



ENVIRONMENTAL PROTECTION AND GROWTH MANAGEMENT DEPARTMENT
Environmental Planning and Community Resilience Division

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Mr. Hardeep Anand
Director of Utilities
City of Fort Lauderdale
100 North Andrews Ave,
Fort Lauderdale, FL 33301

RE: NatureScape Irrigation Service Summary Report, 2014

Dear Mr. Anand,

Please find attached, the City of Fort Lauderdale 2014 Summary Report in fulfillment of the Broward County NatureScape Irrigation Service (NIS) Interlocal Agreement. The report summarizes your program evaluations conducted, Actual Water Savings (AWS) and recommendations for the upcoming year. In addition, the NatureScape Broward Program outline is attached for your files. I apologize for not distributing this report sooner. Several of the ILA (Interlocal Agreement) partners hadn't completed the follow-up repairs to a number of sites that held up the completion of the annual summary tables for year four of the agreement.

I am sure that you are aware that the primary goal of the NIS program is to achieve water savings and protect water quality through more efficient irrigation operations and landscaping practices. Increased irrigation efficiency, appropriate landscaping choices and best maintenance practices will save money, valuable resources, reduce runoff, improve water quality and help in addressing TMDLs (Total Maximum Daily Loads) for nutrients. In addition, the implementation of the program can help the City's utility meet regulatory and program requirements such as the implementation of your Water Conservation Plan as required in Consumptive Use Permits issued by the South Florida Water Management District as well as for the amended Rule 40E-2.321 F.A.C.

On behalf of Broward NatureScape Irrigation Service, we would like to thank you for the continued support of this important and successful water conservation program and look forward to working with you on any program enhancements that you may offer.

It continues to be a pleasure to work closely with your staff during the evaluations. Their attention to detail and proactive attitude makes these complicated efforts much easier. Should you have any questions, please feel free to contact me (954) 519-1281 (rcarew@broward.org) or my supervisor, Barbara Powell (bapowell@broward.org).

Sincerely,

Robert Carew
NatureScape Irrigation Service Program Manager
Environmental Planning and Community Resilience Division
Broward County Environmental Protection and Growth
Management Department

2014 NIS Report for the City of Fort Lauderdale (April 13, 2013- April 12, 2014)

Evaluations Conducted/Water Savings, Year Four:

For the City of Fort Lauderdale, NIS completed eleven (11) original evaluations and four (4) follow-up evaluations for year four of the contract agreement (April 13, 2013 to April 12, 2014). In pursuit of additional water savings, the number of follow-up evaluations exceeded the contracted (11) original and three (3) follow-up evaluations with the one (1) additional follow-up evaluation completed at no extra cost to the City to capture and document more savings. As I mentioned in the cover letter, several ILA partners delayed the repairs of several sites that prevented the completion of the follow-up evaluations required for year four contract deliverables, as well as the annual summaries

Of the fifteen (15) overall evaluations completed (original and follow-up), twelve (12) evaluations were conducted on City park systems, one (1) was at another city government site (Peele Dixie Water Treatment Plant) and two (2) were at completed at a business site (Museum of Discovery and Science). The overall combined savings from those sites evaluated was a 62% reduction in water use during this reporting period (based on total volumetric reductions). The average reduction per site was 43%. The overall Actual Water Savings for year four of the agreement was calculated to reach 27,152,112 gallons/yr. Additional copies of the (11) original evaluations and four (4) follow-up evaluations are available upon request.

Current ILA Overall City Summary

To date, since the inception of the current NatureScape Irrigation Service agreement on April of 2010, we have completed 74 evaluations for the City of Fort Lauderdale with an Actual Water Savings of 85,333,663 gallons, resulting in a 50.5 % reduction in water use (based on total volumetric reductions). The average reduction per site was 31.7%. This number will continue to grow as we complete year five of the current agreement and start year one of the next agreement in April of 2015.

Specific Recommendations:

With the recent commencement of year five of this Agreement, starting on April 13, 2014, we are focused on ways to provide even more water savings throughout the County. We strive to conduct evaluations that are of significant value to our Interlocal Partners. That can only be done if we are provided sites that are in need of improvement.

During field evaluations we strive to focus on critical maintenance and landscape issues, repairs and/other problems that can significantly impact the expected water savings of these sites. Other times (in several municipalities) we are provided sites to evaluate that have been recently overhauled or are in relatively good shape with no

major maintenance, repair or renovation issues, resulting in little or no Actual Water Savings.

The following is specific to the City of Fort Lauderdale and intended to highlight recommended areas where greater savings may be realized.

- The sooner that the sites to be evaluated are identified, the sooner the evaluations can be initiated and the sooner the Actual Water Savings can be realized. In addition, early initial site selection and scheduling minimizes the impact on the city’s irrigation maintenance staff. Thanks to your proactive staff we have completed all of the required original evals for year 5 and are waiting for the repairs to be completed to conduct the follow-up evaluations.
- A selection of older sites that are in need of repair, renovation or overhaul could offer greater potential for water savings for this upcoming year. Sites in need of renovation provide the majority of Actual Water Savings.
- The irrigation systems that irrigate parks, post offices, fire and police stations as well as the associated parking areas and other high resident use areas appear to sustain an unusually high rate of damage from pedestrian and vehicle traffic, especially during the winter tourist season. These sites might require additional monitoring.
- Recent evaluations in other municipalities in Broward County that were conducted for Homeowner’s Associations and other commercial properties (identified by water bills as increasingly excessive water users) have often proven to have the potential for substantial water savings if the property manager have the funds and manpower to do the repairs. Similar sites in Fort Lauderdale might reap comparable water savings.

We have already started conducting evaluations for year five of the current Interlocal Agreement, and are looking forward to working closely with you in the selection of future potential sites. We will be offering additional workshops to our NIS partners throughout the upcoming year promoting new innovations for more efficient irrigation technology.

If you are interested in comparing your City’s Actual Water Savings with the program’s overall savings by year, please review the following summary report table.

Table 1: Year 4 Overall NatureScape Irrigation Services Program Summary – 2014

Reporting Period	Number of Evaluations	Actual Water Savings (million gallons)	Average % Reduction/Site	% Using Potable	% Using Reuse
4/13/10 - 4/12/11	205	116.39	19%	64%	1%
4/13/11 - 4/12/12	180	119.52	20%	66%	2%
4/13/12 - 4/12/13	182	116.54	24%	44%	3%

4/13/13 - 4/12/14	195	139.41	26.9%	51%	0%
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I wanted to point out from the year four summary totals, that 100 of the 195 evaluations were on potable water systems, forty-seven (47) were well water supplied and the remaining forty-eight (48) evaluations were using surface water (canal and lake) for their water source.

I should also mention that of the 195 evaluations we recently completed for year four of the contract period, we evaluated twenty (20) businesses, one (1) church, seventeen (17) residential multi-family, twenty-two (22) residential single family, fifty-six (56) city parks as well as seventy-nine (79) other city government properties.

Finally, we encourage you and your managers, to consider NatureScaping their property. This Broward County initiative is about creating Florida-friendly landscapes that conserve water, protect water quality, and create wildlife habitat. NatureScape Broward recognizes properties certified through either the Florida Yards and Neighborhoods program or the National Wildlife Federation’s Backyard Wildlife Habitat Program. Each evaluation report includes the NatureScape website (www.broward.org/naturalresources/naturescape) as well as the NatureScape team phone number (954-519-0317) to provide additional information on pursuing this important certification.

We also wanted to congratulate the City of Fort Lauderdale as being registered to become a Community Wildlife Habitat and are well on their way to becoming certified.

Appendix

The NatureScape Broward Program:

The program goals of the NatureScape Broward program are to protect water quality and quantity, and create wildlife habitat through appropriate landscaping practices, the prudent use of our water resources, and the planting of native, non-invasive, and other drought tolerant plants in Broward County.

Background

On December 6th, 2005, a contractual agreement was approved between Broward County and twenty-two Interlocal partners for the operation of a NatureScape Irrigation Service (NIS). The NIS is modeled after Mobile Irrigation Labs (MILs) throughout Florida as well as California and Texas, and is staffed by trained irrigation specialists who evaluate the performance of irrigation systems and recommend improvements based on these on-site evaluations. This program seeks to protect water quantity and quality by improving the efficiency of irrigation systems in Broward County, and by promoting proper landscaping practices consistent with the NatureScape Broward program principles.

Coordination meetings were held at the County and various municipal facilities to provide an overview of the evaluation process, establish points of contact, develop reporting protocols and parameters, and review the process for selecting prospective NIS properties. Once all twenty-two partners had signed the agreement, the Water Resources Division of the Broward County's Environmental Protection Department submitted the agreement to the Broward County Board of County Commissioners for final approval. On December 6th, 2005 the Broward County Commission approved the overall Interlocal Agreement to:

“PROVIDE COST SHARE SUPPORT OF A NATURESCAPE IRRIGATION SERVICE TO BE OPERATED BY BROWARD COUNTY WITHIN THE WATER UTILITY SERVICE AREAS AND AUTHORIZE BROWARD COUNTY TO CONDUCT SPECIFIC TECHNICAL ACTIVITIES REQUIRED AS PART OF LANDSCAPE and IRRIGATION SYSTEM EVALUATIONS TO BE PERFORMED BY THE BROWARD COUNTY ENVIRONMENTAL PROTECTION DEPARTMENT.”

Current Contract

On April 13th, 2010, a new agreement was signed by 18 municipal partners and the Broward County Commission to further the successful conservation measures of the NatureScape Irrigation Service. Since its establishment in 2005, the NIS has been as an integral part of the water resources protection, management and outreach efforts implemented by the Natural Resources Planning and Management Division of the Environmental Protection and Growth Management Department of Broward County. The NIS is staffed by irrigation specialists whose mission is to promote water conservation through on-site evaluations of irrigation systems and conservation education. The primary goal of an irrigation evaluation is to achieve water savings and protect water quality through more efficient irrigation operations and landscaping practices. Irrigation system evaluations focus on determining capacity and efficiency, and identifying means for improving system efficiency. Additionally, one must recognize that landscapes are often managed to respond to plant needs; thus, it is important to promote the integration of low maintenance, low water-demand vegetation into landscapes, thereby reducing irrigation demand and chemical applications as part of standard maintenance practices. Increased irrigation efficiency, appropriate landscaping choices and best maintenance practices will save valuable resources, reduce runoff, improve water quality and help in addressing TMDLs (Total Maximum Daily Loads) for nutrients.

The results of the irrigation evaluation are used to develop a sound Irrigation Management Plan in which irrigation water is applied only when needed and only in the amounts which can be fully utilized by healthy plants. Each evaluation is summarized in a letter to the owner and /or property manager that includes a list of specific recommended improvements to reduce irrigation demands while increasing irrigation efficiency. Each letter closes with an encouragement for the property manager to consider NatureScaping their property. This Broward County initiative is about creating Florida-friendly landscapes that conserve water, protect water quality, and create wildlife habitat. NatureScape Broward recognizes properties certified through either the Florida Yards and Neighborhoods program or the National Wildlife Federation's Backyard Wildlife Habitat Program. Each letter also includes the NatureScape website (www.broward.org/naturalresources/naturescape) as well as the NatureScape team phone number (954-519-0317) to provide additional information on pursuing this important certification.

NatureScape Irrigation Evaluation Methods

All of the irrigation system evaluations completed by the NatureScape Irrigation Service are conducted in compliance with all of the standard design and testing specifications of the Mobile Irrigation Labs (MIL) evaluations that have been conducted across the country for the past 25 years. Field evaluations and subsequent analyses are in

compliance with the “Mobile Irrigation Laboratory Urban Irrigation Evaluation Manual”, produced by the U.S. Department of Agriculture Natural Resource Conservation Service, (2007), as well as the “Urban Irrigation Auditor Certification Manual” produced by the Florida Irrigation Society (2002).

Irrigation Evaluation Methods

There are 3 basic levels of mobile irrigation evaluations conducted in the field:

- Evaluation by visual inspection;
- Pressure and flow check; and
- The “Catch-Can” test

Visual inspections are conducted first to determine if the system is in disrepair or has poor coverage. When the system is found to be in a state of disrepair, the other levels of evaluation are not carried out. If an irrigation system can operate even minimally, pressure and flow checks on individual sprinkler heads or emitters are performed. If pressure and flow are found to be relatively uniform, a catch can test can be conducted to determine irrigation efficiency as well as optimum run times for each zone in the system. The field data is brought back to the office for further analysis and to compare the performance with the manufacturer’s specifications. The results are presented in a formal, written report that summarizes the field analysis as well as offering specific recommendations that are designed to increase the system’s efficiency.

Improved irrigation efficiency can result in:

- Reduced runoff of fertilizer and pesticides
- Reduced soil erosion
- Increased crop (or healthier landscape plant) production
- Lower energy costs
- Reduced plant diseases

The system and associated problems observed by the Broward NatureScape Irrigation Service are summarized in an attached table. Uniformity is expressed in the table as either Emission Uniformity (EU) or as Distribution Uniformity (DU), depending on whether the system is low volume (EU) or high volume (DU). (The vast majority of the evaluations conducted during this past year were high volume systems and were rated in DU.) A rating is then assigned, depending on the uniformity value. When the results are presented in the written report to the irrigator, the optimum performance standards, as determined by the NRCS (Natural Resource Conservation Service, U.S. Department of Agriculture), are explained along with ways to improve the system’s operation.

The ratings for the (high volume systems) Distribution Uniformity (DU) are listed below:

<u>Uniformity %</u>	<u>Rating</u>
80 – 100	Excellent
70 – 79	Good

56 – 69

Fair

< 56

Poor

The most common problems that were encountered were:

- Mixed sprinkler sizes and unmatched precipitation in the same zone
- Turf and landscape irrigated in the same zone
- Stream of water blocked by vegetation
- Watering too long
- Operating too frequently
- Leaks and broken valves, pipe, laterals lines (Poly-tubing), emitters, sprinklers

The NatureScape Irrigation Service will continue to target larger urban irrigation systems with higher water demands to encourage property managers to improve their systems and to be attentive in adjusting their irrigation schedules to reflect seasonal temperatures and rainfall patterns.

Typical Urban Irrigation Problems

The following list highlights some of the more frequent problems that are typically observed during an urban irrigation evaluation. (See the last page of the Appendix for the detailed list).

Grass and landscape area irrigated in the same zone. Grass and landscape have different watering needs. When both are watered in the same zone, the potential for over watering turf or landscaped beds is greatly increased.

Mixed sprinkler sizes & unmatched precipitation in the same zone. Different sprinkler/head sizes emit different amounts of water. Since different size nozzles apply water at different rates, the amounts of water being applied to an area will vary, which often results in an uneven coverage.

Mixed sprinkler brands or types in the same zone. Different manufacturer's brands and types emit different amounts of water. By having a mix of brands and types in one zone, a uniform distribution of water will not be achieved and the potential for applying too much or too little water is greatly increased.

Low water pressure in the irrigation system. Lower water pressure than the manufacturer's specification has a negative impact on system performance. Sprinklers will not operate correctly, nor will they provide the same coverage as a system that has the proper line pressure.

Sprinkler/emitter spacing varies in the same zone. Proper spacing is crucial to having a uniform distribution of water. By spacing the sprinklers so that there is good overlap, the watering efficiency to all areas of the zone will increase. This can eliminate spots that are too wet or too dry.

Missing/malfunctioning emitters or sprinklers. Making necessary repairs to missing or broken sprinklers and/or lateral lines will reduce the amount of water wasted each cycle and will increase pressure in the lines for better performance throughout the zone.

Leaks and/or breaks in piping, valves and/or lateral lines. Leaks in piping or control valves waste a lot of water. They also waste fertilizer and can cause erosion.

Sprinkler heads not properly adjusted, causing overflow on paved areas. Minor adjustments to the heads will reduce or eliminate overspray onto paved areas where the water is wasted.

Clogged sprinklers (due to biological, chemical or physical factors). Older sprinkler nozzles tend to clog over time. Routinely inspect each sprinkler for reduced flow and clear any clogged nozzles as necessary.

Stream of water blocked by vegetation. Vegetation blocking sprinklers/emitters causes water to pool around the sprinkler instead of watering the desired area.

Operating time is too long. Operating irrigation zones too long wastes precious water. It makes the turf prone to disease and erosion and wastes fertilizer. Excessive watering can also stress the storm water drainage system.

Operating time is too short. Operating irrigation zones for too short a watering cycle doesn't allow the water to reach the complete root system of the grass and makes the roots stay near the surface, which can then cause the grass to burn and sometimes die in dry drought conditions.

Operating time is too frequent. Operating irrigation zones too frequently (too many times per week) also makes a lawn prone to disease and erosion, wastes fertilizer and can stress the storm water drainage system.

No Rain Sensor/Shut Off device. A rain sensor is a shutoff device that prevents an automatic irrigation or sprinkler system from turning on during and after a rain storm. These devices override a scheduled irrigation cycle when a water collection cup or sensor on the shutoff device detects a sufficient amount of rain water.

No soil moisture measuring device or rain gauge. Testing the moisture of the soil is another way to determine when water is needed. A rain gauge is another simple way of helping to know whether to irrigate. Only water when necessary.

Additional General Recommendations Provided to the Property Manager

- Check all spray nozzles periodically for any clogging or blockage as a preventive measure.
- When replacing broken nozzles, ensure that they are the same brand and size in each zone; this will result in more uniform flow rates and an even distribution of water.
- Cut back all vegetation that is blocking sprinklers, to reestablish head to head coverage.
- Continue to irrigate in the early morning while winds are slight and evaporation is relatively low.
- Replace high maintenance, high water-use landscaping with native, drought tolerant plants.
- Cluster plants with similar water needs to further minimize water use.
- Visit the NatureScape Broward website www.broward.org/naturalresources/naturescape to help in the selection of proper drought tolerant plants, many of which are native to Florida and do well in our environment.

Definitions

Actual Water Savings (AWS) - The total amount of water which is actually saved for a period of years as a direct result of following the repairs and schedule changes derived from an irrigation system evaluation.

D.U. (Distribution Uniformity) is a value that expresses how evenly the water is applied over the area being irrigated. The optimum DU for these systems is 80% or higher.

Instant AWS can be achieved if repairs are made during the evaluation, resulting in quantifiable water savings or if the controller settings are adjusted (as a schedule change) at the time of the evaluation or before the report is completed.

Potential Water Savings (PWS) – The total amount of irrigation water that potentially can be saved annually by following the recommendations derived from an irrigation system evaluation and the efficiency improves to a goal of 80% or higher.

Irrigation System Efficiency

The efficiency of an irrigation system is defined in terms of Distribution Uniformity (DU) for high volume sprinklers and Emission Uniformity (EU) for low volume micro irrigation. (The vast majority of urban irrigation sprinklers are high volume). These terms are listed in the USDA-NRCS Irrigation Guide and are defined as values that express how evenly the water is applied over the area being irrigated. These numbers, in the form of percentages, are used to calculate the run times of irrigation events.

Primary Irrigation Evaluation Goal

The primary goal of a NatureScape Irrigation Service evaluation is to achieve water savings and protect water quality through more efficient irrigation and landscaping practices. Irrigation system evaluations focus on determining capacity, efficiency, and identifying improvements for healthier landscaping. This information is then used to develop a sound Irrigation Management Plan in which irrigation water is applied only when needed and only in amounts which can be fully utilized by healthy plants.

Net Irrigation Requirement

Properly managed irrigation is used to supplement natural rainfall. The amount of irrigation required annually is the Net Irrigation Requirement (NIR) and is defined as;

$$\text{NIR} = \text{Crop water requirement} - \text{Effective rainfall}$$

Code	Description of Problems
Typical Irrigation System Problem Descriptions – Problems that are irrigation system or management factors that limit irrigation system performance or efficiency. Problems are noted during the site visit, system evaluation, and/or through discussions with the operator.	
1	Under-sized pump for number and type of sprinkler heads or emitters
2	Pressure loss between pump and sprinklers/emitters due to inadequate pipe size
3	Higher pressure than manufacturer's specifications
4	Lower pressure than manufacturer's specifications
5	Low pressure due to water supply
6	Different pressure between manifolds
7	Small wetted area
8	Application rate > soil infiltration rate (ponding)
9	Air in pipelines
10	Turf and landscape area irrigated in the same zone
11	Pressure variation due to elevation differences
<u>Emitters / Sprinklers</u>	
20	Mixed sprinkler/emitter sizes & unmatched precipitation in the same zone
21	Mixed sprinkler/emitter brands or types in the same zone
22	Poor emitter/sprinkler uniformity due to worn orifice
23	Poor overlap due to improper sprinkler/emitter alignment or spacing
24	Various riser heights in same zone
25	Emitter/sprinkler spacing varies in same zone

26	Missing/malfunctioning emitters or sprinklers
27	Missing/malfunctioning pressure gauge/regulator/filter
<u>Maintenance - Irrigation System</u>	
30	Leaks and broken valves, pipe, laterals lines (Poly-tubing), emitters, sprinklers
31	Clogged filter or filter screen
32	Sprinkler heads not properly adjusted, causing overflow on paved areas
33	Clogged emitters/nozzles (due to biological, chemical or physical factors)
34	Leaning sprinklers/emitters causing non-uniform distribution
35	Malfunctioning valves
<u>Maintenance – Landscape</u>	
40	Stream of water blocked by vegetation
41	Variable crop spacing and stage of growth
42	Poor drainage, requiring water control
<u>Operation / Management</u>	
50	Operating time too long
51	Operating time too short
52	Operating time too frequent
53	No rain shut-off device
54	No soil moisture measuring device or rain gage