1, including confirming for participants each year the star rating that can be promoted for each Public Open Space site listed in section 2 of this MoU. The star rating will be confirmed on the basis of information accepted by IAL in the participants Annual Reports.
- 4.2.5 arrange and run, in partnership with IPWEA (Victoria), annual workshops with Program participants to develop a fellowship between participants and enable participant input and feedback to refine the Program.
- 4.2.6 provide <Participant Details> with any freely available technical information to assist them to meet irrigation system performance benchmarks.
- 4.2.7 refer <Participant Details> to IAL Certified Irrigation Professionals when competent irrigation services are needed for development of irrigation management plans, development of schedules, system auditing and system rectification.

4.3 IPWEA (Vic) agrees to:

- 4.3.1 promote the Program to its members.
- 4.3.2 assist IAL in the administration and implementation of the Program, including:
 - a. review of Program materials such as promotional materials, templates, reports etc;
 - b. promoting and arranging Program related events such as training or workshops;
 - c. enabling IAL or its representatives to, within reason, make presentations on the Program at IPWEA (Victoria) member functions.

ATTACHMENT D1

**Minimum Information Requirements in an
Irrigation Operation and Maintenance Plan**

System description

- Equipment inventory – type, manufacturer, date of installation, maintenance requirements, performance expectations, location of equipment specification information
- Spare Parts inventory
- Design performance measures/expectations

Routine Operation and Maintenance Activities

- Start up procedures
- Shut Down procedures
- Daily operational tasks – including record keeping/checklist
- Daily maintenance tasks – including record keeping/checklist
- Quarterly maintenance tasks – including record keeping/checklist
- Annual tasks – including record keeping/checklist

Performance Monitoring/Auditing

- When
- How/Methodology

System Performance Reporting

- To Whom
- When
- What to Report

Emergency Response Action Plan

- When
- Immediate Actions to Take
- Who to Contact
- Where can Professional help be obtained

Employee Training

- Inductions to this O&M Plan
- Minimum quals/competencies
- Training Needs Analysis – where existing staff qualifications/competencies do not meet needs for each task, and where participant does not want to contract in external competency for these tasks.
- Where to Get Training

**ATTACHMENT D2
Acceptable Scheduling Methods and Relevant References**

Scheduling method		Requirements	Online references on methodology
Plant stress symptoms		<ul style="list-style-type: none"> Minimal 	Connellan G (2002) Efficient irrigation: A reference manual for turf and landscape
Soil water	Soil water sensor	<ul style="list-style-type: none"> on site calibration 	Agfact: AC27 Soil water monitoring: choosing the right device
	Soil suction sensor	<ul style="list-style-type: none"> soil calibration 	Giddings J(2005) Tensiometer tips, NSW Industry & Investment
	Feeling the soil	<ul style="list-style-type: none"> skilled person 	US Department of Agriculture: Estimating soil moisture by feel and appearance
Weather methods	ET models	<ul style="list-style-type: none"> soil water holding capacity crop coefficient daily weather water balance sheet 	Connellan G (2002) Efficient irrigation: A reference manual for turf and landscape Or IAL Irrigation Efficiency Course: resource Manual 2010 Edition
	Pan evaporation	<ul style="list-style-type: none"> soil water holding capacity crop factor daily pan data simple water balance model 	Connellan G (2002) Efficient irrigation: A reference manual for turf and landscape Or IAL Irrigation Efficiency Course: resource Manual 2010 Edition
Rain*	Rain gauge	<ul style="list-style-type: none"> can be used in all methods 	Literature is available from various manufacturers
	Rain switch	<ul style="list-style-type: none"> minimal water savings on sites watered less often than twice a week 	

*required by all methods of irrigation scheduling