



# **Best** MANAGEMENT PRACTICES



## **Irrigation Management**

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## 4.1 Definition of Resource

Managing water resources is an important part of protecting Seattle Parks and Recreation (SPR) landscape assets. The SPR irrigation system consists of many miles of pipe, thousands of sprinkler heads, and waters a large percentage of parkland. The efficient operation of these irrigation systems is vital to maintaining the diverse horticultural assets, athletic fields, and landscapes that SPR manages. SPR has a variety of irrigation systems designed to deliver water to our landscapes.

## 4.2 Goal Statement

In accordance with our environmental stewardship ethic, staff will have comprehensive knowledge of our irrigation systems and employ sound water management practices in the field. SPR staff will run efficient irrigation programs that use the least amount of irrigation water possible while sustaining a diverse and horticulturally rich vegetation infrastructure.

## 4.3 Definitions

**Automatic Irrigation:** An irrigation system that is controlled electronically and has the ability to operate on an adjustable schedule.

**Capital Improvement Program:** Parks' funding source for large-scale replacement and renovation of park landscapes and facilities

**Irrigation Controllers:** An electronic device that stores programmable information on scheduling and adjusting an irrigation program for a specific area.

**Irrigation Management:** Term for the process by which landscape water is applied efficiently.

**Irrigation System:** Plumbing infrastructure, including water, plumbing, controllers, piping, and hose bibs.

**Irrigation Zones:** A specified area of landscape that is irrigated, often within a larger landscape

**Landscape Assets:** The trees, shrubs, perennials, turf and other hardscape materials that have an economic value in park landscapes

**Manual Irrigation:** An irrigation system that must be operated completely by hand.

**Maxicom™:** Maxicom is the brand name for the centralized computer-controlled irrigation system currently used by SPR.

**Semiautomatic Irrigation:** An irrigation system that can be operated by turning on a valve.

**Water Budgets:** The yearly quantity of water allocated to an individual irrigation system.

**Water Conservation:** The practice of saving water through efficiencies.

## 4.4 Policies and Guidelines

**SPR Irrigation Inventory:** A catalogue of all irrigation systems within SPR. This document is managed by the SPR Planning, Design and Development Division and includes the type of system, acreage, as well as recommendations for future improvements. These recommendations from the SPR Irrigation Inventory will be reviewed prior to any project or renovation.

**SPR Water Shortage Contingency Plan:** This plan provides detailed guidance for reducing water use, including irrigation, across SPR in the event of a regional water shortage.

**Vegetation Management Plans (VMP):** These plans guide the growth, development, and maintenance of specific parks and open spaces. Each VMP brings together diverse interests, to inform and direct the actions of the organizations and individuals that manage the sites.

**The Mayor’s Environmental Action Agenda (EAA):** The EAA presents the City's environmental goals and creates a framework for integrated City departmental environmental action. It addresses water conservation through mandates for increased energy and water efficiency of City buildings and facilities. The City has a continuing commitment to an aggressive water conservation program, including incentives for water efficient irrigation system development

**Sustainable Infrastructure Initiative (SII):** The SII is a component of the Mayor’s Environmental Action Agenda. It encourages application of innovative approaches that provide basic services in ways that are resource-efficient and environmentally responsible through a variety of incentive programs.

Sustainable design encompasses the following broad topics:

- Efficient management of energy and water resources
- Management of material resources and waste
- Restoration and protection of environmental quality
- Enhancement and protection of health and indoor environmental quality
- Reinforcement of natural systems
- Analysis of the life cycle costs and benefits of materials and methods
- Integration of life cycle costs in design decision-making

**Seattle Public Utilities (SPU) Saving Water Partnership:** SPU is the department that manages the City’s water supply, drainage, storm water, and sewage. It provides guidance and financial incentives for conservation and stewardship of water resources for a variety of water uses, including irrigation, through the Saving Water Partnership ([saving.water.org](http://saving.water.org)). SPR will continue to partner with SPU to develop strategies for short-term and long-term water saving behaviors that ensure that there is a plentiful supply. [www.savingwater.org](http://www.savingwater.org)

**SPR Standards** (<http://www.cityofseattle.net/parks/projects/standards/specs.asp>)

**Seattle Department of Parks and Recreation Tree Management, Maintenance, Pruning and/Or Removal Policy**, Number 060-P 5.6.1, June 1, 2001

**Construction Best Management Practices Manual.** City of Seattle.

**Avoiding Tree Damage During Construction**, International Society of Arboriculture [http://www.treesaregood.com/treecare/avoiding\\_construction.asp](http://www.treesaregood.com/treecare/avoiding_construction.asp))

**Avoiding Tree & Utility Conflicts**, International Society of Arboriculture ([http://www.treesaregood.com/treecare/avoiding\\_conflicts.asp](http://www.treesaregood.com/treecare/avoiding_conflicts.asp))

## 4.5 Planning and Design of Irrigation Systems

The relationship between vegetation, land, and water is the foundation for sound water management. New projects and/or renovations will require a properly structured soil profile to assure a sufficient volume of soil to provide optimal holding capacity for water use needs of plants while reducing runoff. Inspection of installed systems should ensure that water is applied in appropriate amounts as intended by the design.

### 4.5.1 Significant Irrigation Design Elements

Irrigation design goals should provide the most practical and efficient water delivery system for the site. Good design is a critical step toward maximizing water conservation. The following significant design elements must be considered for any system construction or renovation:

- All new irrigation systems and system renovations shall be designed and installed according to **Seattle Department of Parks and Recreation Standard Specifications**  
<http://www.cityofseattle.net/parks/projects/standards/specs.asp>.
- Whenever irrigation installations or modifications are anticipated, site drainage should be assessed and improved if necessary.
- New irrigation systems should be inspected and audited before operation to insure that water delivery is appropriate to the intended design.
- To the extent possible, standard equipment and materials should be installed to simplify operation and maintenance of the system.
- Sprinkler head selection will be limited to the highest quality, lowest maintenance, and vandal resistant options.
- Determine the supplemental water needs of the landscape based on site characteristics, vegetation type, and placement.
- Design separate irrigation zones for different landscape characteristics (slope, soil, plant material, hardscape).
- Irrigation zones should be designed to limit the impact of a zone shutdown.
- All newly designed or renovated automatic irrigation systems should have manual backup capability in the event of a breakdown (computer failure, power outage, broken line, etc.).
- The use of automatic shut off valves, based on time or water volume, and should be required for automatic, semiautomatic, and manual systems. Alternative energy controllers that are battery or solar powered, can be used in smaller parks. New or renovated systems should be designed for eventual automation, including connection to a central computer control system.
- Manual water sources should be placed so that a sprinkler at the end of a 50-foot hose can reach any spot needing watering.

#### 4.5.2 Determining Which Landscapes To Irrigate

SPR has many parks or park areas with either substandard irrigation systems or are without irrigation. In some cases, it is desirable to irrigate these parks and in others cases it is not. Determining whether a park should be irrigated should be based on the following considerations:

- Visibility and intensity of use
- Water needs of existing or potential plant communities
- Expectations of park users and adjacent neighbors
- Existing condition of irrigation infrastructure
- Value of landscape assets - particularly those with unique horticultural, historical, or aesthetic significance.
- Temporary or intermittent irrigation such as for new landscape areas requiring "establishment irrigation" or "life support" during severe drought.
- Alterations to landscape that could reduce the need to irrigate.

### 4.5.3 Determining Which Irrigation Systems To Automate

Ideally, all irrigation systems should be automated. Because automation is costly, SPR prioritizes the systems that will be automated. Use the following questions/criteria when considering converting a system from manual operation to automatic.

- Does the park have an existing semi-automatic system? (These systems are typically the easiest and most cost effective to upgrade and will be given the highest priority for automation.)
- Does the park have one or more athletic fields?
- Does the park have high visibility or high use?
- Is the existing irrigation system or landscape slated for replacement?
- Does the existing manual system require excessive amounts of labor to operate, including moving multiple lengths of hose around the park?

**SPR recommends that any park meeting any of the above criteria should be targeted for automation regardless of park size.** The installation of automatic shutoffs (based on time or water volume) is a potential improvement. New or renovated systems should be designed for eventual automation, including connection to a central computer control system.

### 4.5.4 Automatic Irrigation Control Options

If the decision is made to irrigate a park, the next step is to decide what type of irrigation system to install or upgrade. SPR employs a variety of controllers for timing the application of irrigation water. These automatic controllers serve four primary purposes:

1. Control operation changes directly based on weather (relates to Maxicom controllers) and reducing irrigation during rain down pours by system-wide remote shutdown
2. Operate remotely rather than manually
3. Accurately time irrigation to specific needs of soils, slopes, and plants
4. Reduce impacts to park use and water loss to evaporation by operating at night

A brief description of each of the five types of controllers used in the SPR system is provided below:

| <b>Types of Irrigation Controllers</b> |
|--|
| Mechanical                             |
| Solid State                            |
| Battery Powered                        |
| Solar Powered                          |
| Maxicom™ Compatible                    |

**Mechanical Controllers:** Mechanical systems were the first automatic irrigation controllers used by the SPR and are still in operation today.

Mechanical controllers employ an electric clock programmed by a set of pushpins. They turn a system on and off by irrigation zone for set amount of time each day. While relatively easy to use, mechanical systems are limited in their ability to meet today's water management needs for flexibility in programming the application of water. They are easily damaged by improper use.

**Solid State Controllers:** These controllers use solid-state circuitry. The advantages of solid-state controllers include relatively low cost, significant programming flexibility, and ease of repair. The only disadvantage of these controllers is that a solid-state system operates as an individual unit, thereby lacking the savings potential of a central control computer system. Solid state is the preferred controller for parks that will not be connected to the central control computer system.

**Battery-Operated Controllers:** Mechanical or solid state controllers that are powered by batteries. They are typically used at locations where automatic irrigation is desirable but access to electrical power is not feasible. SPR has very few of these devices. Advantages of these systems are their reduced labor costs, ease of operation, and limited need for training. These controllers should be considered for use at small sites with existing semi-automatic systems.

**Solar-Powered Controllers:** As the name suggests, these controllers use the sun as their power source. The environmental benefits of solar-powered controllers, which are typically installed at small sites, are obvious. The application of these controllers is limited because of potential vandalism to their working parts, which must have open solar access. These controllers cannot be linked to the central control computer system.

**Maxicom™ Compatible:** Maxicom is the brand name for a centralized computer-controlled irrigation system SPR currently uses at those parks where linkages are possible. Maxicom allows remote irrigation systems to be programmed. Because the system is linked to a weather station, it can be programmed to withhold water on rainy days. Maxicom employs various sensors such as flow meters and sub-meters within the irrigation systems. These built-in water meters very accurately determine where water is being used and where there may be problems. Water use is monitored within individual systems and can detect problems and pinpoint them for repair.

#### 4.5.5 Using Maxicom Central Control Systems

If funding were available, all automatic systems would be operated through a centralized computer control system such as Maxicom. However, the costs for hardware and ongoing charges such as modem connections are significant. There is not sufficient return on investment to install Maxicom at all sites. Mini-parks, squares, places, and triangles are probably best left to onsite automation control. Similar consideration should be given to static sites such as special gardens where gardeners are on-site and where site-specific water control may be best for plant collections. Maxicom is recommended for use at medium to large parks and athletic fields. There is currently one operational Maxicom Control System in each SPR geographic area: north, central, and south. There

are currently 42 sites programmed for Maxicom operation. Any expansion of the system will be accomplished through the capital improvement program.

## 4.6 Upgrades and Replacements

SPR has an existing capital improvement program in-place for performing major upgrades or replacement of existing irrigation systems. This program sets priorities for timely upgrade or replacement of old systems and identifies the sources for the necessary funding.

There are many different components to an existing irrigation system that must be considered when adding to or removing any part of the irrigation system, such as long-term vegetation water use. Whenever a major irrigation project is considered, the drainage needs of the site should also be evaluated. There are numerous efficiencies from doing irrigation and drainage projects at the same time. In order for projects of this type to be successful SPR employs a collaborative effort between internal and external stakeholders.

Any changes made to an irrigation system must be documented in the SPR Irrigation Inventory. The SPR Irrigation Inventory of the condition of all SPR irrigation systems shall be maintained and updated whenever there are changes to the system. The SPR Planning, Design, and Development Division are responsible for updating this document.

## 4.7 Irrigation Operation Activities

### 4.7.1 Irrigation Controller Programming

Programming irrigation controllers relies more on the art of understanding a site and its plant materials than the science of the system itself. SPR recommends that senior gardening staff program irrigation controllers. A Senior Gardener will normally be assisted by and work closely with others, such as Lead workers, facilities staff, and athletic field coordinators. The basics a Senior Gardener must know for programming a controller are listed in the table on the next page:

Efficiency Factors affecting all irrigation programming

| Component                | You Should Know:   |
|--------------------------|--|
| <b>Irrigation System</b> | <ul style="list-style-type: none"> <li>• <b>Daily amount of water discharged.</b> Most important is the amount of water the system discharges in gallons per minute (gpm) and how that translates into "inches of water per week."</li> <li>• <b>Daily multiple programming ability.</b> Some controllers allow for multiple programming daily; others don't. Certain sites, such as those with steep slopes, may require multiple programming.</li> <li>• <b>Capabilities of each system.</b> Each type of controller operates slightly differently. Know enough about each type of controller and how it operates to be able to set up the right program for the job.</li> </ul> |
| <b>Site Conditions</b>   | <ul style="list-style-type: none"> <li>• <b>Soil conditions.</b> Watering regimen differs from soil to soil. Sandy soils drain much faster than clay soils. Clay soils often will not absorb water very quickly.</li> <li>• <b>Topography.</b> The more sloped the site, the greater the potential for runoff.</li> <li>• <b>Watering requirements of plants.</b> Most sites are designed so that plants with similar water needs are grouped together. Most lawns are on separate irrigation "zones" from plant beds because their watering needs differ from plant beds.</li> </ul>  |
| <b>Other Info</b>        | <ul style="list-style-type: none"> <li>• <b>Uses of site.</b> Know how a site is used, including type of use, intensity, special scheduling issues, and the potential for vandalism.</li> </ul>  |

|  |  |
|--|--|
|  | <ul style="list-style-type: none"> <li>• <b>Understand system or local water service.</b> For instance, it may not be possible to get sufficient water volume during certain times of the day.</li> <li>• <b>Fundamental design problems</b> Check for and correct the following: <ul style="list-style-type: none"> <li>-System has irrigation heads that are unsuited to the site</li> <li>-Controller needs capacity for multiple daily programming.</li> </ul> </li> </ul> |
|--|--|

#### 4.7.2 Programming Activities for Gardeners and Designers

- Soil type plays an important role in irrigation. If practical, increase soil organic matter to improve soil structure and water holding capacity.
- Soil conditions should be considered especially in turf areas with heavy wear and use. Be aware of different water holding capacities of soil types. For example, clay-type soils take longer to saturate, and hold more water longer than sandy soils. Sandy soils drain more quickly and should be watered on a more frequent schedule than clay types.
- Site topography plays an important role in irrigation frequency and amount of water applied. Sloped sites may require multiple applications of irrigation water in shorter timing cycles (cycle and soak) than required for flat sites to reduce runoff.
- Consider plant species, size, and age when irrigating. Know the water needs of the turf, shrubs, and trees to be irrigated. Apply no more water each week than required to sustain healthy plants. Group plants with similar water needs together.
- For turf areas, a general rule of thumb is no more than 1 inch of irrigation water per week, including rainwater. Irrigate other planted areas as appropriate.
- Monitor the application of automated irrigation water carefully and adjust controller settings as needed throughout the season.
- Incrementally reduce watering in late summer/early fall. Plant needs are less at this time.
- Develop a recordkeeping system for automatic irrigation operations. This system provides a database from which programming records can be retrieved for annual system reprogramming.

#### 4.7.3 Infrastructure Management Activities For Operations Staff, Gardeners, Plumbers, Electricians

- Use the system winterization and de-winterization processes as opportunities to make complete system visual checks and perform any periodic maintenance.
- Perform annual preventive maintenance on heads, valves, controllers, and additional onsite hardware and computer programs each spring.
- As plants grow, monitor for sprinkler head interference and reduced coverage. Work with plumbers to adjust sprinkler head heights or placement as needed.
- Water should not be applied outside intended coverage area (i.e. sidewalks and streets). Work with plumbers to adjust head heights, direction, or placement as needed.

- From May through September, continually monitor for signs of system problems, such as controller schedules, valve operation and sprinkler head alignment/grade.

#### 4.7.4 Field Maintenance Activities for Operations Staff, Gardeners

##### System Protection

- Clean sprinkler heads in spring and as needed throughout the season to ensure optimum performance.
- Maintain grass trimmed away from heads to allow proper functioning.
- Avoid damaging irrigation equipment such as sprinkler heads by driving over them or hitting them with aerators, tillers, or edgers.

##### Water Conservation

- Be sure to water plants adequately according to cultural needs. Check soil moisture levels routinely.
- Automatic systems should be adjusted periodically to match plant water needs throughout the growing season.
- Avoid watering during the high evapotranspiration times of the day typically afternoon and early evening.
- Do not allow any system to apply water longer than needed. No system shall be turned on in the morning and turned off at the end of the day just for convenience.
- Manually operated systems shall not be operated at night unless staff is present or unless the system has an automatic shut-off valve.
- Routinely aerate turf and cultivate landscapes and turf to relieve soil compaction and increase water infiltration (See Turf Mgmt BMP, page #).

##### Repairs and Work Orders

- Monitor landscape for potential drought effects. If needed, use backup irrigation systems or set up temporary irrigation to avoid plant loss.
- In the event of broken heads, controller malfunction, or other repairs, assess the situation and report problems to the Senior Leadworker, Senior Gardener or Crew Chief.
- For repairs to Maxicom operated systems, a Senior Gardener or other Maxicom-certified staff person should assess any potential computer problems before calling in work orders to the Shops (See Maxicom Operations, Page 4-11).
- Work Orders for repairs to irrigation systems will ONLY be called in by Senior Leadworkers, Senior Gardeners, or the Crew Chief.
- Any irrigation zone or station with broken lines or sprinkler heads shall only be shut off by Senior Leadworkers, Senior Gardeners or other trained staff.
- Assist plumbers and electricians to repair the system **promptly** to reduce water deficiency impacts.

#### 4.7.5 Maxicom™ Operations

The Maxicom™ system can provide an incredible level of water use efficiency. Only trained and certified staff are allowed to create, operate,

and trouble shoot Maxicom programs and operation. The SPR Maxicom Operations Manual is the definitive reference for operating this system.

### Troubleshooting Maxicom Problems

Whenever a problem with a Maxicom-operated system occurs, troubleshooting begins with the computer system. The computer should be checked out prior to calling in any repair work orders. If the computer program is operating correctly, then the field controllers and other hardware in the field should be assessed as with any other automatic system. Refer to the Maxicom Operations manual for troubleshooting information and recommendations.

#### Basic Operations for Maxicom™ Systems:

| Step | Activity  |
|------|---|
| 1.   | Train the selected staff that will have access to the system. A certification course is available that selected staff will need to attend and complete. There are several levels of certification. In addition to this basic training, selected staff may need to attend additional training as the system evolves and changes. Onsite assistance must be available to successfully orient new Maxicom users. |
| 2.   | Use the SPR Maxicom Operations Manual to program the computer with site-specific information. This data is obtained through an on-site audit. This audit might be best done as a contracted service because staff time is often not available for such time-intensive processes.  |
| 3.   | Make sure the: <ul style="list-style-type: none"> <li>• Weather station is up and operating</li> <li>• Evapotranspiration information is accurate</li> <li>• Various flow sensors and other system hardware are operational.</li> </ul>   |
| 4.   | Refer to the Maxicom Operations Manual for system operation guidance. The system needs to be regularly monitored and maintained   |
| 5.   | Document actual water use. Sites using the Maxicom system typically show a 30% reduction in water use   |

## 4.8 Water Shortage Contingency Plan

In the event of a water shortage emergency, Seattle Public Utilities may choose to activate the *City Water Shortage Contingency Plan (WSCP)*. This is a multi-phase plan, with escalating levels of response based on the actual conservation needs during the particular water shortage. SPR has a detailed *Water Shortage Contingency Plan*, complimentary to the SPU WSCP. It lays out specific policies, rules and strategies for responding to different water shortage emergencies or drought situations (see Appendix 2, page 4-12, for the complete text Plan).

All water use, including irrigation, is subject to the WSCP guidelines during a water shortage emergency. SPU will determine the activation and deactivation of a water shortage emergency. The citywide response will be coordinated through the Office of Sustainability and Environment.

## 4.9 Training

Staff training is required in several areas:

Basic Irrigation Management and Water Conservation

All park resources staff should receive training on basic water conservation as part of an overall training program in environmental management.

#### Irrigation System Controller Operation

- Maxicom™ Operation  
Operation of the Maxicom system requires taking vendor provided training and meeting certification requirements.
- Water Budget/Auditor Training  
It is likely that water budgets will be required in the future for park locations not tied into Maxicom. Selected staff will need training in how to establish water budgets for park sites and perform water auditing.
  - Automatic Irrigation Controller Operation
  - Remote Control of Automatic Irrigation Systems

#### 4.10 Appendices Lists for Irrigation Management

##### HARD COPY REFERENCES

1. **Guidelines for Landscape Work affecting Utilities**
2. **SPR Water Shortage Contingency Plan**

##### ONLINE REFERENCES

1. SPR Standards and Specifications: All mandated SPR construction standards that apply to landscape projects.  
<http://www.cityofseattle.net/parks/projects/standards/specs.asp>

## Appendix 1

### Irrigation Management

### Guidelines for Landscape Work Affecting Utilities



## Guidelines for Landscape Work affecting Utilities

Every time you are going to aerify turf, dig plant or remove trees and shrubs, add mulch, add soil, remove soil or sod, consider the impacts to utilities, both underground and aboveground. These utilities need to be located prior to beginning work.

Utilities may be located in out-of-the-way places or underground. Locations and especially the exact depth underground may not match plans or blueprints. Failure to accurately locate these utilities can delay your project, can cause significant damage to park landscapes or structures and can also result in serious injury or even death. Follow these guidelines, as applicable to your project or maintenance work, to make your work successful.

Remember that it is your project, job or maintenance task until completion! Be sure to follow through with all tasks and assist Shops whenever possible.

### PLAN AHEAD.

- Identify a **Project Lead person** for this project or work.
- **DO NOT assume that there are no utilities in your site.** Look at an irrigation plan or other site blueprints or plans to determine possible utilities. Locate the exact areas where you are doing this work.
- If you have made a reasonable attempt to locate something on the plan and you just can't find it let the Plumbing Shop know.
- **Consider any reason you may need to adjust your schedule of work or move the work location.** For example, if the place you want to plant a tree is directly over an irrigation line, it is easier to adjust your location than to accidentally damage irrigation. Consider seasonal scheduling of your work or project so as not to impact special events or recreation programs like baseball. A work order needs to be requested for all in-house utility locates, moving plants, trenching or other additional work by the Shops or Horticulture crews.

### AT LEAST TWO WEEKS PRIOR TO THE WORK STARTING DO THE FOLLOWING TASKS AT YOUR WORK SITE:

1. **Make a drawing** of the work that you are planning; indicate NORTH with an arrow.
2. **Call the Work Order Jobline and request an in-house locate** for the Electric Shop, the Plumbing Shop and the Sewer Crew. Fax a drawing of the work site with irrigation details to the Jobline: #684-7271
3. **You will need to call DIAL TO DIG—1-800-424-5555.** (The Parks contract ID# is 34267.) If you are not sure call one of the Shops. (Many Parks were streets at one time and many Parks have utilities running thru them.)
4. **Mark landscapes** with special **inverted solvent-based marking paint** from the Warehouse.
5. **Mark every location** at the site where the work is to be done.

### AT LEAST TWO WEEKS PRIOR TO THE WORK STARTING DO THE FOLLOWING TASKS, continued:

6. **Mark** all irrigation heads, hose bibs, quick couplers, valves and valve boxes that you see on the plan that are within 15 feet of the work that you are planning.
7. **Mark the sprinkler heads** with a circle around them keeping the paint 4" away from the sprinkler.
8. **Uncover and make obvious** any valve boxes that you locate.
9. **Do not dig within two feet of any marked utilities**—if you are not sure what the marks are indicating, contact the Shops.
10. **If you determine** that there are irrigation heads, valves and/or valve boxes that need to be raised because of your work call in a separate work order and contact

the Plumbing Shop to make arrangements to assist with digging, barricades or otherwise to complete your job.

**1 TO 2 DAYS PRIOR TO THE LANDSCAPE WORK BEGINS, DO THE FOLLOWING TASKS:**

- **Hand dig excavation areas** and assist Shops whenever possible.
- **Re-mark landscapes** with special **inverted solvent-based marking paint** from the Warehouse; **DO NOT** use regular spray paint as it clogs sprinkler heads and other equipment.
- **Re-mark the work area** at the site where the work is to be done.
- **Re-mark all irrigation** heads, hose bibs, quick couplers, valves and valve boxes that you see on the plan that are within 15 feet of the work that you are planning.
- **Re-mark the sprinkler heads with a circle** around them keeping the paint 4" away from the sprinkler head.
- **Uncover and make obvious** any valve boxes that you locate.

Appendix 2  
Irrigation Management

Water Shortage Contingency Plan





## **WATER SHORTAGE CONTINGENCY PLAN**

**REVISED MARCH, 2005**

**SEATTLE PARKS AND RECREATION  
WATER SHORTAGE CONTINGENCY PLAN  
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**SEATTLE PARKS AND RECREATION  
WATER SHORTAGE CONTINGENCY PLAN**

## SECTION I

### Introduction

This plan provides guidelines for a systematic response, should the need arise, to reduce demand in the event of a water supply disruption or weather related water shortage. Disruptions require more immediate and dramatic demand management measures than progressive drought situations; therefore, two parts to the response plan have been developed. Long-term conservation will continue to be developed as part of an overall water management strategy by the Seattle Department's and Recreation and will be presented as part of the Department's Best Management Practices (BMPs).

This document updates the Department's 2002 Water Shortage Contingency Plan (WSCP), incorporating revisions made in 2002.

### Objective of WSCP

The objective of the WSCP is to establish actions and procedures for managing water demands during water supply reductions or water shortages. The plan establishes a strategy in advance of actual conditions, so that the Department is prepared to maintain essential public health and safety and minimize adverse impacts on economic activity, park

assets, environmental resources and the region's lifestyle. The Department will assist and support curtailment measures required by Seattle Public Utilities (SPU) to manage demand during an emergency or shortage. In order to be effective, a demand management strategy must be regionally consistent. This is based on several considerations:

- Public support and cooperation is likely to be higher if actions are equitable, i.e., all water users are experiencing the same service level and degree of hardship
- A unified message and approach is easier to understand and distribute through the media, which is key in communicating information to the public
- Consistency makes it easier for Seattle to forecast demand reductions, which is essential to effectively manage the system during a supply disruption

## **SECTION 2**

### **OVERVIEW OF DROUGHT MANAGEMENT STRATEGY**

While water supply disruptions can occur for a variety of reasons, a weather-related water shortage – generally referred to as a “drought” - is one category of particular importance. Droughts are naturally occurring but unpredictable weather events of varying frequency, duration and severity. In the region served by the Seattle water system, available data indicate a very low probability of a multi-year drought, but the region has experienced short- term droughts.

This region is generally faced with a relatively dry summer period. In Seattle, only about 5 of our 38 – 40 inches of annual precipitation fall during the summer months. The Seattle water system operates with an annual refill and drawdown cycle of its water supply storage reservoirs. Highly unusual weather events affect this cycle and can cause potential shortages. This can manifest in one or more of the following ways:

- Less than normal winter snowpack, which would limit the volume of instream flows available from snowmelt in the

spring to fill Seattle's storage reservoirs for peak season demands and fish and wildlife habitat needs

- Unusually warm spring weather bringing with it early melting of the snowpack, resulting in early drawdown of the mountain reservoirs
- Unusually warm and dry summer weather which can significantly increase peak season demands, and create low flow conditions in streams tributary to the mainstem rivers
- A delayed return of the fall rains, or a dry winter, which can delay the fall reservoir refill cycle (which replenishes the storage reservoirs after the peak season), creating extended low flow conditions in the streams and rivers

The specific cause of any supply disruption will affect the department's response, strategy and timing. Operational flexibility is key, with operating plans changing as conditions and forecasts change. A key assumption is that abundance, shortage and risk must be shared among all beneficiaries of the water resource. Coordination between SPU and other departments is necessary for decision-making related to real-time operations.

## **Recent Drought Experiences**

In 1992, the system experienced a drought due to unusually warm weather at the same time that snow-

pack and flows into the storage reservoirs were at record low levels. In late February, it was evident that there was insufficient snow-pack to fill the storage reservoirs and that the likelihood of recovery by June 1 due to rainfall was minimal. A number of measures were taken to maximize available supply (e.g., reducing system flushing, adjusting stream flow levels, etc) and to reduce demand.

In May, a number of *mandatory* curtailment actions were implemented in the Seattle service area, including a ban on turf watering. This resulted in an average consumption reduction of 25 to 30 percent below normal throughout the summer. For Parks, this resulted in the loss of some turf assets, most noticeable on our golf courses and athletic fields. This loss of assets impacted revenues and scheduling far beyond the duration of the drought event. When raised as a concern, but after the damage was done, it was clear that this level of asset loss was not required for Parks to be in compliance with the drought related water cutbacks. The mandatory restrictions were eventually rescinded in September as supply levels returned to normal with the onset of fall rains. This drought event reminded us that we need to have a clear understanding among all city departments regarding which operations will be curtailed and when in order to conserve water resources. To that end, this WSCP, requested by SPU, will be reviewed Citywide for consistency.

Since 1995 SPU has incorporated numerous changes in their WSCP including updating the required responses for each of the Phased Curtailment Stages. The Department's 2002 WSCP incorporates those changes and incorporates further conservation measures that have been implemented as a result of the 1992 drought experience. Thus, both departments' Water Shortage Contingency Plans articulate the following principles:

- Given clear, timely and specific information on supply conditions and the necessary actions to forestall worsening conditions, customers prefer the opportunity to meet targeted demand reduction levels through **voluntary** compliance measures. The decision to move to mandatory restrictions is more acceptable if the voluntary approach has been tried first but has not resulted in enough demand reduction to ensure public health, safety and adequate streamflows through the projected duration of the shortage;
- Each drought or other shortage situation has enough unique characteristics that a plan cannot specifically define all the scenarios and specific

supply and demand management actions. The usefulness of a Water Shortage Contingency Plan lies in planning the range of supply and demand management actions in advance of the situation, and in defining the communication mechanisms by which decisions will be made during the event;

- Given the effective long-term conservation programs operated by Department, it is important to distinguish between the short term **curtailment** measures necessitated by a water supply disruption, and the **conservation** measures Department promotes within its BMPs. Conservation focuses on efficiencies which do not affect the quality of life, whereas curtailment measures can involve short term actions which could impact it; and
- It is essential to closely monitor water quality during a supply disruption and particularly during a warm weather drought (an SPU responsibility). Water quality issues must be considered when supply management decisions are made.

### **Alternative Water Supplies**

Depending on the nature and timing of a potential water shortage, alternative water supplies may be useful to supplement existing supplies.

**Jackson Park Golf** – Jackson Park Golf has historic water rights for the use of Thornton Creek for irrigation purposes. A current collaborative project with SPU will continue this practice into the future.

**Reclaimed water** - Using highly treated effluent instead of potable water for irrigation, street washing, construction purposes, etc. can reduce demand for potable water and lessen the impact of the shortage on the community. While high quality reclaimed water can be produced by King County at one or more of its wastewater treatment plants, issues include obtaining permits to use this water, and obtaining and distributing adequate amounts to decrease potable water demands. These issues – availability, permitting and distribution – are likely to change in future years, and should be revisited in the event of any future water shortage.

The potential exists for Department's to reuse wading pool water and swimming pool water in addition to the other sources of reclaimed water listed above. The method and scheduling of loading, transfer and application of this water is no small logistical

undertaking. Nevertheless, the Department's Water Shortage Management Team will want to determine the feasibility of this idea with the potential of pilot projects. If determined feasible, the use of reclaimed water should be considered part of the Department's water shortage strategy at any curtailment stage.

### SECTION 3

#### **PHASED CURTAILMENT PLAN**

This plan provides four stages of response based upon increasing severity, as progressively more serious conditions warrant. This type of response would be appropriate to a summer drought or other long-range disruption. The four stages include a variety of communications, internal operations, and demand management strategies as appropriate, and are characterized as follows:

- **Advisory Stage -** Customers are informed as early as meaningful data are available that a possible shortage may occur.
- **Voluntary Stage -** If supply conditions worsen, the plan moves to the "Voluntary" stage which relies on voluntary cooperation and support of customers to meet target consumption goals. During this stage, specific voluntary actions are suggested for both residential and commercial customers.
- **Mandatory Stage –** If the Voluntary Stage does not result in the reduction needed, the Mandatory Stage prohibits or limits certain actions. This stage would be accompanied by an enforcement plan, which could include fines for repeated violation.
- **Emergency Curtailment** – This addresses the most severe need for demand reduction and could include a combination of mandatory measures and rate surcharges. This could be used as the last stage of a progressive situation, such as a drought of

increasing severity, or to address an immediate crisis, such as a facility failure.

A Water Shortage Management Team may be assigned at the direction of the Superintendent to review the Department's Water Shortage Contingency Plan, advise on current conditions and customer response.

## **ADVISORY STAGE**

### **Objectives**

- To prepare the Department, City, relevant agencies and water users for potential water shortage thereby allowing all parties adequate planning and coordination time
- To undertake supply management actions that forestall or minimize the need later for more stringent demand or supply management actions

### **Triggers**

As presented earlier, there are a variety of weather and other conditions that may cause concern about water availability and a potential water shortage. Two of the primary conditions that would trigger an "Advisory" are as follows:

1. Total reservoir storage is not projected to be at standard operating capacity as of June 1, due to exceptionally low snow pack, precipitation and/or lack of carryover storage from previous year;
2. Total reservoir storage and predicted inflows are significantly below historical "normals" for the current time of year, and supply modeling indicates that expected demands may not be met if this trend continues or worsens.

The Advisory is withdrawn when projected reservoir storage trends follow the normal water supply conditions.

### **Public Message**

"Potential exists for lower than normal supply; conditions **may**

return to normal or, later on, we  
may need to reduce consumption.  
We'll keep you informed."

## *Advisory Stage Actions*

### **Communication Actions**

Consult with SPU, participating in a committee if needed, to assist the SPU shortage advisory group to define message and provide feedback on utility actions

Superintendent appoints a Water Shortage Management Team (WSMT) to review the WSCP, evaluate conditions, determine action and establish communications network for department staff.

- WSMT initiates informational status report for staff
- Prepare and distribute public information materials via the Department's WebPages and other communication media explaining the WSCP stages and range of actions; link Department's WebPages to SPU's WebPages on water supply conditions and water conservation
- Standardize informational signage for public information
- Evaluate ability, resources, plans to move into Voluntary stage; as appropriate, begin preparatory measures

### **Parks' Internal Operating Actions**

Initiate planning and preparation for Voluntary Stage actions, including an assessment of potential staffing impacts, training needs, and communications strategies including use of web-based information and informational signage  
Focus attention on Best Management Practices for water conservation, including irrigation system periodic maintenance and repairs, mulching landscaped areas, turf aerification and adjustment of turf mowing heights

Review proposed landscape additions and projects; consider postponement and define specific criteria for postponement

Review aquatics programs and schedules for water conservation; limit hours for non-recirculating water fountains and water play features

Research technologies with the potential of providing water savings such as faucet aerators and automatic irrigation rain shut-off devices – implement new

technologies as resources allow  
Prioritize facility plumbing system repairs and periodic maintenance

## **VOLUNTARY STAGE**

### **Objectives**

To maintain or reduce demand to meet target consumption levels by voluntary actions

To forestall or minimize need later for more stringent demand or supply management actions

To minimize disruption to Parks' projects and programs while meeting target consumption goals

To minimize impact on revenue producing programs

To continue use and maintain valuable assets

### **Triggers**

The "Voluntary Stage" is implemented when one or both of the following factors apply:

- Supply conditions identified in the Advisory Stage have not improved
- Demand levels indicate the need for a more systematic response to manage the situation

### **Public Message**

"We are relying on support and cooperation of all water users to stretch the available water supply. Demand needs to be reduced by \_\_\_\_%. Customers are responsible for determining how they will meet that goal. Water waste is not allowed. If everyone cooperates, we may avoid imposing more stringent restrictions. In addition to meeting essential water needs of customers, meeting the needs of fish habitat and other environmental concerns is a priority."

## **Voluntary Stage Actions**

### **Communication Actions**

The WSMT will meet frequently to re-evaluate the situation based on information provided by SPU and determine the appropriate actions and strategies.

The WSMT will continue systematic communications with the Superintendent, staff and customer groups throughout the shortage, to help develop information messages and materials and to obtain feedback on actions.

The team will identify and review potential next steps necessary to reduce demand, including which restrictions will be imposed.

As needed, the WSMT will meet with other City/industry representatives to discuss compliance strategies.

Forward list of commercial car wash facilities from SPU that recycle water to staff

Initiate remaining planning and preparation for Mandatory Stage.

### **Parks' Internal Operating Actions**

Continue actions listed in the Advisory Stage

Establish agreed upon methodologies for measuring water savings (to ensure compliance with % reduction required)

Eliminate all water uses determined to be non-essential to maintain water quality, continue Department projects and/or programs, maintain the health of valuable assets and ensure public safety and zoo animal health

Propose and/or implement staffing reassignments and

schedules as needed, and plan staffing changes that may be needed for the Mandatory Stage

Evaluate ability to accelerate or enhance or expand long term conservation programs; implement as appropriate

Supply and Demand  
Management Actions

- Alternative water sources activated for use, if available

**Facilities, Vehicles,  
Equipment, Picnic  
Areas, Boat Docks and  
Playgrounds**  
FACILITIES

1. Use pressure washers when feasible to accomplish necessary cleaning

COMFORT STATIONS

2. Clean as needed for public health and safety

VEHICLES

3. Wash all city vehicles only as needed

4. If possible, wash vehicles at a car wash that recycles water

HARD SURFACE

MAINTENANCE

5. Limit washing hard surfaces such as sidewalks, driveways, parking lots, etc. where required for public health and safety

## FOUNTAINS

6. Turn off all fountains and water features, except for those necessary to maintain water quality or animal health and containment

## PLUMBING

7. Focus attention on leaks and repairs

8. Continue installation of faucet aerators

### **Continuing programs:**

- Operate only high priority recirculating water features
- Water construction sites for dust control
- Continue normal water use for comfort station cleaning
- Do limited hard surface cleaning

### **Park Landscapes**

## IRRIGATION

1. Reduce water use by 10% overall

2. Automatic irrigation systems controlled by ET stations reduced by 10%

3. All irrigation on established plantings will be done between 7pm and 10am, except for hand watering of planted containers, tree wells , etc.

4. Reduce watering of general irrigated park turf

5. Reduce irrigation to general park landscape beds and mature trees

## IRRIGATION SYSTEMS

6. Focus attention and resources on irrigation system monitoring, leaks and repairs

7. Monitor for obvious water waste such as hoses without shutoff nozzles or irrigation leaks; fix problems immediately

8. Accelerate installation of water conservation devices for manual and automated systems

#### EQUIPMENT

9. Wash equipment only as needed

#### PROJECTS

1. Review project schedules; postpone landscape projects if appropriate (See Attachment D: “Water Shortage Contingency Plans for Newly Established and Planned Landscapes”)

#### **Continuing programs:**

- Maintain normal irrigation programs at special gardens, high visibility public facility landscapes, prominent turf areas, zoo exhibits, lawn bowling greens, greenhouses and nursery
- Maintain normal irrigation programs on athletic field turf; water all-weather fields and infields for dust control
- Maintain normal irrigation programs in new turf, landscapes and tree plantings
- Irrigate construction sites for dust control

#### Golf

##### IRRIGATION

1. Automatic irrigation systems controlled by ET stations will be reduced by 10%
2. All irrigation on established plantings will be done between 7pm and 10am, except for handwatering on tree wells, container plantings, etc.
3. Reduce irrigation to “out-of-play” areas

4. Reduce irrigation to general park turf
  5. Reduce irrigation to established shrub beds and mature trees
- IRRIGATION REPAIR**
6. Prioritize irrigation periodic maintenance and repair
- EQUIPMENT/CARTS**
7. Eliminate all washing of hard surfaces such as sidewalks, parking lots and cart paths, except as needed for public health and safety
  8. Wash all equipment on an as needed basis in the field to utilize water efficiently
  9. Wash carts as needed

**Continuing programs:**

- Maintain normal irrigation programs on tees, greens, lawn bowling greens and fairways
- Maintain normal irrigation programs on new turf, landscapes and tree plantings
- Water construction sites for dust control

**Aquatics**

**WADING POOLS AND WATER PLAY FEATURES**

1. Limit programs to sunny days of 70 degrees Fahrenheit (by 9:00am); update Hotline, as needed as needed
2. Fill pools to pre-determined lower level
3. Reduce hours of operation at non-recirculating water play features

4. Utilize informational signage to inform customers  
**SWIMMING POOLS AND BEACHES**

5. Reduce shower temperatures to 100 degrees Fahrenheit to shorten use

6. Reduce spa temperatures by 2 degrees Fahrenheit

7. Reduce sauna hours of operation

8. Utilize informational signage to inform customers

9. Wash only full loads of clothes

**Continuing programs:**

- Operate normal programs for all pools and re-circulating water play features

## **MANDATORY STAGE**

### **Objectives**

To achieve targeted consumption reduction goals by restricting defined water uses

To protect public health and safety and ensure survival of valuable assets

To minimize disruption to Parks' projects and programs while meeting target consumption goals

To minimize impact on revenue producing programs

### **Triggers**

The SPU Director would approve progression to this stage, as recommended by the SPU shortage advisory group, if goals established in the "Voluntary Stage" have not been met and additional action is needed. The specific restrictions imposed during the mandatory stage would be determined based on the season of the year, targeted demand levels, and other considerations previously mentioned. Variations of the specific restrictions may be applied based on water supply conditions. For example, turf watering restrictions may simply consist of time of day restrictions; or, if conditions warrant, turf watering could be restricted to certain times of day and allowed only once a week.

### **Public Message**

"It is necessary to impose mandatory restrictions to reduce demand because the voluntary approach has not resulted in the necessary savings. We are continuing to rely on the support and cooperation of the public to comply with these restrictions but need the certainty and predictability of restricting certain water uses in order to ensure that throughout the duration of this shortage an adequate supply of water is maintained for public health and safety."

#### **Mandatory Stage Actions**

#### **Communication Actions**

The WSMT continues to meet frequently to re-evaluate the situation based on information provided by SPU and feedback from Voluntary Stage actions to determine appropriate actions and strategies. The group will determine target consumption goals to be achieved on a mandatory basis that may be revised as necessary.

Any exemptions from restrictions will be clearly identified

In communicating mandatory restrictions to the public, **a clear distinction will be made between turf watering and watering gardens and ornamental plantings.** Also, the **unique watering needs of the golf courses** will also

be clearly identified. The type and amount of watering allowed will be clearly defined

Communication actions from the Advisory and Voluntary stages will be continued and enhanced

Plans will be made to move into the fourth stage - Emergency Curtailment - and to begin preparatory measures as appropriate

**Department's Internal Operating Actions**

Continue appropriate actions from previous stages

Finalize and implement procedures for exemptions from restrictions

Evaluate ability, resources and plans to move into Emergency Curtailment Stage; begin preparatory actions as appropriate

**Supply and Demand Management Actions**

- Continue all previous actions outlined in Advisory and Voluntary actions.

**Facilities, Vehicles, Equipment, Picnic Areas, Boat Docks and Playgrounds**

**FACILITIES**

1. Limit pressure washing of facilities to planned project work or operations that protect public health and safety on a case by case basis

**COMFORT STATIONS**

2. Limit pressure washing of comfort stations to operations that

protect public health and safety on a case by case basis

#### VEHICLES

3. Continue washing only when needed, if possible, at car washes that recycle water

#### EQUIPMENT

4. Stop all equipment washing, except for cutting units, power tools or similar equipment

#### HARD SURFACE

#### MAINTENANCE

5. Stop washing hard surfaces, except at those places necessary to maintain water quality, public safety or zoo animal health

#### FOUNTAINS

6. Turn off all fountains

#### PLUMBING

7. Continue to focus attention on plumbing leaks and repairs

8. Continue installation of faucet aerators

**Continuing programs:**

- Water construction sites for dust control
- Comfort station washing is done on a case by case basis
- Reduced hard surface cleaning

**Park Landscapes**

**IRRIGATION**

1. Reduce water use by \_\_\_% overall
2. Automatic irrigation systems controlled by ET stations reduced by \_\_\_\_\_%
3. All irrigation on established plantings will be done between 7pm and 10am, except for hand-watered tree wells, container plantings, etc.
4. Further reduce or stop irrigating general park turf
5. Further reduce irrigation to established park landscape beds and mature trees for survivability

**IRRIGATION SYSTEMS**

6. Continue to focus attention on irrigation system leaks and repairs
7. Accelerate installation of water conservation devices for manual and automated systems

**EQUIPMENT**

8. Stop all equipment washing, except for cutting units and similar equipment

**PROJECTS**

9. Postpone landscape projects, if appropriate

**Continuing programs:**

- Maintain normal irrigation programs at special gardens, high visibility public facility landscapes, prominent turf

areas, zoo exhibits, lawn  
bowling greens,  
greenhouses and nursery

- Maintain normal irrigation programs on athletic field turf; water all-weather fields and infields for dust control
- Maintain normal irrigation programs in new turf, landscapes and tree plantings
- Water construction sites for dust control

### **Golf**

#### **IRRIGATION**

1. Stop irrigating out-of-play areas
2. Stop irrigating roughs
3. Stop irrigating fairways on par 3 courses except Interbay
4. Stop all equipment washing, except for cutting units and similar equipment
5. Reduce irrigation to general established landscape beds and mature trees
6. Reduce irrigation of selected fairways

#### **IRRIGATION REPAIR**

7. Repair all leaks within 24 hours

#### **EQUIPMENT/CARTS**

8. Eliminate all washing of hard surfaces, such as sidewalks, parking lots and cart paths
9. Stop all equipment washing, except for cutting units, power equipment and similar equipment
10. Reduce cart washing frequency as necessary for public health and safety

**Continuing programs:**

- Maintain normal irrigation programs on tees, greens, lawn bowling greens and most fairways
- Maintain normal irrigation programs on new turf, landscapes and tree plantings
- Water construction sites for dust control

**POSSIBLE ADDITIONAL IRRIGATION RESTRICTIONS FOR LANDSCAPES AND GOLF**

Overall, the SPU shortage advisory group, in evaluating which restrictions to impose, will consider supply conditions. If supply conditions continue to deteriorate, before moving to the Emergency Curtailment Stage, and if irrigation is still occurring, turf watering will be banned (**except for golf greens and tees and athletic fields**). Newly installed turfs may be exempted from this ban if the procedures listed below are followed.

**Watering Restrictions**

The following are several possible approaches to watering restrictions. The nature of the restrictions used will depend on the situation, and may change as severity of the situation changes.

- Prohibit all watering during the warmest hours of the day, for example between 10:00 a.m. and 7:00 p.m.
- Limit all watering to a specific number of days per week or per month. This choice will depend on target consumption goals, the time of year and the extent to which watering is occurring, and how much demands have already decreased. For example, if demand has already been reduced by 15% through other measures, during July and August limiting turf watering to **two** days a week on a region-wide basis would further reduce average daily demand by approximately 15 million gallons. Limiting turf or turf watering to

one day a week will yield an additional average daily reduction of 15 to 20 million gallons. (These figures are based on experience during 1992.)

- Ban turf watering (see exemptions below), with other watering prohibited during the warmest hours of the day, for example, between 10:00 am and 7:00 p.m.

### **Exemptions from Water Use Restrictions**

**Turf watering ban exemption-** Newly installed turfs may be exempted from a ban if the procedures listed below are followed. The procedures relating to the exemption and the requirements of the exemption would be clearly outlined at the time of the ban. For purposes of this exemption, “new turf” refers to a turf newly installed during the current year only. Overseeding or other turf programs would not be exempt

**In the event that the shortage continues to worsen and the Emergency Curtailment Stage is invoked, these special turf exemptions could be revoked.** It could also be revoked on a case by case basis if the rules stated above are not followed, or in the case of a water system emergency.

**Automatic Irrigation System Exemption -** Users of automatic irrigation systems may be exempt from certain mandatory watering restrictions if proper procedures are followed– **but not from a total watering ban.** This approach allows an alternate path to achieving savings due to the precision with which such systems can be operated, but is not intended to be a loophole to avoid the need to curtail use. For example, if only 30 minutes of turf watering is allowed per week, automatic irrigation systems which meet the criteria would be allowed to water based on a certain percentage of evapotranspiration (ET), such as 50%, instead of the time-limit based restriction. [Note: ET is a factor calculated according to climatic data, which is commonly used for turf watering in commercial applications; ET data would be made available on the SPU web page and in alternate formats.] **In the event of a total watering ban, these users would also be prohibited from watering** (unless other safety-based criteria are met, as stipulated in the WSCP).

#### **Other Exemptions -**

For purposes of dust control, water may be applied to construction areas or other areas needing to comply with air quality requirements. **If reclaimed water is available, consider requiring or promoting that it be used for dust control, if feasible**

Aquatics  
WADING POOLS AND  
WATER PLAY  
FEATURES

1. Limit programs to sunny days of 75 degrees Fahrenheit (by 9:00am); update Hotline, as needed
  2. Implement schedule limitations to selected sites to maximize use
  3. Update informational signage to inform customers
- SWIMMING POOLS  
AND BEACHES

#### 4. Postpone PM's and maintenance fills

5. Close spas and saunas
6. **Colman pool:** Implement saltwater backwash
7. Wash only full loads of clothes
8. Update informational signage to inform customers

**Continuing programs:**

- Maintain normal wading pool programs at the Big 3 (Green Lake, Lincoln Park and Volunteer Park) and selected others
- Operate normal public programs at all swimming pools

**EMERGENCY CURTAILMENT STAGE**

At this stage, SPU recognizes that a critical water situation exists. Without additional significant curtailment actions, a shortage of water for public health and safety will be imminent. No prior emergency in the Seattle water system’s history fits this description.

This stage is characterized by two basic approaches. First, increasingly stringent water use restrictions are established and enforced. Secondly, significant rate surcharges are used to encourage customer compliance. While a rate surcharge may be implemented in either the Voluntary or Mandatory stages, a surcharge is a key component to the success of this stage and previous surcharge may be increased if appropriate.

**Emergency Curtailment Stage Actions**

**Communication Actions**

Continue all previous, applicable actions

The Water Shortage Management Team defines the problem to staff and the public as an emergency. Staff and customers are informed of possible pressure reductions and problems that this may entail.

**Department’s Internal Operating Actions**

Continue actions listed in prior stages

**Supply and Demand Management Actions**

2.0 Continue actions listed in prior stages

Facilities, Vehicles,  
Equipment, Picnic Areas,  
Boat Docks and  
Playgrounds

FACILITIES

- 1. Limit pressure washing of facilities to planned project work or to protect public health and safety on a case by case basis

COMFORT STATIONS

- 2. Limit pressure washing of comfort stations except to protect public health and safety on a case by case basis

VEHICLES

- 3. Wash city vehicles only as needed, if possible, at a car wash that recycles water

EQUIPMENT

- 4. Stop all equipment washing except

for cutting units, power  
equipment or similar  
equipment

**HARD SURFACE  
MAINTENANCE**

5. Limit washing  
hard surfaces except to  
maintain public health and  
safety

## FOUNTAINS

6. Turn off all fountains

## PLUMBING

7. Continue to focus attention on leaks and repairs

8. Continue installation of faucet aerators

### **Continuing programs:**

- Water construction sites for dust control
- Continue normal water use for comfort station cleaning
- Reduced hard surface cleaning for public health and safety

### **Park Landscapes**

#### IRRIGATION

1. Reduce water use by \_\_\_\_%

2. Automatic irrigation systems controlled by ET stations reduced by \_\_\_\_%

3. All irrigation on established plantings will be done between 7pm and 10am, except for hand-watered tree wells, container plantings, etc

4. Stop irrigating general park turf

5. Further reduce irrigation to general park landscaped areas/mature trees for survivability

6. Reduce turf irrigation in special gardens, high visibility public facilities, and prominent irrigated turf for survivability

7. Reduce irrigation on soil-based athletic field turf

8. Stop irrigating manually-irrigated annual plantings; remove plants if necessary

#### IRRIGATION SYSTEMS

9. Continue to focus attention on irrigation system leaks and repairs

10. Accelerate the installation of water conservation devices for automatic systems

**EQUIPMENT**

11. Stop all equipment washing, except for cutting units, power equipment or similar equipment

**Continuing programs:**

- Maintain normal irrigation programs at special gardens, high visibility public facility landscapes, zoo exhibits, lawn bowling greens, greenhouses and nursery

- Maintain normal irrigation programs on sand-based athletic field turf only; water all-weather fields and infields for dust control

- Maintain normal irrigation programs in new turf, landscapes and tree plantings, or as instructed for survivability

- Water construction sites for dust control

**Golf**

**IRRIGATION**

1. Stop irrigation to out-of-play areas
2. Stop irrigating roughs
3. Stop irrigating fairways on par 3 courses
4. Significantly reduce fairway irrigation for survivability
5. Further reduce irrigation to general landscape beds and mature trees for survivability

**IRRIGATION REPAIR**

6. Continue to repair all leaks within 24 hours

**EQUIPMENT/CARTS**

6. Eliminate all washing of hard surfaces except to protect public health and safety
7. Stop all equipment washing, except cutting units, power equipment and similar equipment

**Continuing programs:**

- Maintain normal irrigation programs on tees, greens and lawn bowling greens
- Maintain normal irrigation programs on new turf, landscapes and tree plantings, or as instructed for survivability
- Water construction sites for dust control

**Aquatics**

**WADING POOLS AND WATER PLAY FEATURES**

1. Close all wading pools and water features; update Hotline, as needed

2. Update informational signage to inform customers  
SWIMMING POOLS  
AND BEACHES

3. Continue all reductions in Mandatory Stage

**Continuing programs:**

- Operate normal public programs at all swimming pools

## SECTION 4

### SHORT TERM EMERGENCY CURTAILMENT PLAN

#### Introduction

Although many of the demand reduction measures employed would be similar to those used during a progressive, weather-related shortage, **short term emergencies** are unique because of a lack of preparation time and the urgency of immediate, large-scale demand reductions. Each emergency scenario is different, but most of them require major curtailment actions by customers. Also, unlike drought, some emergencies would be localized, requiring demand reduction for only a limited geographic area.

Strategies for dealing with emergencies have been developed based on lessons learned from previous water utility events, other utility experiences, and a sorting of measures based on specific criteria. There are several criteria by which to decide which demand management measures are appropriate to initially reduce demand during an emergency:

- **Timing:** can the measure(s) or action(s) deliver the necessary savings in the necessary timeframe, i.e., are immediate savings needed or can the

system support a gradual reduction in demand;

- Magnitude of savings: will the measure produce enough savings to make a meaningful difference i.e., reduce demand to the level the impaired water system can handle;
- Season: does the action make any impact at the time of year that the emergency occurs, i.e., banning turf watering will have little impact in November;
- Costs: How severe are the cost implications of the measure to the customer, including local business and industry.

### Supply and Demand Management during Emergencies

No single strategy can be created which will meet the needs of the Department for all emergency scenarios. The criteria listed above create a framework for decision-making. Emergencies initially require quick and immediate response. Once an assessment is made as to how long it will take to restore the system, the immediate response strategy may change if it appears that the repair process will be lengthy.

The strategy for most emergencies can be narrowed to measures having the most immediate impact on water supply and

consumption. All needed and available back up supplies would be activated during an emergency: interties, well-fields, off-loading wholesale customers who have other sources, etc.

The table in the attachments presents a range of potential demand management savings. The range depends on factors including the season, weather conditions, how effectively and urgently the message is communicated, whether or not an emergency surcharge is included, etc.

## Attachment A

### Estimated Savings from Possible Curtailment Measures

| Major Uses  | Total Use      | Curtailment Savings |             |              |            |            |   |
|---|----------------|---------------------|-------------|--------------|------------|------------|---|
|   | MGD            | MGD                 |             | % of Savings | %          |            |   |
|   | May 15 -Sep 15 | Low                 | High        | Residential  | Low        | High       |   |
| Toilet  | 31             | 1.9                 | 3.9         | 65%          | 6%         | 13%        | "1 fewer flush" (25-50% compliance)                         |
| Irrigation  | 27             | 18.9                | 24.3        | 84%          | 70%        | 90%        | "Irrigation ban" (75-95% compliance, new landscapes exempt) |
| Other Household Use                                     | 22             | 1.1                 | 2.2         | 84%          | 5%         | 10%        | "Use less, don't let it run" (25-50% compliance)            |
| Shower  | 18             | 1.8                 | 3.6         | 100%         | 10%        | 20%        | "5 minutes max" (25-50% compliance)                         |
| Water System Use  | 18             | 1.8                 | 3.6         | 0%           | 10%        | 20%        | "Only crucial health and safety needs" (100% compliance)    |
| Clotheswashing  | 16             | 0.8                 | 1.6         | 100%         | 5%         | 10%        | "Eliminate partial loads" (25-50% compliance)               |
| Cooling   | 11             | 0.6                 | 1.1         | 0%           | 5%         | 10%        | "Raise the thermostat" (25-50% compliance)                  |
| Process   | 10             | 0.5                 | 1.0         | 0%           | 5%         | 10%        | "Cut non-essential use" (25-50% compliance)                 |
| Other   | 6              | 0.3                 | 0.6         | 0%           | 5%         | 10%        | "Cut non-essential use" (25-50% compliance)                 |
| Leaks   | 6              | 0.3                 | 0.6         | 91%          | 5%         | 10%        | "Fix the leaks" (5-10% compliance)                          |
| Dishwashing   | 5              | 0.3                 | 0.5         | 100%         | 5%         | 10%        | "Eliminate partial loads" (25-50% compliance)               |
| Recreation  | 5              | 0.6                 | 1.3         | 78%          | 13%        | 25%        | "Don't let it run" (25-50% compliance)                      |
| Food Service  | 5              | 0.3                 | 0.5         | 0%           | 5%         | 10%        | "Cut non-essential use" (25-50% compliance)                 |
| <b>Total</b>  | <b>180</b>     | <b>29.2</b>         | <b>44.8</b> | <b>68%</b>   | <b>16%</b> | <b>25%</b> |   |
| <b>Outside Water Use (included in categories above)</b> |                |                     |             |              |            |            |   |
| Home Car Washing  | 1              | 0.2                 | 0.4         | 100%         | 20%        | 40%        | "Go to Recycled Car Washes" (25-50% compliance)             |
| Hydrant Permits   | 1              | 0.4                 | 0.8         | 0%           | 38%        | 75%        | "Only crucial health and safety needs"                      |
| Turf Watering   | 20             | 14.0                | 18.0        | 86%          | 70%        | 90%        | "Turf watering ban"   |
| All Watering  | 27             | 18.9                | 24.3        | 84%          | 70%        | 90%        | "All watering ban"  |
| All Outdoor Use   | 31             | 21.7                | 27.9        | 89%          | 70%        | 90%        | "All outdoor use ban" (Health and safety exempt)            |
| Nonresidential Irrigation                               | 4              | 0.5                 | 1.0         | 0%           | 13%        | 25%        | "Water to 50% of ET" (25-50% compliance)                    |

2.0

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### 2.0 Attachment B

#### *CONTACT LIST*

##### **Department's Water Shortage Management Team**

Division Director(s)  
Horticulture Manager  
Operations Manager(s)  
Maintenance Services Manager  
Aquatics Manager  
Environmental Stewardship  
Manager  
Aquarium Manager  
Zoo Operations Manager  
Golf Manager  
Public Information Officer  
Resource Conservation Coordinator

A working list of contacts for easy reference in case of a drought or emergency should be developed and regularly updated in consultation with Department management.

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Attachment C

### **DEFINITIONS AND LISTS**

#### **IRRIGATED PARK AREAS**

**Prominent turf:** High visibility or high use turf areas. Examples: Community centers, popular picnic or sunbathing areas, zoo turfs or smaller neighborhood Department's where the turf is the major amenity

**General park turf:** Turf areas in Department's of various types where irrigation is available

**Athletic field turf:** Turf areas characterized by scheduled sports play

**Soil-based athletic field:** Athletic fields with substrates generally composed of native soil formed onsite with minimal amendment

**Sand-based athletic field:** Athletic fields with substrates composed entirely of imported sand

**All-weather athletic field:**  
Athletic fields with a well drained playing surface; often non-turf but can include turf-artificial composition surfacing

**High visibility public facility landscapes:** Landscaped areas in a high visibility or high use, prominent location. These landscapes include woody and /or herbaceous plant material, and occasionally turf areas. Examples: Community Centers or park entrances

**General landscape bed areas:**  
Non-turf planted areas that include woody plant material such as shrubs, trees and ground covers.

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**Floral beds:** A landscaped bed for floral display, containing herbaceous plants such as perennials, annuals and bulbs

**Special Garden:** A high visibility, highly maintained landscape display area containing a collection of valuable, unique and rare plants

**Greenhouse:** A house of glass or polymer plastic construction that is used for the propagation, growing and care of plants

**Nursery:** A facility for the propagation and growing of plants for use on developed and undeveloped park property

**New turf, landscape or trees:**  
Landscapes, trees and turf plantings that were installed within the last 12 months

**Zoo exhibit landscapes:**  
Landscapes, trees and turf plantings in an exhibit habitat zone, planted in a naturalistic fashion to represent a bioclimatic region of the world

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### SPECIAL GARDENS

Japanese Garden  
Kubota Garden  
Parson's Garden  
Washington Park Arboretum  
Woodland Park Rose Garden  
Woodland Park Zoological  
Gardens

### GREENHOUSES

Jefferson Greenhouse  
Volunteer Park Conservatory  
Volunteer Park Greenhouse  
Woodland Park Zoo Greenhouses

### NURSERY

Atlantic Nursery

Attachment D

### **Water Shortage Contingency Plans for Newly Established or Planned Landscapes**

**New Landscape installations shall be defined as those tree, planting beds, including shrubs, perennials and ground covers, and turf plantings that are substantially complete and were installed within the last 12 months.** These landscapes will be exempt from irrigation restrictions for during their establishment period as defined below. This ensures that the City's asset investment is properly managed and maintained for long-term health.

The Office of Sustainability and Environment publication: [The Landscape Guidelines for City Departments](#) provides a basis for organizing and analyzing new landscapes for irrigation management in a critical water shortage. The guidelines refer to two categories of project:

- Newly installed landscapes and;
- Proposed, funded landscape projects

Each of these requires assessment and analysis for proper water management. Proposed projects should also be analyzed to consider the impacts of schedule changes or postponement.

### **New Landscapes**

Parks' Best Management Practices identify the critical need for regular irrigation of new landscapes, be they trees, shrubs, perennials or turf. The Landscape Guidelines support this position indicating that

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new landscapes need to be adequately irrigated to fully ensure asset survival and establishment. SPU's and Parks' Water Shortage Contingency Plans are also in agreement with this position. It is well documented that the future health of plants is directly tied to proper post-construction cultural care, including irrigation.

Therefore:

- ❑ New landscapes are exempt from irrigation restrictions and shall be watered as needed for establishment
- ❑ The establishment period for new landscapes is generally considered to be at least two to three years
- ❑ New planting areas shall be mulched to retain moisture
- ❑ Weed control shall be consistently employed to maximize the use of available water by the desired landscape plants

### **Proposed Landscapes**

Proposed landscapes shall be defined as those that are scheduled to be installed during the remainder of the current year. These projects include CIP, CRF, CDBG, NMF, in-house (M&O), volunteer and projects from other fund sources. In order to conserve water the Department shall determine whether these projects can/should be postponed. Criteria for postponement consideration shall include:

- ❑ Contractual concerns - will delaying the project result in problems with in-place contracts (such as the sequencing of work)?
- ❑ Budget concerns - will delaying the project increase costs to the project?
- ❑ Timing - have the plant materials already been purchased and are ready for installation? (If

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the answer is yes, it is recommended that these projects be installed as planned to avoid the possibility of undue plant stress which can lower the chances for healthy plant establishment.)

Community/partnership commitments - does the project have multiple partners? Might postponement cause one or more partners to withdraw the partnership?

A "No" answer to any of these questions should result in serious consideration of project postponement. "Yes" answers are an indication that the project might need to proceed as planned. In addition, consideration should be given to partial project implementation, as follows:

Can the new landscape site be prepared now with planting delayed until fall/winter?

Can the major trees/shrubs be planted now (for hand watering) with ground covers and turf plantings delayed until fall/winter?

Landscape/project managers should assess all of the new and planned landscape installations to determine the irrigation management required for each, and plan according to the above guidelines.

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