

Best Management Practices For Non-Agricultural Irrigation



**Recommended Guidelines for Efficient Use and Conservation of
Ornamental Landscape and Turf Irrigation Water in the Great Lakes Region**

Preface

Water is an extremely precious commodity. The demand for water continues to outpace availability in many areas of the country and the world. This raises concern that water consumption may become unsustainable for current and future uses without significant conservation measures, importation of water from other sources or a combination of both. These have been the primary driving forces behind developing water policy in Great Lakes Basin that will protect and sustain the water resources for current and future generations.

Non-agricultural irrigation is a process to supplement precipitation by artificial means, with the goal of maintaining soil moisture during the growing seasons of turf and ornamental plants. It is vital that a set of standards are formed that incorporate best management and conservation practices to protect the Great Lakes water resources from misuse.

Conservation measures as defined in this document are: *Any beneficial reduction in water loss, waste, or use accomplished by the implementation of water management practices and water-efficiency measures. Water management practices and water efficiency measures must be economically feasible based on a cost-benefit analysis that weighs both environmental and economic concerns.*

Maintaining healthy and visually pleasing turf and landscape plantings enhance our environment through improved aesthetics and provide recreational opportunities to the residents of the Great Lakes Basin.

Introduction

Irrigation management should include the stewardship of water quantity and quality, soil, plants and other natural resources resulting in environmental enhancement and recreational opportunities.

- Water Quantity – using water as efficiently as possible while providing for the needs of the plants. Many landscape plants require supplemental irrigation to meet their intended aesthetic or recreational function. Supplemental irrigation should equal the evapotranspiration rate of the plant being maintained minus any precipitation that occurred. Excessive irrigation is not only wasteful but can have a negative impact on plant health and water quality.
- Water Quality - irrigation at a rate equal or less than the infiltration rate of the soil. This prevents surface runoff and limits the off-site movement of sediment, pesticide and nutrients. Irrigation that exceeds the water holding capacity of the soil may lead to leaching of pesticides and nutrients. Maintaining a healthy plant cover increases soil infiltration rates and minimizes soil erosion and sedimentation of surface waters. This mitigates the effects of storm events and flooding.
- Soil Conservation – improving the physical, biological and chemical properties of the soil. A healthy plant cover provides for improved infiltration of rain or storm water and reduced erosion. A robust plant/soil system filters contaminants and ensures a healthy aquifer recharge.
- Plant Management – employing sound agronomic/horticultural practices, including irrigation, to maximize plant health and performance.

Within these guidelines resides a practical way to protect and conserve water resources through the **Design and Installation, Management, and Maintenance** of the irrigation system, with **Conservation** of water resources at the root of these principles.

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Design and Installation

Site assessment

- Obtain specific knowledge of the site conditions prior to designing that may include, but are not limited to, locations of structures, soil physical properties, microclimates, slope, root depth, plant material, climate, water source, and peak demand.
- The design should be based on a thorough evaluation of physical, environmental, and hydro-geologic site conditions.
- The designer/installer shall adhere to all applicable laws and regulations.

System planning for efficient and uniform distribution of water.

- Placement and spacing of sprinklers should be based on performance data and site specific considerations.
- Assure that the design will match precipitation rates of sprinklers within a control zone or group.
- All plants within a zone should have similar water requirements and root depths.
- Keep sprinkler base pressure within manufacturer's recommendations.
- The use of drip or micro irrigation will help to minimize runoff and water drift on to hardscapes.
- Watering cycles should be scheduled for times of low wind and low evaporation, whenever possible.
- Fully consider all water conserving technology.
- Sprinkler head location should take into account possible obstructions.
- The use of pressure compensating materials in the system will maintain water distribution uniformity throughout the zone.
- Both the design and the installation will incorporate appropriate pipe sizing throughout the system.
- The size and pressure of the specified water source shall be adequate to meet the peak demands of the system within a specified watering time window.

System integrity

- The system must be installed per the design and specifications to insure maximum efficiency and compliance with the designer's intent.
- The owner or the owner's representative will determine acceptable experience and qualifications of all potential installers.
- The installer will insure qualified supervision of the installation process.
- Final inspection and approval of the system shall be conducted by a qualified and authorized individual.

As-built, operation manual creation and system orientation with owner/manager

Documentation should include:

- A set of actual construction drawings, updated daily by the installing contractor and clearly annotated shall be kept during the construction process. The final as-built document should include the locations and sizes of the water meter, shutoff valves, backflow prevention device, mainline pipes, zone valves, lateral pipes, sprinklers, controller locations and sensors.
- Submit all manuals and printed instructions to the owner's designated representative.
- Submit a written manual of suggested maintenance of the system, including winterizing and start up procedures.

Management

Establish and assign management responsibility

- There shall be an individual designated as the system manager, who will be responsible for the management of the system.
- Appropriate personnel shall educate and train the system manager on proper use, operation and capacity of the system. This includes seasonal adjustments or system shutdown based on prevailing or impending weather conditions.

Scheduling

- The system manager should be given the base irrigation schedule that determines the initial frequency of operation.
- The irrigation schedule should be routinely modified based on plant health and vigor and should account for current and anticipated weather, pest pressure or other pertinent conditions.
- In order to prevent runoff, the irrigation schedule should not exceed the soil infiltration rate.

Monitoring

- The effectiveness of the system schedule should be evaluated by a daily assessment of plant material health and soil moisture.
- The irrigation schedule should be adjusted manually or automatically to avoid applying excessive irrigation water.
- The system manager, or another qualified designated entity, should routinely verify proper operation and performance of irrigation components.

Record keeping

- The system manager should record any changes or repairs to the irrigation system, record amount of water used, and record a system operation schedule that reflects seasonal and routine system adjustments.
- The system manager or designee must submit all mandated reports when required to do so.

Periodic changes, technological improvements, and upgrades

- The system manager should strive to stay abreast of and implement improvements that optimize efficiency and the conservation of water.

Maintenance

Routine inspections and repairs

- Periodically perform a thorough inspection of the system to verify that all components meet the criteria for efficient operation and uniform distribution of water, and repair or replace components as needed.
- As plant material matures, the system manager or designee should routinely review the property for landscape growth or changes that prevent the system from delivering uniform distribution of water.
- Smaller systems should be reviewed annually, large systems monthly.

Seasonal measures

- Qualified persons should perform the start up of the system in spring.
- Qualified persons should perform the shut down and winterizing of the system.
- Perform periodic visual inspections while the system is operating to check for needed repairs and adjustments.

Upgrades/replacement of obsolete materials

- System manager should strive to make improvements that provide greatest efficiency and conservation of water through the use of new products, and removal of outdated equipment.

Conservation

- Adhering to the measures outlined in this document will provide for efficient and optimal water use.
- Implementing these guidelines will result in well designed, properly installed, and effectively managed irrigation systems, which promotes conservation and protection of water resources.
- The system manager must be proactive in identifying the cause of irrigation related problems.
- Problems with plant and soil water relationships likely require a broad spectrum approach, involving a variety of disciplines to insure all appropriate measures have been explored to maximize water use efficiency.
- Efficient use of irrigation water will reduce water waste and help sustain the water resources of the Great Lakes Basin.
- Continuing education of non-ag irrigators and the public will lead to a better understanding of efficient water use and water conservation.
- Non-agricultural irrigation will be most effective when implementing a variety of techniques that result in water conservation. These techniques may include:
 - water audits
 - alternative plant species (drought tolerant plants)
 - reclaimed water and/or retained storm water
 - deficit irrigation scheduling
 - syringing
 - soil cultivation
 - soil amendments and wetting agents
 - soil and nutrient management
 - mulches

Summary

Greenspaces with proper irrigation provide receptive open spaces for groundwater recharge, which is a critical element in the hydrologic cycle. In addition, greenspaces break down harmful contaminants, trap dust, provide noise abatement, produce oxygen, create a cooling effect, prevent erosion and sedimentation, and create areas for habitat and recreation.

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Resources:

An electronic version of this document and a list of pertinent resources used in its creation are available at <http://www.turf.msu.edu/water.htm>.

External Review:

Forty-one industry professionals, university faculty, state regulators and national experts were contacted to review this document. Those individuals agreeing to review the document are listed below.

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