



## Evaluating Implementation of Multiple Irrigation and Landscape Ordinances in the Tampa Bay Region

April 2005





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## Section 1.0 Executive Summary

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Based on data collected by Tampa Bay Water, approximately 25 to 30 percent of all potable water used in the Tampa Bay region is for lawn and landscape irrigation and approximately 70 percent of all single family homes have automatic in-ground irrigation systems. This number is expected to increase as population growth continues. However, it has been established, through various conservation projects measuring irrigation system water use efficiency in the region, that approximately 30 percent of irrigation use is wasted due to inefficient irrigation system design, installation, operation, and maintenance. Therefore, four of the six Tampa Bay Water Member Governments (Members) have recently enacted Irrigation and Landscape Ordinances that affect new, single family homes permitting in-ground irrigation installation. This report provides a comprehensive evaluation of these ordinances and recommendations that can improve new irrigation system water use efficiency through refinement of ordinance content, enhancing permit tracking, and optimizing ordinance compliance.

Specifically, the project evaluated landscape/irrigation ordinances, permitting and inspection procedures, ordinance conformance and data tracking with the focus on new single family home construction. Project objectives were developed to:

- Identify permitting review and inspection processes as well as enforcement;
- Estimate the degree of ordinance compliance for each Member Government through on-site irrigation and landscape evaluations;
- Compare Members' ordinances with other ordinances implemented regionally and nationwide;
- Provide general and member-specific recommendations to improve ordinance compliance and ease of implementation;
- Enhance water use efficiency.

These objectives were accomplished by reviewing ordinances, surveying Florida Irrigation Society (FIS) members, meeting with Member Government permitting and inspection personnel, performing on-site irrigation and landscape evaluations, conducting a national literature review, and providing recommendations to increase ordinance compliance.

Overall, ordinance compliance appeared to be lacking in key water use efficiency areas, which minimizes intended increases in new irrigation system water use efficiency. Recommended changes in the permitting, inspection, and promotion of the ordinance are designed to provide affected governments with specific strategies to optimize ordinance adherence, minimize potential permitting cost increases, and develop scheduled improvements in a timely fashion.

### **Improving the Ordinances and Permitting Requirements**

It is recommended that local and regional governments and professional associations work collectively to increase continuity and commonality in ordinance content. This collaborative process would essentially be a second phase of the previous model ordinance effort. The following recommendations apply all or in part to the governments evaluated in this process:

#### **Pasco County**

- Change requirements for native plants by specifying that they be drought tolerant. Additionally, the County should define how this element will be enforced if it is to be retained for single family permit applications.
- Permit drought tolerant turfgrass to exceed the 50 percent limitation only if it is not irrigated by a permanent in-ground irrigation system.
- Require site plans to be provided to the County (in addition to the homeowner) as part of the application process.
- Require plans to be posted in the permit box at the site for ease of inspection.

#### **Hillsborough County**

- Consider adding a provision limiting non-drought tolerant plants or turf. The state-wide ordinance review conducted in California identified turf limitations had the greatest ordinance impact to conserving water ordinance (see Section 6). It should also be noted that turf limitation is one of the easiest ordinance elements to check in the field as it does not require power or water.
- Define which section of their permitting department is charged with enforcing this part of the ordinance. According to the building permit section, they are not charged by the County Commission to enforce the irrigation ordinance beyond the backflow prevention and rain shut-off devices.

- Place a requirement for the efficient use of micro-irrigation systems on all new landscape beds (allows new landscapes to be irrigated as needed through plant establishment while being consistent with irrigation restrictions).
- Require plans to be posted in the permit box at the site for ease of inspection.

### **City of St. Petersburg**

- Consider adding a provision limiting non-drought tolerant plants or turf. The state-wide ordinance review conducted in California identified turf limitations had the greatest ordinance impact to conserving water ordinance (see Section 6). It should also be noted that turf limitation is one of the easiest ordinance elements to check in the field as it does not require power or water.
- Consider adding single family irrigation system permitting since backflow prevention devices are required by Florida Statute to be permitted.

### **City of Tampa**

- Modify example drawings to clearly delineate they are examples only.

### **General Recommendations**

- All Members should consider adding inspection and enforcement as an ordinance element.
- All Members should require to-scale drawings be part of the permit process. Additionally, consider requiring average precipitation rates identified for each irrigation zone.
- Consider either full scale inspections for all single family permit approvals or develop a random spot check process that rotates among builders/contractors based upon installations. If permit requirements are not fulfilled, a certificate of occupancy (CO) could be withheld until met.
- Create a permit training course that permit holders would be required to take if permit requirements are not met at time of inspection.
- Builders should be encouraged to include a statement in their contract agreement with irrigation contractors binding the contractor to adhere to applicable water efficient ordinance elements. To match the requirements with the fees necessary to complete this work, the municipality should consider having the building contractor

sign off on the landscape and irrigation permits while identifying these sub-contractors as part of their permit process.

- All Members should require contractors attach a site plan enclosed in a sealed plastic bag to the irrigation controller at the permitted site as part of their certificate of occupancy package. If the controller is outdoors, the schematic should be either inside the building the controller is attached to or at a common building on the site. This could enhance compliance because the contractor would anticipate the homeowner checking that his/her landscape matches the approved plan.
- Educational materials could be required to be inserted into the irrigation site plan packet.
- A checklist of key ordinance elements should be developed and used during the review and inspection processes similar to any affidavit of compliance and/or elements specified in the permit. This will require educating review and inspection staff on checklist use.
- Development of site preparation guidelines for contractors should be coordinated with the University of Florida Extension Service.
- Filters should be required for all micro-irrigation systems to reduce emitter clogging that could disable the system.

### **Improving the Ease of the Permitting Process**

Consistency in ordinance language between municipalities should increase compliance since contractors would be better informed on similar permit submittal requirements. Creating guidance documents, such as Standard Operating Procedures (SOPs) provided by Pasco and St. Petersburg (not single family specific), helps to clarify the permitting process by providing information on permitting procedures. The main elements of the ordinance are also explained in the SOPs such that a contractor does not need to read the ordinance to know what is required to obtain a permit. The City of Tampa and Hillsborough County should consider developing SOPs.

Sample drawings of site plans need to be as generic as possible and a watermark of the word "SAMPLE" should appear across the plan. The sample plan should be carefully designed to not indicate that irrigation is not allowed in the back yard. Ordinance requirements can be more accurately relayed if the drawing includes notes.



### **Educating Contractors and Builders on Ordinances and How to Comply**

On the last Wednesday of each month plumbing staff from Hillsborough and Pasco Counties and City of Tampa, and members of the Florida Irrigation Society and the Hillsborough Association of Plumbing and Heating Contractors meet at Hillsborough County offices in NetPark. Report results should be presented at this meeting and also at a Tampa Bay Chapter Florida Irrigation Society meeting. Discussion of issue resolution should be encouraged.

Tampa Bay Water has worked with the Florida Irrigation Society to create irrigation ordinance enforcement CEU-based courses. Tampa Bay Water is proposing to fund a series of permit staff-based workshops in 2006 to provide continuity in ordinance implementation, enforcement and evaluation. Additionally, educational tools could be made available at local permitting offices. Examples include touch-screen educational terminals at permitting locations, and providing CDs to contractors for educating their employees or offering classes. This program may be eligible for educational grants from the Southwest Florida Water Management District.

### **Educating Homeowners to Ensure Conservation Continues**

In general, ordinances, by themselves, only set the foundation for landscape water savings. Long-term conservation occurs only if the property owners achieve reductions through proper irrigation practices focusing on environmental conditions and plant needs, regular system maintenance, and good landscape management practices. Currently, educational materials are not required to be delivered to the homeowner during the CO process.

The Florida Cooperative Extension Service, which operates in each county, has an ongoing homeowner-oriented program called "Florida Yards and Neighborhoods." The program provides practical information on how to conserve irrigation water and other landscape maintenance help. The education materials include a handbook, workbook, a laminated month-by-month water conservation checklist, and other useful brochures and pamphlets. The Southwest Florida Water Management District also has a number of useful landscape publications. Many purchasers of new homes may not have any knowledge of how to manage a Florida landscape. For example, the new home may be the owner's first home and/or the homeowner may have recently relocated from outside of Florida. These residents may be receptive to guidance on how to properly maintain their new landscapes if it were provided to them at the time of occupancy.

Other resources could be developed and provided to the homeowner such as a booklet on the basics of irrigation maintenance (including micro-irrigation). The irrigation maintenance guidance may be an endeavor for the Extension's Tampa Bay Horticulture "Green Team." With the irrigation system site plan and these materials, a homeowner

could do most maintenance instead of neglecting the system which results in decreased water use efficiency.

### **Using Permitting Data to Further Benefit the Utility**

All affected Members except for Pasco, currently require single family site plans to be submitted in the application process. It was previously recommended that Pasco also require site plans to be submitted to the County. All Members should scan the site plans and store them electronically with the addresses so the data can be accessed later. Both Tampa and Hillsborough County currently archive data to microfiche. This data should be stored electronically. Hillsborough County is currently working toward installing an electronic data management system (EDMS) similar to St. Petersburg. This change is recommended for the both Pasco County and the City of Tampa.

## Section 2.0 Project Background

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In response to Florida's historical 2000-2001 drought, Southwest Florida Water Management District (SWFWMD) Executive Director Order No. SWF01-14 was instituted on March 21, 2001 declaring a water shortage emergency for Tampa Bay Water and its Member Governments. In addition to allowing temporary exceedance of the existing 158 mgd consolidated water use permit running water production average, a number of short and long-term conservation measures were required to be evaluated and implemented. Specifically, one section required that the Member Governments shall complete and submit to the SWFWMD a schedule to implement an ordinance requiring drought tolerant landscapes and efficient landscaping irrigation designs for new development (Pasco County began development of a landscape and irrigation ordinance in 1999). This was accomplished, in part, through development of a landscape and irrigation subcommittee of Tampa Bay Water's Conservation Coordination Consortium (CCC).

The subcommittee, in part, was made up of representatives from the six Member Governments of Tampa Bay Water, SWFWMD, Florida Yards and Neighborhoods (FYN), Hillsborough Soil and Water Conservation (HSWCD), the Hillsborough County Cooperative Extension Services (IFAS) and the Florida Irrigation Society (FIS). Member Government staff included those involved in local ordinance development, implementation, and enforcement. The FIS and HSWCD staff provided specific expertise in irrigation system standards. IFAS and FYN staff provided expertise in Florida-friendly landscape standards. The overall goal of the subcommittee was to develop a standard model landscape and irrigation ordinance that would be reviewed and agreed upon as a standard basis implemented throughout the region. It subsequently could be adapted for adoption by each Member Government. This effort was preceded by the Tampa Bay Chapter of FIS's creation of irrigation standards for new irrigation system installations. Pasco County, and the Cities of St. Petersburg and Tampa adopted Landscape and Irrigation Ordinances in February 2002. Hillsborough County's ordinance was adopted in October of 2002.

In addition to fostering the development of the model ordinance, Tampa Bay Water committed to assisting its Member Governments in determining cost-effective means to measure enforcement and overall success of the ordinances. This included periodic examination of time and cost elements, evaluation of new methods to creatively enforce ordinances, and assistance in minimizing any potential overlaps with other state, regional and private entity efforts. This report is the first effort in providing that assistance by identifying key components of the ordinances, current permitting processes and a general level of compliance so that improvements can be recommended.

## Section 3.0 Introduction

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Tampa Bay Water Member Governments include Hillsborough, Pinellas and Pasco counties and the Cities of Tampa, St. Petersburg and New Port Richey. Of the six Member Governments, four have landscape/irrigation ordinances that apply to all water demand sectors (single and multi-family and non-residential). **Those Members who have ordinances include Hillsborough and Pasco Counties and the Cities of Tampa and St. Petersburg. These are the only Members that are included in this evaluation and the term “Members” used throughout this report refers to these four Members only.**

This report includes the methodology used to evaluate Members’ ordinances and compliance with these ordinances. The methodology included a review of the content of each member’s ordinance and Standard Operating Procedures (SOPs) where available, a survey of Florida Irrigation Society (FIS) members, meetings with Member Governments, and on-site evaluations. Also, a national literature review was conducted on implementation and effectiveness of other landscape and irrigation ordinances.’ For each government, key ordinance requirements are listed and principal staff procedures and permit application tracking and storage are discussed. Results of the FIS survey and on-site evaluation are tabulated and discussed. The permitting process for each member is illustrated in a flowchart. Finally, recommendations are provided to improve ordinance content, permitting requirements, and the inspection process. Recommendation on educating inspectors, contractors/builders and homeowners are also provided. How permitting data can be used further to benefit the utility and alternative approaches to increasing landscape water use efficiency are also discussed.

Although the permitting processes for commercial/residential and existing/new development are shown in flowcharts, the focus of this evaluation is on new, single family homes only. **All requirements stated in this report apply to new, single family homes permitting in-ground irrigation systems unless explicitly stated otherwise.**

This project was a collaboration of several entities. Tampa Bay Water contracted Hazen and Sawyer to collect background and some evaluation information and produce the report. Hazen and Sawyer contracted with a professional horticulturist to perform on-site horticultural evaluations in Pasco County and to provide overall comments for improvement of ordinance content and compliance. Tampa Bay Water and Hillsborough Soil and Water Conservation District staff performed the on-site irrigation system evaluations. Tampa Bay Water conducted the literature review. Draft copies of the report were distributed to affected governments and the FIS for comment prior to publishing.

This report should be used for general guidance in improving ordinance content and compliance and enhancing irrigation water use efficiency in the single family sector only.

## Section 4.0 Methodology

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Methodology used to evaluate the Members' ordinances is described in this section. Although this study evaluated ordinance requirements and implementation for all customer sectors, the primary focus of this project were permitting of in-ground irrigation systems for new, single family homes.

### **4.1 Review of Members' Ordinances and Permitting Process**

Hazen and Sawyer downloaded and reviewed codes/ordinances from online sources; key provisions of each Member's ordinance are provided in Section 5. Based on ordinances and meetings with permitting and conservation staff, a flowchart was developed for each Member Government identifying permitting, inspection, approval, and enforcement processes.

### **4.2 Meeting with Florida Irrigation Society Members**

Hazen and Sawyer and Tampa Bay Water developed a comprehensive survey tool to evaluate irrigation contractor perspective in ordinance implementation and enforcement. Staff attended a meeting with local FIS members (about 20 in attendance) and they were asked to complete the survey. The survey provided and results are presented in Section 5. A compilation of responses is provided in Appendix A.

### **4.3 Meetings with Member Governments**

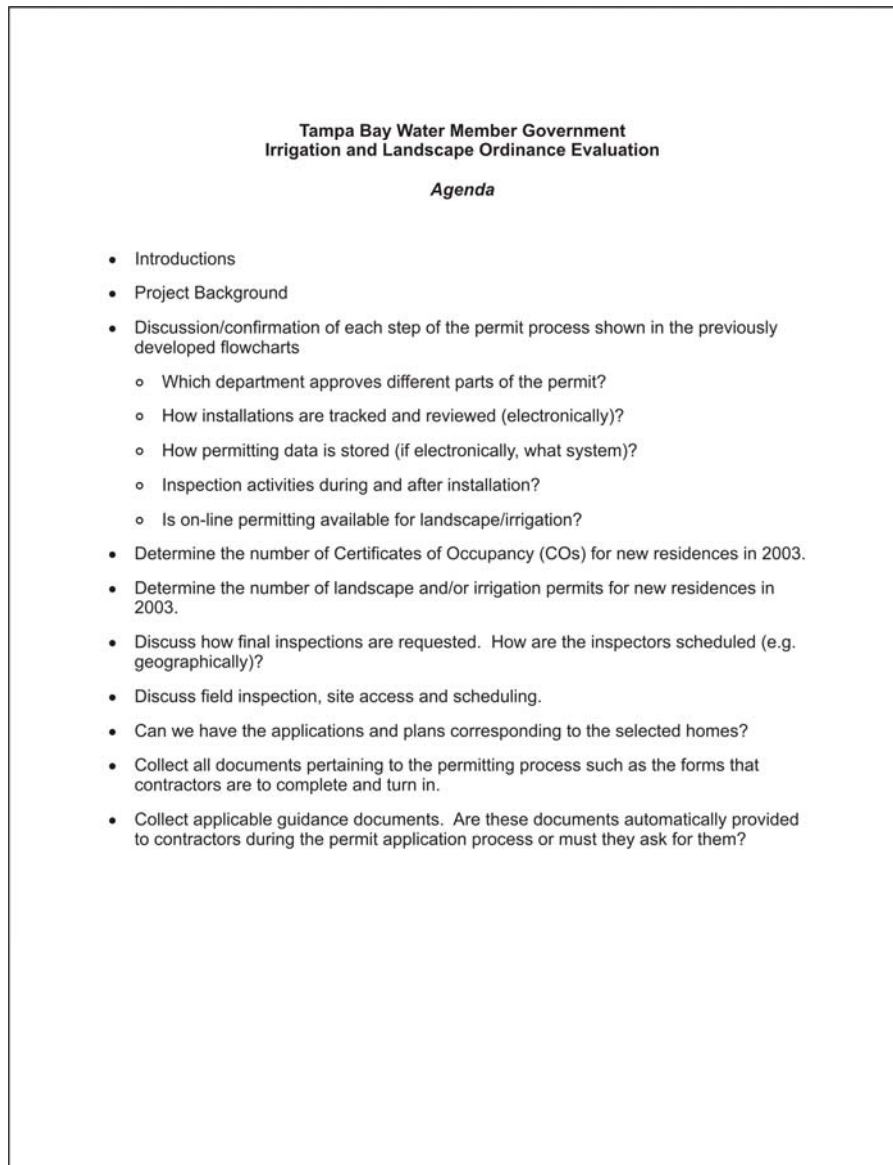
Hazen and Sawyer and Tampa Bay Water staff met with Member Government personnel responsible for permitting and enforcing applicable landscape and irrigation ordinances. Meetings were established by the water conservation coordinator (or other appropriate personnel). Permitting process flowcharts were refined and are shown in Appendix B. The dates of the meetings and the departments that were represented are described below. A sample agenda is shown in Figure 4-1.

- **Pasco County:** A meeting was conducted with Pasco County Development Review and Central Permitting staff members, Pasco County Utilities and the FYN Development Coordinator on March 26, 2004, at 1:30 p.m.
- **Hillsborough County:** A meeting was conducted with Hillsborough County Division of Development Services Environmental Management Section staff members and the County's Water Conservation Manager on March 30, 2004, at 2:00 p.m.
- **City of Tampa:** A meeting was conducted with City of Tampa Construction Services Division staff members and members of the Water Department, including the Water Conservation Coordinator on April 12, 2004, at 10:00 a.m.

- City of St. Petersburg: A meeting was conducted with the City of St. Petersburg Director of Development Services and the Water Conservation Coordinator on April 19, 2004, at 3 p.m.

#### 4.4 Member Government Permit Tracking and Storage

During each Member Government meeting, discussions on site plan and other permit application document collection, tracking, and storage occurred.



**Figure 4-1** Member Government Sample Agenda

## 4.5 On-Site Evaluation

Several options were considered for on-site evaluations of installed landscapes and irrigation systems. Originally, it was proposed site evaluations occur after a Certificate of Occupancy (CO) had been granted so the entire permitting process could be evaluated. However, after speaking with the government permitting representatives, it was evident that much of the irrigation system and landscapes were not directly inspected. For example, the irrigation system controller is generally not checked to confirm that it can support separate zones and the system may not be activated to confirm that plants and turf are on separate zones. Also, head layout is not checked to confirm that micro-irrigation is being used for landscape. Since these items are not included in the inspectors' inspection list, it was not important to conduct the visits after COs were issued. Site visits coordinated with inspectors appeared to be the most reasonable approach for site-access reasons. Also, if a home is visited post-CO, it is possible the observed landscape and irrigation equipment may not be the same as was originally permitted due to new homeowners making changes to either their landscaping and/or irrigation system.

Hillsborough and Pasco Counties and the City of Tampa provided a list of recent permittees (single family residences) to receive an inspection for installation of backflow prevention devices. The City of St. Petersburg does not have a permitting process in their ordinance for single family landscape and irrigation projects. Member-specific field evaluation forms were developed and completed in the field. Evaluation forms focused on the significant requirements of each ordinance. Pasco County is the only government evaluated that has plant type requirements. For this Member, a horticultural and irrigation evaluation were conducted.

FIS-Certified Irrigation Auditors, Rhianna Pensa and David Bracciano (Tampa Bay Water), and Gail Huff (Hillsborough County Soil and Water Conservation District) performed evaluations of installations to determine the degree of ordinance conformance. These evaluations were a quick (15 to 30 minutes per site) visual inspection of the irrigation system.

Eighteen properties were evaluated in Hillsborough County. Six properties were evaluated in City of Tampa, and ten in Pasco County. Due to Pasco's plant requirements, six of ten properties that had irrigation system inspections also received a horticultural field evaluation from a professional horticulturist, Michael Holsinger. Results from the on-site evaluations are presented and discussed in the following sections and tabulated in Appendix C.

Criteria for the on-site evaluation included compliance with the Contractor's signed Affidavit of Compliance and other key ordinance requirements. A comparison of the site to the site plan was attempted; however, only one government program evaluated provided site plans to the evaluators (similar to what inspectors receive). The City of Tampa pro-



vided evaluators with the site plans submitted with permit applications. Although Hillsborough County requires site plans to accompany permit applications, the site plans were not provided to the evaluators. Pasco County requires site plans to be provided to the homeowner rather than to the County; therefore, site plans were not available to evaluators.

#### **4.6 National Literature Review of Ordinance Implementation**

A national literature review was conducted by Tampa Bay Water; findings of the literature review are presented in Section 6.

#### **4.7 Evaluation Report**

The intent of this evaluation report is to identify key components of each Member's ordinance, delineate permitting review/inspection processes and recommend ways to optimize ordinance compliance and water use efficiency. Draft copies of this report were distributed to affected Member Governments and the Florida Irrigation Society for comment prior to finalizing.

## Section 5.0 Results

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### 5.1 Florida Irrigation Society Survey

Hazen and Sawyer and Tampa Bay Water staff attended a Tampa Bay Chapter Florida Irrigation Society (FIS) meeting for the Tampa Bay Chapter on March 2, 2004. FIS members were provided surveys regarding landscape/irrigation permitting in Hillsborough and Pasco Counties and the Cities of Tampa and St. Petersburg. Eight out of 20 contractors attending responded; responses are discussed below and provided in Appendix A.

Many questions relating to St. Petersburg's ordinance were not answered because only one of the eight responding contractors did any work in St. Petersburg and that contractor reported that less than 1 percent of their workload was in the City. Therefore, the following discussion of survey results excludes the City of St. Petersburg.

Contractors were generally concerned about how the permitting process affected their work load. One contractor indicated that the new ordinances have caused him to hire a permitting staff person. Two contractors indicated that permitting in Pasco County was a "pain;" one mentioned that the process requires too many trips. Another contractor said he avoids accepting work in Pasco County. Three of the contractors are "OK" with the Hillsborough County ordinance and one said that the new Hillsborough County permitting process is only "slightly more time consuming" than before the ordinance was enacted. One contractor said Tampa's ordinance is a "pain;" one said it was a "pain, but improving." One contractor said Tampa's ordinance needs to be simpler and another that it is slightly time consuming.

When questioned about permit turnaround time, answers were quite variable. They varied from 24 hours to 5 days for Pasco County, immediately to 2 days for Hillsborough County and 1 hour to 10 days in the City of Tampa. Generally, most contractors had the impression there was some office review of permit applications and a field inspection was also conducted. They all responded they do not submit landscape plans with their irrigation plans.

Most contractors believe that all government programs surveyed inspect for backflow prevention and rain sensors only. One wrote that contractors are signing an Affidavit of Compliance agreeing to abide by the 50 percent rule (percentage of landscape versus irrigated turfgrass) before knowing what landscape will be installed (this was later verified in the field evaluation).

## **5.2 Evaluation of Hillsborough County's Landscape and Irrigation Ordinance**

### **5.2.1 Key Provisions of the Ordinance**

- Oversight of this ordinance provision is the responsibility of the Environmental Services division of the County's Development Services section
- A site plan (does not need to be to scale) showing proposed irrigation zones, both micro and traditional spray or rotor techniques are required in order to receive a permit.
- Sprinkler spacing shall not exceed 55 percent of the sprinkler's diameter of coverage.
- Sprays and rotors shall not be combined on the same zone.
- Sprays and rotors shall have matched precipitation rates within zones.
- Irrigation systems shall be designed to avoid overspray or runoff.
- Only micro-irrigation shall be used on narrow landscape areas of four feet or less.
- Turf areas shall be on separate irrigation zones from other landscape plant groupings.
- Irrigation equipment shall include an automatic irrigation controller with programming flexibility and with battery backup.
- The system shall include a rain sensor device.
- There is no micro-irrigation requirement for use in irrigated landscape beds (non-turf).

### **5.2.2 Principal Staff Procedures**

Principal staff procedures are shown on the Permitting Flow Chart (see Appendix B) and described below.

- Building inspections concentrate on backflow prevention devices, State building code distance requirements from structures for termites, and presence of a rain shut-off device (rain sensor). Environmental Services staff are charged with irrigation ordinance enforcement but lack field staff to implement this change.

- Environmental Services staff indicates that irrigation permit enforcement violations may be handled through the Water Department's "Water Police."
- Requests for CO inspections are called in and sent to inspectors electronically by geographic location.
- Existing homes installing a new irrigation system require permitting. There is no inspection process in place to review the permit in-field.
- Building inspectors conduct about 30 site inspections/day/employee.

### **5.2.3 Permit Application Tracking and Storage**

Permit-required irrigation plans are sent daily to the Records Department on the 19th Floor of the County Center. They are stored for 3 months then placed on microfiche whether or not the permit has been closed. The County is establishing an electronic data management system (EDMS) for all irrigation permits. This will allow them to scan new applications and provide remote electronic permit access for inspectors.

### **5.2.4 Results of Field Evaluations**

Field evaluation results are provided below and tabulated in Appendix C.

- While the ten out of eighteen irrigation systems evaluated met ordinance requirements regarding spacing, irrigation overlap and popup sprays and rotors being on separate zones, none met the uniformity in application rate requirement (mismatched nozzles on rotor heads). Also, the majority of sites evaluated did not have turf on separate irrigation zones from other landscape plantings.
- The majority of sites also had spray and rotor irrigation on landscape beds narrower than four feet (micro-irrigation required). The majority also did not use micro-irrigation. When used, it was usually mixed with traditional popup sprays in plant beds.
- All sites had multi-programmable automatic irrigation controllers.
- Irrigation plans were not made available to the site evaluators, nor were they posted at the site. Therefore, conformance with the plan could not be evaluated.
- Average percent of irrigated landscape devoted to turfgrass was estimated at 77 percent.

- The most common problem with plant material was dead or dying trees and turf at 14 of the 18 sites. Of the living plants, the quality ratings ranged from good to poor; none were rated excellent.
- Other observations from the evaluation included three rain shutoff devices that were not wired and turfgrass installed flush to foundation at four sites (inconsistent with new anti-termite provisions of the Florida Building Code).

### **5.2.5 Percentage of New Homes with Irrigation Systems**

It is estimated that 85 percent of new homes in Hillsborough County have in-ground irrigation systems (Based on 6,636 COs issued in 2003 with 5,200 of those COs including backflow prevention permits).

## **5.3 City of Tampa**

### **5.3.1 Key Provisions of the Ordinance**

- Three sets of site plans or surveys showing the irrigation zones and specifying micro-irrigated and traditionally irrigated areas are submitted to the City.
- Sprinkler spacing shall not exceed 55 percent of the sprinkler's diameter of coverage.
- Sprays and rotors shall not be combined on the same control valve circuit (zone).
- Sprays and rotors shall have matched precipitation rates within zones.
- Irrigation systems shall be designed to avoid overspray or runoff.
- Irrigation of narrow areas less than four feet shall be limited to micro-irrigation.
- 50 percent of the green space shall be allowed to utilize irrigation techniques other than micro-irrigation.
- Turf areas shall be on separate irrigation zones from other plant groupings.
- Irrigation systems shall include a flexible programming controller, with battery backup.
- Irrigation systems shall employ a rain sensor device.

- Turfgrass irrigated by a permanent system shall be limited to a maximum of 50 percent of the irrigated landscaped.

### **5.3.2 Principal Staff Procedures**

Principal staff procedures are shown on the Permitting Flow Chart (see Appendix B) and described below.

- Final site inspection for a CO includes an irrigation system inspection; however, this is typically performed without power to operate the system.
- Rotor, spray, and micro-irrigation placement are checked against the site plan; rain shutoff device and backflow preventer are checked for proper installation. Entire site visit is conducted by City staff in about 10 minutes per site.
- Inspectors have the right to go back after a CO is issued to verify that illegal modifications have not been made.

### **5.3.3 Permit Application Tracking and Storage**

Installations are tracked and reviewed on paper. Residential permitting documents are kept in-house for two years and then are placed on microfiche. Commercial permitting documents are kept in-house for one month before placing on microfiche. The City requires a copy of the landscaping irrigation plan and signed affidavit be placed in the permit box at the site.

### **5.3.4 Results of Field Evaluations**

Field evaluation results are provided below and tabulated in Appendix C.

- While all but one site had rotors and sprays on separate zones, only 50 percent of the sites were identified as meeting ordinance requirements for sprinkler diameter of coverage.
- Five of the six sites failed to have uniformity in emitter application rates (mismatched precipitation rates on rotor heads).
- 50 percent of the sites had tree and shrub beds on separate irrigation zones from turfgrass. The majority were irrigating narrow (less than 4 feet wide) areas with traditional irrigation. However, micro-irrigation was being utilized in nearly all plant beds (consistent with ordinance's intent).
- All sites had automatic multi-programmable irrigation controllers, but rain shutoffs were not observed at two of the six sites.

- Permit drawings were completely accurate at only two locations.
- Although the Tampa ordinance specifically limits irrigated turfgrass to a maximum of 50 percent, the estimated average was 83 percent.
- The most significant plant problem was dead or dying trees and turf at three of the five sites visited. Of the living plants, landscape quality ratings were good to fair; none were rated excellent or poor.
- Bubblers and rotors were mixed at two sites.

## **5.4 Pasco County**

### **5.4.1 Key Provisions of the Ordinance**

- County requires contractor submit certificate of compliance with irrigation and landscape components (self-certification) of ordinance to permitting staff. No drawing schematic required to be submitted to staff. No schematics required at site.
- A maximum of 50 percent of the plant materials used, other than trees, may be non-drought tolerant.
- The use of turfgrass varieties with excellent drought tolerance may exceed the 50 percent rule.
- A minimum of 30 percent of the plant material, other than trees and turfgrass, shall be native to Florida.
- Turfgrass shall be on separate irrigation zones from other landscape plant zones.
- Narrow landscaped beds (four feet or less) shall not be irrigated unless micro-irrigation is utilized. Turf grass areas shall not be less than four feet wide.
- Sprinkler spacing shall not exceed 55 percent of the sprinkler's diameter of coverage.
- Sprays and rotors shall have matching application rates within separate zones.
- Sprinklers shall not spray water onto paved areas.
- A functioning rain shutoff device exposed to unobstructed rainfall shall be utilized in automatic irrigation systems.

- Organic mulch shall be at least 3 inches thick.
- A maximum of 50 percent of the on-site green space shall be allowed to utilize irrigation techniques other than micro-irrigation.
- The site plan shall indicate the irrigation water source. Where available, reclaimed water will be utilized for irrigation.
- An as-built drawing of the irrigation system shall be provided to the property owner.

#### **5.4.2 Principal Staff Procedures**

Principal staff procedures are shown on the Permitting Flow Chart (see Appendix B) and described below.

- Final inspection for CO includes inspection of backflow preventer, the automatic rain shut-off device and a 1-foot clearance between irrigation and the home.

#### **5.4.3 Permit Application Tracking and Storage**

Applications are kept as hard copies for less than a year, then are placed in storage in county facilities in Dade City. Based on documents provided to on-site evaluators, it appears that at some point in the permitting process, information is entered electronically prior to inspection (this is based on the receipt of copies of electronically generated affidavits).

#### **5.4.4 Results of Field Evaluations**

##### **5.4.4.1 Irrigation and Other Ordinance Requirements**

Field evaluation results are provided below and tabulated in Appendix C.

- The majority of sites evaluated met ordinance requirements for sprinkler spacing, overlap and separate zones for rotors and sprays. Also, there were no rotors or sprays irrigating areas less than 4 feet wide.
- The majority of sites lacked uniformity of irrigation between emitters (mismatched application rates on rotor heads) and did not have separate irrigation zones for turfgrass and tree/shrub beds.
- There was plant interference and/or water applied to impervious areas at the majority of sites.
- Only 50 percent of the sites had micro-irrigation in plant beds.



- Average percent of irrigated area in turfgrass was 69 percent.
- Five sites had no landscape installed. Four of the ten sites had dead or dying turf/plants and non-functioning or broken irrigation components. Of the living plants, the majority were rated good or excellent in quality.
- Five out of ten sites were found with mixed micro and spray and/or rotor irrigation zones.

#### **5.4.4.2 Landscape Plant Requirements**

A separate field evaluation of the Pasco County ordinance was conducted for seven of the sites due to the ordinance plant requirements section. Of the seven sites selected, landscape was not yet installed at two sites. The results of the five sites with landscaping are presented below.

- St. Augustine was used as the only grass at three sites and none of these sites met the 50 percent limitation on non-drought tolerant plants. Non-irrigated drought-tolerant Bahia grass was used in the back yard for two sites; the 50 percent limitation was easily met with this landscape design.
- There appeared to be no systematic process for trying to meet the 30 percent requirement of native plants other than trees and turf to be native. As a result, this requirement was not being met at most locations.
- None of the properties met the rule for 50 percent of the irrigated system to be micro-irrigation. All five sites had sprays installed throughout. (However, in looking at surrounding properties that were occupied and fully landscaped, a significant number had micro jet systems in beds.).
- There were some properties with strips of non-irrigated mulch along the sides of the foundation to meet the new anti-termite requirement of the Florida Building Code, but at others grass was installed flush to the foundation.
- From an overall horticultural perspective, the landscapes reviewed reflect what was typically installed prior to the ordinance (with the exception of micro-irrigation). However, entranceways to two developments included attractive beds of shrubs and groundcover plants installed using micro-irrigation and organic mulch.

### **5.4.5 Percentage of New Homes with Irrigation Systems**

It is estimated that 57 percent of new homes in Pasco County have in-ground irrigation systems (Based on 5,883 COs issued in 2003 with 3,369 of those COs requiring irrigation permits).

## **5.5 St. Petersburg**

### **5.5.1 Key Provisions of the Ordinance**

- Rain shutoff device required.
- Irrigation systems shall be designed to provide 100 percent coverage.
- Irrigation systems shall be operated by a multi-programmable automatic irrigation controller.
- Sprays and rotors shall not be on the same control valve circuit and shall have matching application rates within each zone.
- Sprinkler spacing shall not exceed 55 percent of the sprinkling diameter of coverage.
- No permit required for single family installations.

### **5.5.2 Principal Staff Procedures**

Principal staff procedures are shown on the Permitting Flow Chart (see Appendix B) and described below. This applies to the overall permitting process and not single family applications.

- The ordinance is checked in full during the in-house review. The review staff is well educated on landscape and irrigation.
- It was not clear what is looked at by the inspectors in the field during the CO inspection (not applicable to single family installations).
- In addition to the reviews and inspections during the permitting process, City staff members have identified corridors or areas to inspect. Violations are noted and the city works with the site owners to bring the site into compliance. However, after non-compliance, the violation is turned over to Codes Compliance Assistance, which is essentially their code enforcement.

### **5.5.3 Permit Application Tracking and Storage**

When a multi-family or non-residential irrigation system permit application is received, a permit number and personal identification number (PIN) are provided to the contractor. The contractor can then use these numbers to track the progress of the permit. As the permit goes through the various reviews, comments are posted and can be read electronically almost in real time.

### **5.5.4 Field Evaluations**

Field evaluations were not conducted. The City does not permit single family landscape and irrigation systems (the primary focus of this evaluation report).

## Section 6.0

# Results: Literature Review

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Tampa Bay Water and its consultants conducted a review of applicable landscape and irrigation ordinance implementation strategies occurring in the region and comprehensive reports developed throughout the country. Although there was some literature, single family residential irrigation ordinance implementation and associated reviews appear to be minimal. Outside the Tampa Bay Water Members' service area, review of Sarasota County's ordinance revealed critical elements of implementation and review strategies that should be considered in the Tampa Bay Region. These elements are discussed in Section 8 of this report.

### 6.1 Sarasota County Landscape and Irrigation Ordinance

#### Reference

Sarasota County's Ordinance No. 2001-081,  
Article VI "Water Efficient Landscaping Regulations," 2002.

#### Background

The ordinance was reviewed and comments from Michael Holsinger, previously a Sarasota County Extension horticulture agent who helped to write and implement the ordinance, were provided in this section. The ordinance, which governs all new landscapes installed with building permits issued after January 13, 2002, was developed with input from the homebuilding industry and irrigation/landscape professionals. It was designed to be self-certified by a building, irrigation and/or landscape contractor. The ordinance pertains only to the irrigated portion of applicable landscapes.

#### Key Elements of the Ordinance

- Application is for all new single family and multi-family residential structures and any addition to a residential building that amounts to 50 percent or greater of the assessed value.
- Turfgrass and annual flower limitations to 50 percent or less of irrigated area.
- Sprays and rotors on different zones.
- Micro-irrigation required for plant beds.
- Separate irrigation zones for grass and tree/shrub beds.
- No grass in areas narrower than four feet, except next to contiguous properties.
- No plants are allowed to be planted or spray irrigation applied under roof overhangs.
- A filter is required for all micro-irrigation systems.

- Building contractor shall leave as-built drawings for homeowner.
- The contractor shall provide the property owner a landscape maintenance checklist and information package produced by the County.

### **Implementation and Compliance**

- A certificate of compliance and as-built drawing of the irrigation system are provided to the county and the property owner before CO is issued.
- Continued education for the builders, contractors and county building inspectors is provided by a contracted Extension agent (this is not a requirement of the ordinance).
- A contracted Extension agent works in the field with contractors and inspectors during construction to facilitate compliance and full cooperation (not an ordinance requirement).
- A compliance certification checklist is required to be signed by the contractor.
- Conclusions and Recommendations
- Extension agent should continue field evaluations, educate builders, contractors and inspectors to ensure ordinance compliance.

## **6.2 Analysis of Eleven U.S. Landscaping Ordinances**

### **Reference**

“An Investigation into What Planning Departments and Water Authorities Can Learn from Eleven Communities’ Water-wise Landscaping Ordinances,”  
K. Anderson, University of Oregon Terminal Project, 2004.

### **Background**

The report compares eleven ordinances from eight states in order to identify common ordinance elements, advantages and disadvantages of various elements and provide recommendations. The author of the study noted the study’s focus was on plants and plant design rather than water use efficiency.

### **Selected Ordinances**

- Gilbert, Arizona
- Glendale, Arizona
- Santa Rosa, California
- Las Vegas, Nevada
- Reno, Nevada
- Albuquerque, New Mexico
- Santa Fe, New Mexico

- Greensborough, North Carolina
- White City, Oregon
- Leander, Texas
- Pierce County, Washington

### **Key Elements of the Ordinances**

- Most ordinances apply to all new construction and major remodels; six excluded single family dwellings.
- Eight ordinances set turf limits from 0 – 50 percent of the landscaped area.
- Eight ordinances require the use of mulch with a required minimum cover ranging from two to four inches.
- Eight ordinances require the use of water-wise plants and/or provide approved plant lists.
- Five ordinances require the use of micro-irrigation on non-turf areas, parking lot landscapes, and when traditional irrigation will result in overspray and/or run-off.
- Four ordinances set limits for minimum width of irrigated turf from five to ten feet.
- Two ordinances require educational landscape information packages to be provided to the homeowner, landscape contractors, maintenance companies and title companies.
- Two ordinances require irrigation system audits to be performed by a registered landscape architect or certified irrigation auditor before a CO is issued.
- One ordinance requires a permanent in-ground irrigation system with a multi-programmable controller and rain shut-off device.

### **Implementation and Compliance**

- Six communities perform field inspections, some random, before CO is issued; completed landscape must meet the original approved plans before the CO is issued. However, not all residential landscape plans from these six communities are submitted and/or inspected.
- Verification required if landscape planting plan is changed after it has been approved.
- Irrigation system audit performed by an Irrigation Association (I.A.) certified Landscape Irrigation Auditor before the municipality issues a CO. In this review, single family dwellings are exempt.

### **Conclusions and Recommendations (Provided Directly from Report)**

- More detailed inspections are needed; approved plans do not reflect installed landscape, which indicates a lack of qualified inspectors. Ultimately, the approved original plan is not enforced in many of the ordinances.

- The exclusion of single family dwellings from six of the twelve ordinances negates much of the ordinance intent, which is water use efficiency, since single family dwellings tend to use more water for irrigation than other sectors.
- The ordinances should include a definitions section where key terms are defined.
- The ordinance's intent should be clearly specified (water conservation) in the ordinance.
- An ordinance summary checklist should be developed and used during the plan review process and field inspection.
- If plant lists are utilized, frequent updates are necessary.
- Various stakeholders should be engaged and educated in all stages of ordinance planning to ensure ordinance efficiency.
- "Continuing education" should be made available to all stakeholders.
- The restrictions on maximum amounts of irrigated turf in the landscape should be increased, thereby reducing irrigated turf areas.
- Knowledge of inspection personnel should be increased to curtail changes that occur from the plan design review process to the installation.
- Plan review staff members should be increased.
- All ordinances should be in one location of the jurisdictional codes to ease review by contractors.
- Ordinances among jurisdictions should be standardized.
- Water conservation/efficiency educational materials should be provided to the end user (any entity dealing with the property including the home/property owner).
- Landscape/irrigation auditing process should be performed before CO is issued.
- There is a need for consistent review/inspection and reception to alternative methods of compliance when an exception is warranted.

### **6.3 California's Model Water Efficient Landscape Ordinance-Statewide Implementation Review**

#### **References**

"Water Efficient Landscape Ordinance (AB 325): A Statewide Implementation Review," A. Bamezai, R. Perry, C. Pryor; Western Policy Research Report, 2001.

"Waste Not, Want Not: The Potential for Urban Water Conservation in California," Dr. Peter H. Gleick, D. Haasz, C. Henges-Jeck, V. Srinivasan, G. Wolff, K. Kao Cushing, A. Mann; Pacific Institute Report, 2003.

#### **Background**

Report evaluates the effectiveness of California's Department of Water Resources' (DWR) water efficient landscape model ordinance. The "Water Conservation in Landscaping Act" of 1990 required DWR to develop a statewide ordinance. The ordinance

targeted land use agencies with no parallel to water utilities' involvement. The ordinance was adopted and went into effect January 1, 1993. Local land use agencies had to adopt the ordinance, or develop and adopt a better-suited ordinance or justify an ordinance exemption. Out of 257 land use agencies that had adopted ordinances, the report sampled 151; 66 agencies responded.

### **Key Elements of the Ordinance**

- Ordinance applies to all new and/or renovated landscapes for public agencies, private development projects requiring a permit and developer-installed (built prior to prospective home owner purchase/use) single and multi-family dwellings. Landscapes must exceed 2,500 square feet for the ordinance to apply.
- Reliance on water budgets for both landscape design and irrigation maintenance.
- Water allowance established based on 80 percent of an established reference evapotranspiration (ET).
- Some agencies promote time of day and/or week irrigation limits.
- 14 agencies promote the use of recycled water.
- Use of appropriate native/drought-tolerant plant material.
- Reduction of turf grass in landscaped areas.
- Mulching requirements.
- Separate irrigation valve zones.
- Micro-irrigation in plant beds.
- Upgrade older irrigation systems with/without rebates.
- Increased efficiency requirements for large homeowner's association common areas.

### **Implementation and Compliance**

- 51 responding agencies mandate water efficiency in their ordinances while 8 only recommend efficiency.
- 47 responding agencies verify compliance between the approved plans and the installed landscapes.
- Most agencies rely on the permitting process to educate landscape architects and building contractors regarding ordinance requirements.
- Three agencies reported non-comprehension of their respective ordinances by landscape architects.
- Phone calls, citations and/or water audits are given to ordinance violators.

### **Conclusions and Recommendations (Provided in Report)**

- Standards/implementation, compliance and follow-up are inconsistent from one city to another.
- Post construction auditing/compliance not addressed or rarely practiced.



- The ordinance relies mainly on water budgets, i.e. maximum allowances and an ET rate based on cool-season grasses.
- Ordinances' jurisdiction falls under planning departments rather than water suppliers.
- Generally, ordinances lacked enforcement and monitoring.
- The largest ordinance impact to conserving water is through limits on percentage of turfgrass used.
- Synergy is needed between land use agencies and water utilities that adopt conservation best management practices and/or join the California Urban Water Conservation Council (CUWCC) -thereby encouraging incorporation with one another.
- Irrigation meters are needed for accurate water use measurements.
- Indicated need for further understanding of linkages between land use agencies and water agency policies.
- "Continuing education" should be made available for all stakeholders.

## Section 7.0

### Discussion of Results

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#### 7.1 Components of a Landscape and Irrigation Ordinance

Landscape water conservation ordinances can be an effective tool in reducing water use. Principal provisions of such ordinances should include: (1) requiring efficient and effective irrigation system design and installation, (2) limiting the percentage of landscape elements requiring the most supplemental irrigation, (3) requiring water conserving landscape preparation and installation practices, and (4) mandating water-use efficient maintenance educational material and as-built or other “to scale” drawings be provided or placed at the property for existing or future owner retention. Other provisions include requiring use of drought-tolerant plants, use of organic mulch in plant beds, proper retention of existing native trees and understory plants, and minimized compaction of areas to be landscaped. Compacted landscape soil causes poor plant root development, thereby necessitating more frequent irrigation during dry periods. The most effective ways to reduce landscape soil compaction include removal, stockpiling and re-application of existing topsoil, limiting vehicular traffic over areas to be landscaped and roto-tilling landscape areas after final grade before plants are installed.

#### 7.2 Components of the Member Governments’ Ordinances

Each of the Members employed some of the above measures in their ordinances, but not all. There was commonality in all ordinance provisions dealing with irrigation efficiency that is likely the result of the model ordinance discussed in Section 2: 1. All Members require multiple programmable irrigation controllers and mandate that turfgrass be on separate irrigation zones from tree/shrub/groundcover beds 2. Each of the ordinances specifies that irrigation systems shall be designed to prevent overspray and runoff onto paved areas. (While the City of Tampa and Pasco County limited non-drought tolerant plants such as turfgrass, Hillsborough County and the City of St. Petersburg have no limit).

Tree protection provisions for existing native trees appear inadequate because they do not establish root protection zones out to tree drip-lines (optimal to insure survival). No ordinance provisions limiting soil compaction in areas to be landscaped were observed. Each Member’s ordinance identified landscape and irrigation best management practices; however this information was not delineated in the form of educational information designed for property owner application.

In addition to the four principal ordinance provisions discussed, the Pasco ordinance has a requirement for at least 30 percent of plants other than trees and turfgrass to be native, and has limits for non-drought tolerant species (shrubs, groundcovers and grass) to

a maximum of 50 percent of the irrigated area (It does allow drought tolerant turfgrasses to exceed this percentage. It should be noted, the most drought tolerant turf grass, Bahia grass, will actually utilize about 12 percent more supplemental irrigation than St. Augustine if both are kept green by irrigation according to University of Florida research, which would negate the ordinance's intent (if irrigated)).

Pasco County and City of Tampa provided sample drawings of required submittals in their ordinance guidance documents. Pasco improved their original drawing because it appeared to some the front yard can have St. Augustine and the back yard can only have Bahia grass.

### **7.3 Member Government Permitting Process**

During the meetings with affected Member Governments, structural commonalities between Hillsborough and Pasco Counties and between the Cities of Tampa and St. Petersburg permitting departments were observed. Due to the large volume of ongoing development in Pasco and Hillsborough Counties, there are two main divisions of permitting: 1. Site development permitting process which historically permitted horizontal development (site preparation), and 2. The building permitting process which historically permitted vertical development (building the structure). Generally, multi-family residential and commercial sites go through both processes sequentially. For single family residential, development of a subdivision as a whole goes through the site development process and then individual homes are permitted through the building permitting process. Any existing development or new development that has recently received a Certificate of Occupancy and installs a new irrigation system goes directly through the building permitting process.

For all affected Members, it is common for irrigation and landscape permitting to be done at separate times, with irrigation permitting typically being done last (St. Petersburg is the exception).

For Pasco and Hillsborough counties, commercial site review includes trees and shrubs to be removed and installed but does not include other landscaping or irrigation. A commitment to irrigate is sometimes checked during site review and inspection. Single family irrigation is handled through the building permit phase rather than site development and is typically one of the last permit applications to be submitted and approved. Counties have a self-certifying landscape and irrigation permit process in which the contractor submits an Affidavit of Compliance. Office review staff confirms the affidavits and other required documents exist, but they do not review actual drawings. During the final building inspection, prior to issuing a CO, the irrigation system is checked for a backflow preventer. Additionally, Pasco checks that there is a 1-ft. clearance between the structure and the irrigation system. Hillsborough County checks that the system has a rain sensor.

In Tampa and St. Petersburg new development and redevelopment do not enter two separate areas of permitting. Instead, packages of information are submitted to a single department and parts of the permit are reviewed by appropriate staff within the department.

#### **7.4 Inspection Process**

Although the participating governments evaluated all have irrigation ordinances that were developed around the same time, most items in the single family irrigation component of the ordinance are self-regulating. Contractors sign an Affidavit of Compliance and office reviews verify the affidavits are in the application package. There was no identification of what occurs if site conditions are not similar to signed affidavit documentation. On-site inspections for Pasco and Pinellas counties are limited to rain sensors, backflow prevention and clearance between house and irrigation system as discussed in Section 5. Tampa permitting staff indicates, and field evaluations confirm, the City also inspects for use of micro-irrigation in all irrigated plant beds. During the Pasco on-site evaluations it was noticed that of the sites that had requested an inspection, several did not have landscape installed and some did not have an irrigation system. Therefore, if a more comprehensive inspection of irrigation system installation is anticipated in the future, measures will need to be taken to ensure that landscape will be installed prior to inspection. Another issue is lack of power or water at the sites which make it impossible for inspectors to perform inspection duties such as determining if turf and beds are on separate zones.

#### **7.5 Ordinance Compliance**

Based on the evaluation of irrigation systems and landscapes, lack of ordinance compliance was apparent. While compliance was good regarding installation of rotors and sprays on separate zones and generally with sprinkler spacing, other areas were lacking. This was the case pertaining to limitations in the percentage of turfgrass, establishing separate irrigation zones for turf from other landscape plantings, use of micro-irrigation and mixing of micro-irrigation and traditional irrigation emitters. The overwhelming majority of sites failed to meet uniformity of water application requirements (mismatched sprinkler application rates in rotors). At the majority of sites in City of Tampa and Pasco County where turfgrass is limited and where St. Augustine was exclusively used, it comprised approximately 75 percent or more of the landscape areas rather than the required 50 percent limit.

The primary items being checked by inspection staff are backflow prevention and rain shutoff devices (Tampa does inspect for micro-irrigation). Self-regulation appears to have been left predominantly to an agreement to comply on the part of builders, landscape and irrigation contractors, due to lack of inspectors or departments not being ade-

quately charged or focusing on identifying different mechanisms to implement, enforce and evaluate ordinance adherence.

Through field and office evaluations, some requirements of the ordinances, such as sprinkler uniformity and overlap and native/drought tolerant plant requirements would require some additional overhead (staff and dollars) to enforce. This is due in part to inspectors requiring specialized training in irrigation and in horticulture (along with existing time constraints). Inspectors could be trained adequately in some areas, but thorough inspections of all single family permitted sites would require significant time, and for power and water to be available.

In Pasco County, single family irrigation plans are not submitted to the county. They are required to be provided to the "owner," which is generally the builder at the time of CO (there is no confirmation this actually occurs). Since no plans were on-site at the time of inspection, it appears the owner that will actually operate and maintain the system probably does not receive the irrigation plan.

## Section 8.0

# Conclusions and Recommendations

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In-ground irrigation systems are prevalent in many new single family homes. Based on 2003 permitting data provided by Members, 57 percent and 85 percent of homes built in Pasco and Hillsborough counties, respectively have irrigation systems. Actual percentages may be higher since many homeowners install irrigation systems after moving into the home and may not apply for permits. According to surveys completed by Tampa Bay Water, automatic irrigation systems are estimated to be installed in approximately 70 percent of single family homes in the region. Total single family projected and actual water use constitutes the largest percentage of use in the region. Therefore, it is imperative that local governments take measures to adequately ensure irrigation water use efficiency. Results of this evaluation indicate that overall ordinance enforcement/compliance is not consistent, which infers that water use efficiency standards are not being optimized and will not prevail in spite of the ordinances. Through charting the permitting process and performing on-site evaluations, some possible reasons for non-compliance have been identified. Recommendations for improving ordinance compliance and water use efficiency are provided below.

### **Improving the Ordinances and Permitting Requirements**

It is recommended that local and regional governments and professional associations work collectively to increase continuity and commonality in ordinance content, enforcement efforts, and consistency in use of efficiency standards. This collaborative process would essentially be a second phase of the previous model ordinance effort. Additionally, some specific ordinance changes are recommended as follows:

#### **Pasco County**

- Change requirements for native plants by specifying that they be drought tolerant. Additionally, the County should define how this element will be enforced if it is to be retained for single family permit applications.
- Permit drought tolerant turfgrass to exceed the 50 percent limitation only if it is not irrigated by a permanent in-ground irrigation system.
- Require site plans to be provided to the County (in addition to the homeowner) as part of the application process.
- Require plans to be posted in the permit box at the site for ease of inspection.

**Hillsborough County**

- Consider adding a provision limiting non-drought tolerant plants or turf. The state-wide ordinance review conducted in California identified turf limitations had the greatest ordinance impact to conserving water ordinance (see Section 6). It should also be noted that turf limitations is one of the easiest ordinance elements to check in the field since it does not require power or water.
- Define which section of the permitting department is charged with enforcing this part of the ordinance. According to the building permit section, they are not charged by the County Commission to enforce the irrigation ordinance beyond the backflow prevention and rain shut-off device.
- Place a requirement for the efficient use of micro-irrigation systems on all new landscape beds (allows new landscapes to be irrigated as needed through plant establishment while being consistent with irrigation restrictions).
- Require plans to be posted in the permit box at the site for ease of inspection.

**City of St. Petersburg**

- Consider adding a provision limiting non-drought tolerant plants or turf. The state-wide ordinance review conducted in California identified turf limitations had the greatest ordinance impact to conserving water ordinance (see Section 6). It should also be noted that turf limitations is one of the easiest ordinance elements to check in the field as it does not require power or water.
- Consider adding single family irrigation system permitting since backflow prevention devices are required by Florida Statute to be permitted.

**City of Tampa**

- Modify example drawings to clearly delineate they are examples only (not an ordinance modification).

**General Recommendations**

- Members should consider adding specific inspection and enforcement requirements. Consider passing a resolution that assists in generating operational funds to cover inspection costs if water use efficiency standards are not met at time of inspection.

- All Members should require to-scale drawings be part of the permit process. Additionally, consider requiring precipitation rates be identified for each irrigation zone.
- Consider developing a comprehensive inspection process for all single family permit approvals/government or an evaluation that randomly conducts evaluations of permitted irrigation systems based on permits received. If permit requirements are not fulfilled, a CO could be withheld until system improvements are made.
- Members may also want to consider developing a non-compliance inspection fee where permit applicants are charged a fee for inspections if affidavit requirements are not met. A repeat non-compliance permit evaluation and enforcement grid should be developed for guidance purposes.
- Create a training course that permit holders would be required to take if permit requirements are not met at time of inspection.
- Members should consider having the building contractor, or the primary contractor for the affected site, pull the landscape and irrigation permits concurrently while identifying the properly licensed irrigation and landscape contractors as part of their permit process. Builders should be encouraged to include a statement in their contract agreement with irrigation contractors that binds the contractor to adhere to applicable water efficient ordinance elements.
- All Members should require contractors to attach a site plan enclosed in a sealed plastic bag to the irrigation controller at the permitted site as part of their certificate of occupancy package. If the controller is outdoors, the schematic should be either inside the building the controller is attached to or at a common building on the site. This could enhance compliance because the contractor would anticipate the homeowner checking that his/her landscape matches the approved plan.
- Educational materials could be required to be left with the irrigation site plan attached to the irrigation controller, if located inside a sheltered area.
- A checklist of key ordinance elements should be developed and used during the review and inspection processes similar to any affidavit of compliance and/or elements specified in the permit. This will require some additional training of review and inspection staff.
- Development of site preparation guidelines for contractors should be coordinated with the University of Florida Extension Service.



- Filters should be required for all micro-irrigation systems to reduce emitter clogging that could disable the system.
- All permitting should be easily accessible and available via the internet. For example, Tampa Bay Water's website would be a good location to commonly link all efforts.

### **Improving the Ease of the Permitting Process**

Consistency in ordinance language between Members should increase compliance since contractors would be better informed on similar permit submittal requirements. Creating guidance documents, including site plan development procedures, helps to clarify the permitting process by providing information on permitting procedures. The main elements of the ordinance should also be explained so a contractor does not need to read the ordinance to know what is required to obtain a permit.

Sample drawings of site plans need to be as generic as possible and a watermark of the word "SAMPLE" should appear across the plan. For example, the sample plan should be carefully designed to not indicate that irrigation is not allowed in the back yard. Ordinance requirements can be more accurately relayed if the drawing includes notes.

### **Educating Contractors and Builders on Ordinances and How to Comply**

On the last Wednesday of each month plumbing staff from Hillsborough and Pasco Counties, the City of Tampa, members of the Florida Irrigation Society and members of the Hillsborough Association of Plumbing and Heating Contractors meet at Hillsborough County offices in NetPark. These results should be presented at this meeting and also at a Tampa Bay Chapter Florida Irrigation Society meeting. Discussion of permitting and compliance issue resolution should be encouraged.

Tampa Bay Water has worked with the Florida Irrigation Society to develop training courses for irrigation inspectors as well as the Site Manager Course to increase awareness of the codes and promote water conservation. Tampa Bay Water is proposing to fund a series of permit staff workshops in 2006 to provide continuity in ordinance implementation, enforcement and evaluation. Additionally, educational tools could be made available at local permitting offices. Examples include touch-screen educational terminals at permitting locations, and providing CDs to contractors for educating their employees or offering classes. This program may be eligible for educational grants from the Southwest Florida Water Management District.

### **Educating Homeowners to Ensure Conservation Continues**

In general, ordinances, by themselves, only set the foundation for landscape water savings. Long-term conservation occurs only if the property owners achieve reductions

through proper irrigation practices focusing on environmental conditions and plant needs, regular system maintenance, and good landscape management practices. Currently, educational materials are not required to be delivered to the homeowner during the CO process.

The Florida Cooperative Extension Service, which operates in each county, has an ongoing homeowner-oriented program called "Florida Yards and Neighborhoods." The program provides practical information on how to conserve irrigation water and other landscape maintenance help. The education materials include a handbook, workbook, a laminated month-by-month water conservation checklist, and other useful brochures and pamphlets. The Southwest Florida Water Management District also has a number of useful landscape publications. Many purchasers of new homes may have very little knowledge of how to manage a Florida landscape. For example, the new home may be the owner's first home and/or the homeowner may have recently relocated from outside of Florida. These residents may be receptive to guidance on how to properly maintain their new landscapes if it is provided to them at the time of occupancy.

Other resources could be developed and provided to the homeowner such as a booklet on the basics of irrigation maintenance (including micro-irrigation). The irrigation maintenance guidance may be an endeavor for the Extension's Tampa Bay Horticulture "Green Team." With the irrigation system site plan and these materials, a homeowner could do most maintenance instead of neglecting the system resulting in decreased water use efficiency.

#### **Using Permitting Data to Further Benefit The Utility**

All affected Members except for Pasco County, currently require single family site plans to be submitted in the application process. It was previously recommended that Pasco also require site plans to be submitted. All members should scan the site plans and store them electronically with the addresses so that the data can be accessed later. Both Tampa and Hillsborough County currently archive data to microfiche. This data should be stored electronically. Hillsborough County is currently working toward installing an EDMS similar to St. Petersburg. This change is also recommended for both Pasco and Tampa.

## Appendix A

### FIS Survey Responses

## Florida Irrigation Society Survey Responses

	Pasco County	Hillsborough County	City of Tampa	City of St. Petersburg
What licenses and/or certificates does each entity require to do work in their city/county? (name the licenses and or certificates)	5 = Irrigation Contractor License 1 = Certificate of Competency only 1 = State Block Test-Irrigation Specialty Contractor License-Certificate of Competency 1 = No answer	5 = Irrigation Contractor License 1 = Irrigation Contractor License and need to be certified for backflow testing and repair 1 = State Block Test-Irrigation Specialty Contractor License-Certificate of Competency 1 = No answer	5 = Irrigation Contractor License 1 = No answer 2= A City Competency Card based on County License and Competency	2 = Irrigation Contractor License 3 = Pinellas County Construction Licensing Board Specialty Contractor License 1 = I don't know 2 = No answer
Indicate what percentage of your work is performed in each city/county.	Average = 8%	Average = 48%	Average = 13%	Average = < 1%
How has the enactment of the new ordinances affected you?	1 = Builder does not want to install more drip so they don't put sprinklers in back yard which causes problems resulting in the owner installing irrigation later on their own. 1 = Pain 1 = Ordinances have resulted in us hiring someone to do nothing but permitting. 1 = Pain because too many trips 1 = I try to stay out of the County 3 = No answer	1 = Builder does not want to install more drip so they don't put sprinklers in back yard which causes problems resulting in the owner installing irrigation later on their own. 1 = Ordinances have resulted in us hiring someone to do nothing but permitting. 3 = OK with the ordinance 2 = No answer 1 = Slightly more time consuming	1 = Builder does not want to install more drip so they don't put sprinklers in back yard which causes problems resulting in the owner installing irrigation later on their own. 1 = Ordinances have resulted in us hiring someone to do nothing but permitting. 1 = Pain 1 = Pain, but improving 1 = Slightly more time consuming 1 = Needs to be more simple 2 = No answer	1 = Builder does not want to install more drip so they don't put sprinklers in back yard which causes problems resulting in the owner installing irrigation later on their own. 1 = None 2 = I don't know 4 = No answer
Do you have to apply for irrigation permits? (yes/no)	6 = Yes 2 = No answer	7 = Yes 1 = No answer	7 = Yes 1 = No answer	2 = No 1 = No, plumber does 3 = I don't know 2 = No answer
Do you have to apply for landscape permits? (yes/no)	3 = No 4 = No answer 1 = I do not do landscape	3 = No 4 = No answer 1 = I do not do landscape	3 = No 4 = No answer 1 = I do not do landscape	2 = No 4 = No answer 1 = I do not do landscape 1 = I don't know
Is there an all-inclusive landscape/irrigation permit?	7 = No 1 = No answer	7 = No 1 = No answer	7 = No 1 = No answer	5 = No 2 = I don't know 1 = No answer
How long does it take the city/county to approve a permit from the time the application is submitted?	4 = 3 to 5 days 1 = 24 hrs. 1 = I try to stay out of the County 2 = No answer	1 = Immediately 3 = 1 hour or less 2 = 1 day or less 1 = 2 days 1 = No answer	1 = 1 hour 3 = 3 days or less 2 = 3 to 5 days 1 = 5 to 10 days 1 = No answer	5 = No answer 3 = I don't know

	<b>Pasco County</b>	<b>Hillsborough County</b>	<b>City of Tampa</b>	<b>City of St. Petersburg</b>
Is there an office review of the permit application?	2 = Yes 1 = Yes, somewhat 3 = I don't know 2 = No answer	1 = No 1 = Yes, somewhat 3 = Yes 1 = I don't know 2 = No answer	4 = Yes 1 = Yes, somewhat 1 = I don't know 2 = No answer	1 = No 4 = I don't know 3 = No answer
Is there a field inspection during or after the installation?	5 = Yes 2 = I don't know 1 = No answer	6 = Yes 1 = I don't know 1 = No answer	6 = Yes 1 = I don't know 1 = No answer	1 = No 4 = I don't know 3 = No answer
As an irrigation contractor, are you submitting a landscape plan along with your irrigation plan to get a permit?	5 = No 1 = No, bedlines defined 1 = Yes 1 = No answer	5 = No 1 = No, bedlines defined 1 = Yes 1 = No answer	5 = No 1 = No, bedlines defined 1 = Yes 1 = No answer	3 = No 3 = I don't know 2 = No answer

## FIS Suggestions and Comments

### **Pasco County:**

2 = Pasco should follow Hillsborough

1 = "I feel if we went to low volume in certain planting areas, pressure compensating sprays in turf areas and rotors in the larger Turf areas. This would result in savings of water and by having the area 100 % covered this would keep after inspections alteration to bare minimum. Would make inspections and enforcement a lot easier and quicker along with a signed statement by irrigation contractor that system was installed to code and per ordinance. (I would like to see this in all local governments.)"

1 = Drawings and head spots should not be required. They only check for the backflow and rain sensor anyway. We should be able to sign an affidavit to abide by the code and get permits by fax, rather than having to deliver and pick up.

1 = I don't know

2 = No comment

### **Hillsborough County:**

2 = It is perfect/good as is

4 = No comment

1 = The only items inspected are the rain sensor and the backflow installation.

### **City of Tampa:**

1 = OK, they recently made changes

1 = OK, but too much detail wanted

1 = They want irrigation plans for 50/50 and we don't even know how plants will be done, so it is a joke.

1 = They made an ordinance that they cannot police

1 = The only items inspected are the rain sensor and the backflow installation.

2 = No comment

### **City of St. Petersburg:**

1 = They care more about landscape than irrigation

1 = Not doing work constantly

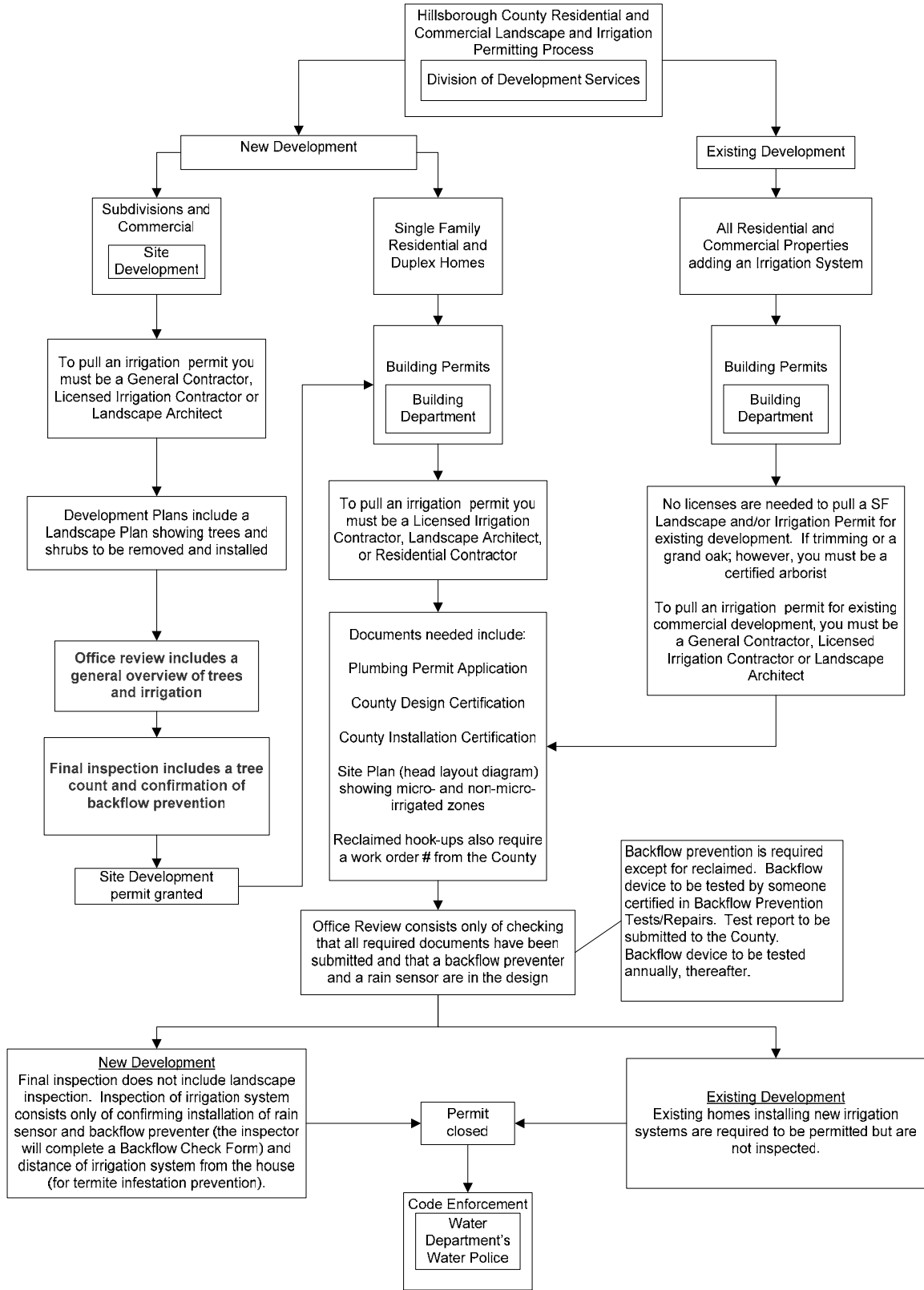
1 = I don't know

3 = No comment

## Appendix B

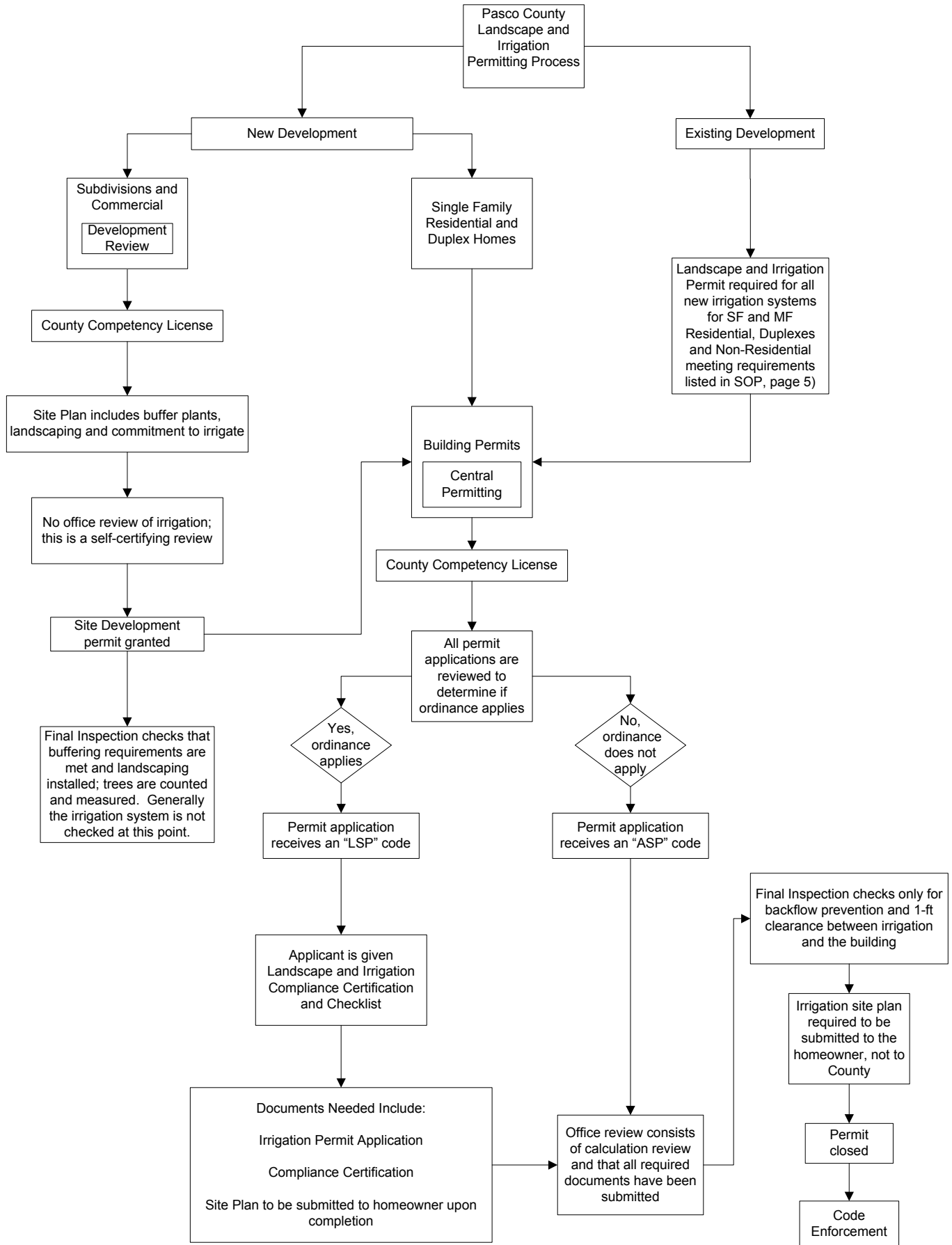
# Irrigation and Landscape Permitting Process Flowcharts for Member Governments

# Hillsborough County Landscape and Irrigation Permitting Process

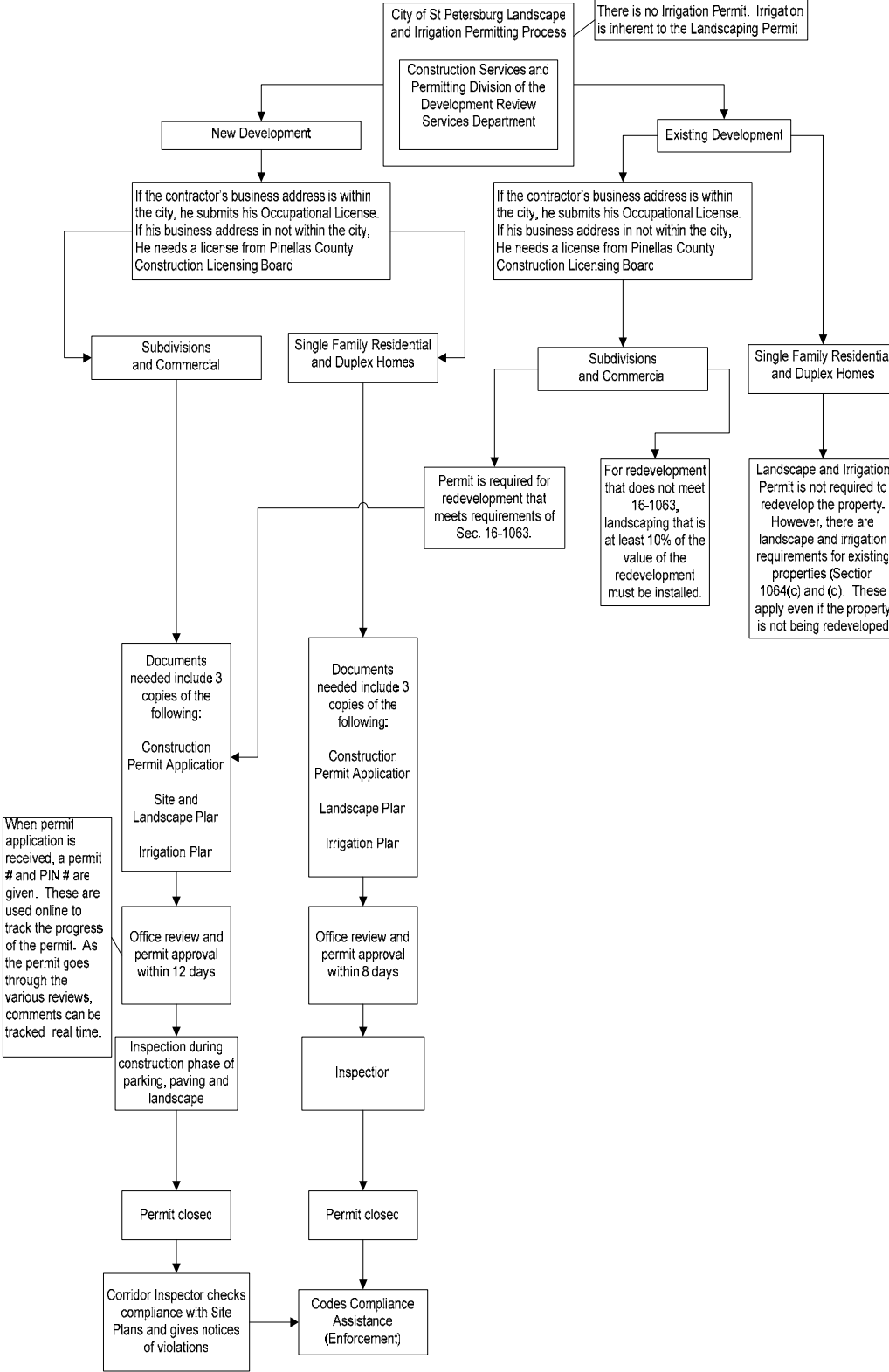




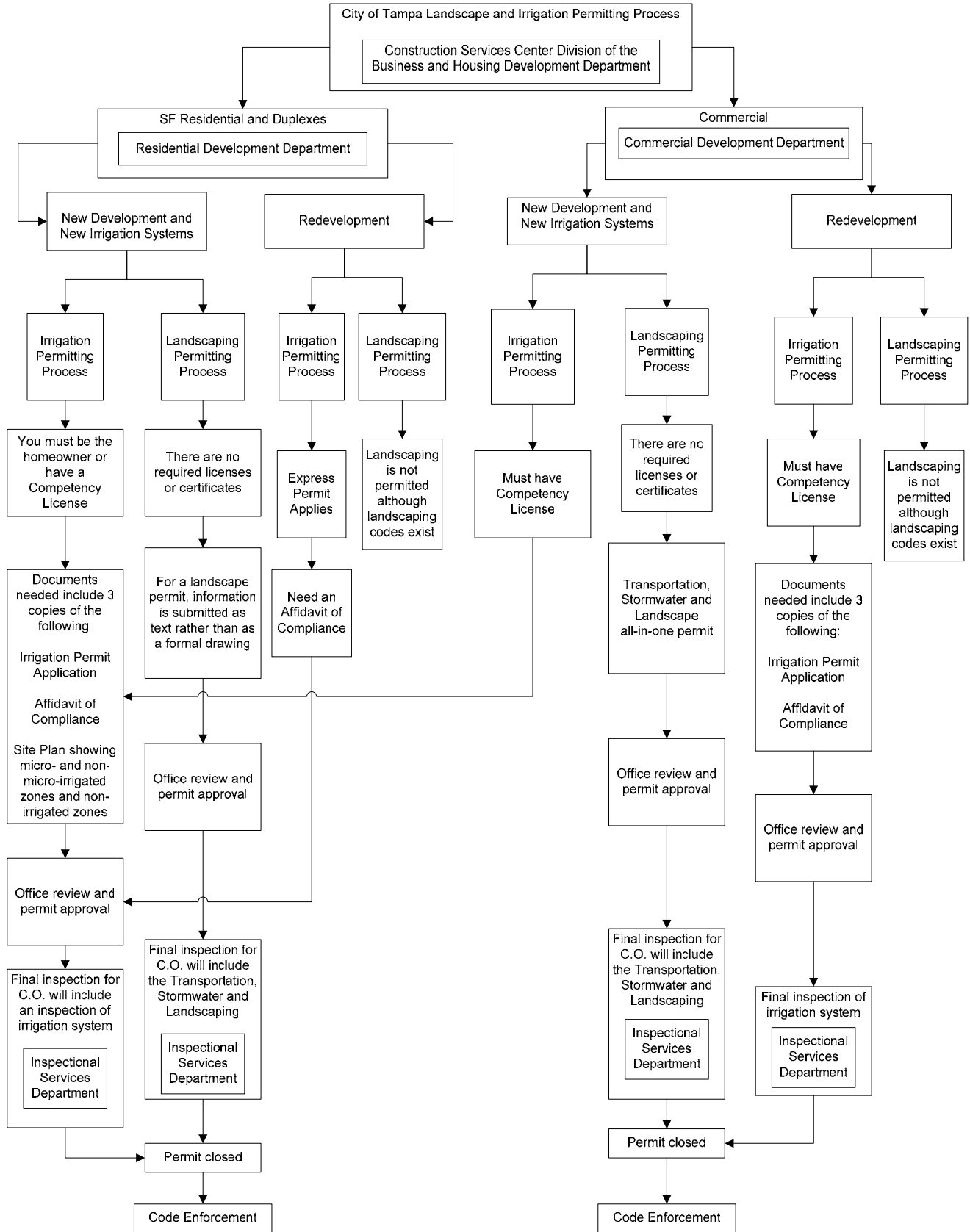
# Pasco County Landscape and Irrigation Permitting Process



# City of St. Petersburg Landscape and Irrigation Permitting Process



# City of Tampa Landscape and Irrigation Permitting Process



## Appendix C

### On-Site Evaluation Results for Member Governments

## Hillsborough County On-site Evaluation Results for 18 Sites

Ordinance Requirements	Yes	No	Not Available	
<b>Survey tasks requiring water/power to be operating:</b>				
Sprinkler spacing/irrigation overlap meet ordinance requirements?	10	8		
Popup sprays and rotors are on separate zones?	16	1	1	
Rotors have matched precipitation rates?	0	13	5	
Turf and tree/shrub beds on separate irrigation zones?	4	13	1	
Functioning rain shutoff device?	17	0	1	
<b>Survey tasks not requiring water/power to be operating:</b>				
Sprays/rotors on areas <4 feet wide?	14	4		
Micro-irrigation in shrub/tree bed zones?	5	13		
Automatic multi-programmable irrigation controller?	13	0	5	
<b>Number of Sites</b>				
Dead/dying plants/turf	14			
Nonfunctioning or broken irrigation components	2			
Inadequate mulch coverage	0			
Debris in landscape	1			
Other comments:				
Azaleas planted in full sun.				
Maple planted too close to house.				
	<b>Yes</b>	<b>No</b>	<b>Not Available</b>	
Permit drawings reflect field conditions?	0	0	18	
Describe variations:				
No Plans or permit drawings were made available to evaluators.				
Estimated average percentage of irrigated area in turf			77%	
Overall quality assessment of landscape:	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>
	0	7	7	2
Other Comments:				
Nozzles were not matched at 12 sites.				
Micro-irrigation and sprays mixed in beds at 1 site.				
Traditional sprays in plant beds at 9 sites.				
No access to controller at 2 sites.				
Turf planted up to foundation at 3 sites.				
No power and/or water at 3 sites.				
Valves could not be located at 1 site.				
Rotor zones at 3 sites should have been pop-up sprays.				

Evaluator(s) Names: Gail Huff (Florida Irrigation Society) and Rhianna Pensa (Tampa Bay Water)

## Pasco County On-site Evaluation Results for 10 Sites

Ordinance Requirements	Yes	No	Not Available	
<b>Survey tasks requiring water/power to be operating:</b>				
Sprinkler spacing/irrigation overlap meet ordinance requirements?	7	1	2	
Pop-up sprays and rotors are on separate zones?	6	1	3	
Rotors have matched precipitation rates?	1	5	4	
Turf and tree/shrub beds on separate irrigation zones?	2	6	2	
Shrub interference or irrigation of impervious areas?	5	1	4	
Functioning rain shutoff device?	7	2	1	
<b>Survey tasks not requiring water/power to be operating:</b>				
Sprays/rotors on areas <4 feet wide?	0	8	2	
Micro-irrigation in shrub/tree bed zones?	4	4	2	
Automatic irrigation controller?	8	0	2	
<b>Number of Sites</b>				
Dead/dying plants/turf	4			
Nonfunctioning or broken irrigation components	2			
Inadequate mulch coverage	1			
Debris in landscape	0			
Other comments:				
<b>Number of Sites</b>				
Irrigation system drawing on site?	0	10	0	
Describe variations:				
Estimated average percentage of irrigated area in turf (less exemptions, i.e. right of ways, stormwater drainage areas, etc.)			69%	
Overall quality assessment of landscape:	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>
	2	2	1	1
Other Comments:				
Four sites had no landscape installed; two of the four sites had beds delineated.				
Two sites did not have an irrigation system installed.				
One site was a town home that was connected to a common controller which could not be located.				
Evaluators attempted to evaluate 12 sites but one could not be located and one evaluation could not be conducted due to heavy rains.				

Evaluator(s) Names: Rhianna Pensa and Dave Bracciano (Tampa Bay Water)

## City of Tampa On-site Evaluation Results for Six Sites

Ordinance Requirements	Yes	No	Not Available	
<b>Survey tasks requiring water/power to be operating:</b>				
Sprinkler spacing/irrigation overlap meet ordinance requirements?	3	3		
Popup sprays and rotors are on separate zones?	4	1	1	
Rotors have matched precipitation rates?	0	5	1	
Turf and tree/shrub beds on separate irrigation zones?	3	3	0	
Functioning rain shutoff device?	4	2	0	
<b>Survey tasks not requiring water/power to be operating:</b>				
Sprays/rotors on areas <4 feet wide?	4	2	0	
Micro-irrigation in shrub/tree bed zones?	5	1	0	
Automatic multi-programmable irrigation controller?	6	0	0	
<b>Number of Sites</b>				
Dead/dying plants/turf	3			
Nonfunctioning or broken irrigation components	1			
Inadequate mulch coverage	0			
Debris in landscape	1			
<b>Yes</b>				
<b>No</b>				
Permit drawings reflect field conditions?	2		4	
Describe variations:				
Plan for two sites showed sprays in back where rotors were.				
Plan showed backyard as not irrigated; however, backyard had St. Augustine sod which requires irrigation. A valve box with an un-used valve was in the backyard.				
One plan showed two zones, evaluators found three.				
One plan showed a non-irrigated "wetland set-back line," but it was irrigated.				
Bubblers installed were not on plan.				
For two plans, beds were installed that did not appear on the plan.				
Estimated average percentage of irrigated area in turf (less exemptions, i.e. right of ways, stormwater drainage areas, etc.)			83%	
<b>Excellent</b>				
<b>Good</b>				
<b>Fair</b>				
<b>Poor</b>				
Overall quality assessment of landscape:	0	4	1	0

## City of Tampa On-site Evaluation Results for Six Sites

Other Comments:
Three controllers were set to water daily; of those three, one did not have landscape installed.
No power to controller was observed at two sites.
One site had bubblers and rotors mixed on same zone.
Traditional sprays and micro on same zone at four sites.
Controller at one site with established landscape was set to water for 45 minutes 2x/day everyday.
Traditional sprays used in small beds at two sites.
One site had no landscape installed yet. This is the reason for some survey answers totaling to five, rather than six.
Rain shutoff device found dangling off side of house.

Evaluator(s) Names: Gail Huff (Florida Irrigation Society) and Rhianna Pensa (Tampa Bay Water)