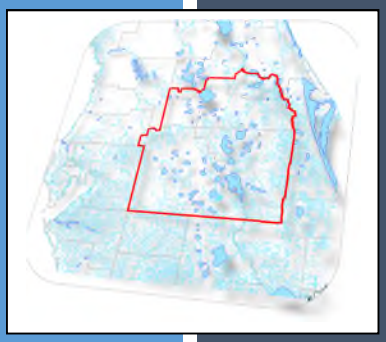
DMIT HYDROGEOLOGIC WORK PLAN UPDATE FOR FY2016-FY2020

Central Florida Water Initiative

This document is the product of the Data, Monitoring, and Investigations Team (DMIT) and represents an update to DMIT's 2015 Work Plan dated February 2015.

July 2016



Contents

Tables

Figures

Acronyms and Abbreviations

APT	aquifer performance test
CFWI	Central Florida Water Initiative
DMIT	Data, Monitoring, and Investigations Team
ECFTX	East-Central Florida Transient Expanded Model
FDEP	Florida Department of Environmental Protection
FY	fiscal year
GIS	geographic information system
IA	intermediate aquifer
LFA	Lower Floridan aquifer
MFL	Minimum Flow and Level
SA	surficial aquifer
SC	Steering Committee
SFWMD	South Florida Water Management District
SJRWMD	St. Johns River Water Management District
SWFWMD	Southwest Florida Water Management District
TBD	to be determined
UFA	Upper Floridan aquifer

1.0 Introduction

The Central Florida Water Initiative (CFWI) is a planning-level effort to review existing and projected water use demands in a five-county region of Central Florida. As part of the initial CFWI effort, the Data, Monitoring, and Investigations Team (DMIT) was tasked to "ensure that available hydrologic, environmental, and other pertinent data collected throughout the region are identified, inventoried, and accessible to support the CFWI technical initiatives and CFWI regulatory activities." With guidance from other committees and oversight from the Steering Committee (SC), DMIT summarized data collection findings and activities within the CFWI region and prepared the *CFWI Regional Monitoring Program: Summary Report* (Summary Report). The Summary Report can be found on the CFWI website (www.cfwiwater.com). Following the acceptance of the Summary Report, the SC provided additional guidance to DMIT to develop a Work Plan detailing an implementation strategy based on the Summary Report findings and minimum data collection standards.

The initial DMIT implementation plan was approved by the SC in February 2015 and set forth construction and other data collection activities through Fiscal Year 2020 (FY2020). The objective of the implementation plan was to establish a schedule for the construction and testing at existing and new data collection sites identified in the Summary Report. The *DMIT Hydrogeologic Work Plan for FY2015-FY2020* report (2015 Work Plan) can be found on the CFWI website (www.cfwiwater.com).

As part of DMIT's continuing efforts, the 2015 Work Plan is to be updated annually to include 1) a review of site prioritization, 2) updated costs for well construction, 3) updated monitoring and testing sites proposed for each fiscal year, and 4) a record of work completed in preceding fiscal years. The annual work plan update provides a tool to convey information to CFWI management and the SC to ensure data collection needs for the CFWI region are being met. This document, the *DMIT Hydrogeologic Work Plan Update for FY2016-FY2020* (2016 Work Plan), is the first of the annual reports documenting the progress of DMIT's work plan implementation and changes in future work efforts. The report identifies a shift in data collection priorities in order to focus on wetland data collection through the end of 2017. This focus on wetland data collection is proposed to align data availability and maximize the number of wetland sites being monitored in support of future modeling and assessment efforts. The report also discusses issues that impacted construction progress during FY2015 and how these issues are being addressed to minimize their impact on the schedule in the future. Lastly, the report discusses the status of other ongoing efforts by DMIT such as updates to the Data Inventory and geographical information system (GIS) efforts supporting CFWI data management.

1.1 FY2015 WORK PLAN GOALS

The goals set forth by the SC for the DMIT work plans focus on implementation of the minimum monitoring option guidelines identified in the Summary Report. With regards to construction, the goals were identified for the following monitoring sites:

- Wetland locations – defined as one monitoring location per wetland type per physiographic region (107 additional locations)
- Surficial aquifer (SA) locations – defined as the addition of a new SA well at all active and proposed Upper Floridan aquifer (UFA)/Lower Floridan aquifer (LFA) locations as well as the SA locations identified in the Summary Report and as revised in the 2015 Work Plan (a total of 117 additional wells)

- UFA and LFA locations – defined for both monitoring horizons at the locations specified in the Summary Report (67 additional wells)

The Summary Report identified guidance criteria and tools for identifying and prioritizing possible monitor locations. The Summary Report discussed completion of a GIS analysis to estimate the number of sites needed for each aquifer and wetland. The minimum option described in the Summary Report proposed monitoring locations to be added to the existing network of sites. It is assumed that sites currently being monitored will continue to be monitored or replaced to maintain the current level of collected monitoring information.

Developing the 2015 Work Plan required review of proposed site conditions at existing monitoring locations to accommodate additional wells. The site review resulted in a reduction in the number of potential monitoring sites from those identified in the Summary Report. The most notable change was the reduction of potential SA sites from 165 to 117 locations. This change was effected by several circumstances, including incorrect information in the 2014 data inventory (monitored versus unmonitored); wells completed in FY2014 that were not included in the data inventory; and removal of sites known to have access issues. Six locations specified for UFA monitoring were removed for similar reasons. The GIS analysis proposed for completion in FY2015 to identify replacement SA and UFA monitoring stations was not completed and is now proposed for completion in FY2017 in order to focus staff and funding resources on installation of currently identified well construction sites, including highly prioritized wetland monitoring locations. An overview of the GIS effort is described in the 2015 Work Plan.

2.0 Status of Work Plan Implementation

The 2015 Work Plan was approved by the SC in February 2015, midway through the fiscal year (October 1 to September 30) of plan implementation. This gave a clear picture of the FY2015 intended construction activities, but provided minimal lead time for site identification and arranging acquisition/access of proposed well construction sites identified in FY2016. As a result, several changes have been identified in this 2016 Work Plan to rearrange construction starts in order to improve project implementation.

Updating the 2015 Work Plan required the St. Johns River Water Management District (SJRWMD), Southwest Florida Water Management District (SWFWMD), and South Florida Water Management District (SFWMD) to review several factors that influence when and where construction activities would take place, including the following:

- Timing of site acquisition/access;
- Availability of internal funding and cooperative funding agreements;
- District staffing resources to manage projects;
- Contractor availability and performance;
- Discussions with other CFWI technical teams on changing data needs; and
- Timing of data needs for future analysis.

Of all the factors listed, site acquisition/access and funding have had the largest impact on the implementation schedule. In most instances, these factors contributed to delays in construction start. In one instance, site access allowed construction activities to move forward.

2.1 FY2015 ACCOMPLISHMENTS

The 2015 Work Plan identified 13 new permanent wells for construction in FY2015. Costs identified in the 2015 Work Plan were associated with well construction materials, well drilling contractor costs, isotope sampling, aquifer performance tests (APTs), elevation surveys, wellhead completions, monitoring setup, and a limited amount of other contracted services. District staff costs are not accounted for in the estimates except when staff is directly involved with the construction and site acquisition activities. The total cost to construct 13 wells and perform tests was estimated at $2.88 million. Five unidentified wetland monitoring locations also were proposed for construction at an estimated cost of $50,000.

Of the 13 identified permanent wells and 5 wetland sites, 5 wells were completed: 1 SA well, 1 intermediate aquifer (IA) well, 2 UFA wells, and 1 LFA well. These wells were constructed at four locations within the SJRWMD. The SJRWMD also completed core drilling at the Duda-Whittle location in preparation for drilling a deeper well in FY2016. Although no wetland sites were completed in FY2015, the Districts completed several initial site screenings in preparation for construction activities in FY2016. Construction costs related to the sites constructed in FY2015 totaled $554,000.

In addition to the construction activities identified under the 2015 Work Plan, the Districts accomplished several efforts focused on identifying future work locations and the methods that will be used to collect data. Following approval of the 2015 Work Plan, a GIS analysis was completed in May 2015 that identified wetland monitoring site options by intersecting physiographic regions, existing SA locations, wetland coverage, and areas susceptible to groundwater withdrawals. In addition, through a number of field visits, District staff fine-tuned the vegetation, soils, and survey data collection methods previously identified in the DMIT Minimum Standards Document, which is available at www.cfwiwater.com.

Lastly, an effort began to develop an electronic database for storing field reports and digital media associated with each wetland site. The database will store data collected across District boundaries in a uniform format and will act as a storage and retrieval area for photographic documentation and field reports. This effort is scheduled for completion in FY2017.

2.2 FY2015 IMPLEMENTATION ISSUES AND RESOLUTIONS

The 2015 Work Plan implementation revealed the importance of establishing early monitoring site access and the need for additional test drilling to verify the hydrogeologic framework before final construction design. Approval of the 2015 Work Plan midway through the fiscal year, site access constraints, and scheduling conflicts with drilling contractors limited the Districts' implementation of tasks identified for FY2015 and FY2016. Although monitor site construction starts did not meet planning projections, completed exploratory drilling efforts provided much needed information to improve network design. The SJRWMD began construction activities on each of their sites identified in the 2015 Work Plan. The SJRWMD also completed a well at the Groveland Water Plant that was not identified in the 2015 Work Plan. The SFWMD and SWFWMD worked to resolve site access issues and gain entry to several wetland monitoring locations to begin soil and vegetative data collection. All uncompleted FY2015 activities identified in the 2015 Work Plan are rescheduled within the proposed plan update.

Although there were several issues that caused delays in implementation, the Districts have taken corrective actions to minimize future delays. Site acquisition/access was the greatest limiting factor in implementing construction activities in FY2015 and into FY2016. An easement or permanent land purchase is required to accommodate the well construction, monitoring, and testing activities planned for

each site. Site access often requires months, if not years, of real estate, legal, and permitting efforts. Efforts have been made to locate sites on District or other state or municipally owned lands where possible. Through consultation at the executive level of all three Districts and the Florida Department of Environmental Protection (FDEP), a process to streamline obtaining right-of-entry agreements on state lands not owned by the Districts is underway.

Beyond site access, permits may be required to discharge water off site during APTs or to collect soil and vegetation samples. Groundwater discharged to a surface water body may require a Generic Permit for the Discharge of Produced Ground Water from the FDEP, Document #62-621.300(2). Additional state authorization may be required for monitoring associated with the collection of vegetative and soils data related to wetland monitoring transects. An "Application for the Use of State Owned Uplands" and/or a "Scientific (Non-Commercial) Research/Collecting Permit" may be required for wetland monitoring sites proposed in State Parks, State Forests, or State Wildlife Management Areas. Efforts of the executive managers at the Districts and FDEP have assisted staff in streamlining permitting activities. A transition of District project staff during FY2015 interrupted the flow of work in FY2015 and early FY2016. In early FY2016, the Districts redirected staff and project site identification is back on schedule. Contractor performance issues identified in the past were considered short term; new vendors are now on board and work is progressing. Continued funding sources and availability are important concerns for some Districts moving forward (**Section 6.0**).

3.0 Site Prioritization

The objective of prioritizing monitoring sites that were included in the minimum option was to establish a schedule for construction between FY2015 and FY2020. Initial efforts by DMIT to prioritize construction activities were identified in the Summary Report and specified in the 2015 Work Plan. Those documents identified wetland and LFA data as the highest priority to support multiple objectives, including the adopted and proposed Minimum Flows and Levels (MFLs), characterization of wetland response to hydrologic stress, and further evaluation of the LFA. The 2016 Work Plan continues to place the highest priority on the addition of wetland, MFL, and LFA data. Wetland baseline data associated with sites that have 6 years of historical hydrologic monitoring are being targeted to support wetland impact analysis associated with groundwater modeling evaluations. The completion of hydrologic calibration of the updated East-Central Florida Transient Expanded Model (ECFTX) is expected to be completed in late 2017 or early 2018. While not actually performing the work, DMIT will support other CFWI technical teams by identifying locations with appropriate historical SA water levels adjacent to isolated wetland systems.

Sites proposed as part of the hydrological investigation of the LFA in Polk County (collectively known as P280 projects and managed by the SWFWMD) continue to remain a high priority in the 2016 Work Plan. The P280 project locations currently include three sites and were part of the 2015 Work Plan because they align with CFWI and DMIT objectives. The P280 project sites are designed to assess the hydrogeologic characteristics of the LFA in Polk County and to test the viability of the LFA as an alternative water supply source in the region. A total of 12 permanent monitoring wells will be constructed among these sites.

3.1 SURFICIAL AQUIFER

As part of the original data compilation and review, DMIT performed a desktop evaluation to identify existing UFA and LFA data collection sites that do not have an existing SA monitoring within 1,000 feet or were identified as part of future construction of a nested site. The 1,000-foot radius was considered

reasonable to provide information on the hydraulic connection between the SA and UFA. Prioritizing the installation of these sites was associated with the locations of the greatest projected change in the SA as identified from results of the East Central Florida Transient (ECFT) model for the 2005 to 2035 model simulations. Using the model results and observations made at existing SA data collection sites, DMIT developed the priority map and asked other teams for input. The SA wells constructed alongside UFA stations are separate from a group of shallow wells associated with wetland sites also being constructed (**Section 3.4**).

The targeted number of additional SA/UFA well pairings was adjusted from 165 to 117 locations in the 2015 Work Plan. The 117 SA locations were reviewed and field verified to establish viable construction sites at or near existing UFA monitoring locations. Efforts this year to review co-location of new SA wells to existing and proposed UFA well locations has adjusted the viable number of SA wells to 120. This work effort is expected to continue in order to identify and field verify possible SA and UFA well pairings. In a separate effort, the Districts continue to install SA wells at each of the proposed new construction sites.

3.2 UPPER FLORIDAN AQUIFER

The Summary Report identified regional data gaps in Orange, Osceola, and Polk counties for the UFA. The proposed UFA sites were designated medium priority in the Summary Report except where associated with an MFL site. Eighteen sites are proposed for construction to support MFLs, and three UFA sites will be constructed as nested stations in support of the P280 projects managed by the SWFWMD.

A total of 38 UFA well sites were identified in the 2015 Work Plan. The number of proposed UFA well construction sites increased by 2 for a total of 40 locations under the 2016 Work Plan. The majority of the UFA sites are proposed to support MFL development or are part of a nested set of P280 wells.

3.3 LOWER FLORIDAN AQUIFER

Gathering LFA data remains a high priority under the 2016 Work Plan. The addition of LFA sites within the CFWI region will provide much needed insight on water quality and will help determine the vertical and horizontal extent of Middle Confining Units I and II within the Floridan aquifer system in the region. As water demands are increasingly expected to be met by water produced from the LFA, a viable monitoring network becomes essential.

The target number of additional LFA wells remains the same, for a total of 29 wells specified in this 2016 Work Plan. The wells are proposed for construction at 19 locations. One LFA well was constructed in FY2015, leaving 28 wells slated for installation between FY2016 and FY2020.

3.4 WETLAND PRIORITIZATION

A GIS analysis of wetland hydroclass, geomorphic regions, and existing SA monitoring locations was completed in support of the Summary Report. Under the guidance of other CFWI technical teams, it was concluded that the physical hydrologic characteristics of wetlands can differ between physiographic areas, and it cannot be assumed that a given hydroclass of wetland responds similarly to groundwater stresses across all physiographic regions. This was a limitation of the statistical approach developed as part of the 2035 planning effort. Discussions with the EMT and SC concluded that the minimum number of wetland monitoring sites should be set such that there is at least one monitoring site per wetland hydroclass within

each physiographic region, effectively adding 107 wetland monitoring sites to meet a minimum number of monitored sites. This information would be paired with the statistical data analysis to form a more measured picture. DMIT's Minimum Standards Document for monitoring identified the collection protocols for vegetation, soils, and survey baseline data. As part of the wetland data collection effort, each site is envisioned to have at least one SA well associated with vegetation and soils data collection. These wells are a separate group of SA monitoring points from those discussed in **Section 3.1**.

While reviewing the current data collection and timelines for data use, a more immediate need was recognized for wetlands information over the next 12 to 18 months in support of wetland constraint development. For this reason, DMIT is focusing efforts on adding new sites to the wetlands inventory that have historical water level monitoring. Part of this effort is proposed to include an increase in the level of cooperation among existing permittees that are required to perform water level monitoring. The Districts are looking at locations where permittees have collected six or more years of daily SA water level monitoring data adjacent to wetland sites of a preferred type and with current access. Once identified, the Districts are proposing to cooperatively develop baseline data to add to these locations. This is a cooperative effort, and permittees are not being asked to perform work not specified in their permit. Most wetland monitoring locations are not identified in this 2016 Work Plan because site arrangements are ongoing with permittees.

4.0 Proposed FY2016-FY2020 Work Schedule

The 2016 Work Plan specifies the priorities for implementing the minimum monitoring option identified in the Summary Report. This includes detailed work schedules for FY2016 and FY2017 as well as a more generalized work scheduled for FY2018 through FY2020. Construction activities from FY2018 through FY2020 are less certain due to several factors that could influence site availability. The 2016 Work Plan includes completion of a GIS analysis to identify future SA monitoring wells to add to existing UFA monitoring sites. As new monitoring locations are confirmed, the site specifics will be provided in future work plan updates.

The proposed implementation schedule takes into account potential District funding and current staff availability. Implementation of the 2016 Work Plan is predicated on obtaining assistance of local governments and water use permittees as well as funding from alternative sources. Therefore, completion of the 2016 Work Plan tasks within the identified time frame is influenced by staffing, funding, and site acquisition/access constraints.

The 2016 Work Plan outlines a schedule for construction activities in FY2016, FY2017, and FY2018 through FY2020. Larger sites (such as those in the P280 projects) may require multiple years to complete construction and testing activities. Construction activity tables in the 2016 Work Plan only list estimated construction costs associated with well construction and testing activities in a given fiscal year. The costs found in the tables include well construction materials, well drilling contractor costs, isotope sampling, APTs, elevation surveys, wellhead completion, site acquisition, monitoring setup, and a limited amount of other contractual services. District staff time expenses and costs associated with long-term site monitoring and maintenance are not included in the tables.

4.1 FY2016 IMPLEMENTATION

Implementation of the 2016 Work Plan has begun for FY2016. The 2016 Work Plan specifies the construction of 40 new monitoring stations. These sites include 14 new wetland monitoring locations as well as 5 wetland locations that were carried over from FY2015. Costs associated with construction activities proposed for completion in FY2016 total $2.04 million.

Table A-1 in the **Appendix** lists the construction activities for the three Districts in FY2016. **Figure 1** shows the locations of the proposed sites. Two wetland monitoring locations are listed as "to be determined" (TBD) in Table A-1 and are not shown in **Figure 1**. Site construction at many of the sites listed in Table A-1 is underway and eight wells have been completed at the time of this update. Well site construction status is included in Table A-1.

Table A-1 in the **Appendix** specifies several new sites not identified in the 2015 Work Plan. The sites are primarily wetland locations targeted through the GIS analysis completed in FY2015, and they replace TBD sites listed in the 2015 Work Plan. Other locations previously listed for construction start in FY2015 are now expected to begin in FY2016.

4.2 FY2017 IMPLEMENTATION

Table A-2 in the **Appendix** lists the sites and associated costs of the permanent wells scheduled to begin construction in FY2017. The FY2017 costs associated with construction activities and testing are estimated to be $9.43 million. **Figure 2** shows the locations of construction activities projected for FY2017. The map shows activities continued from FY2015 and FY2016 because some sites are expected to require multiple years to complete. Table A-2 includes nine unidentified wetland monitoring locations proposed for FY2017. These sites are not shown in **Figure 2** because the locations have not been identified.

GIS and field screening efforts to locate additional SA sites for pairing with existing UFA locations are expected to be completed in FY2017. The task is proposed to be moved from a FY2015 start to FY2017 because of shifting priorities to maximize wetland site identification and construction. The proposed GIS analysis should shortlist SA locations for field screening. Cooperation with permittees may help add SA wells at existing UFA and LFA well locations where the SA currently is not monitored. The GIS analysis performed in FY2015 for the DMIT Summary Report overestimated the number of potential SA wells needed to pair with existing UFA and LFA wells in the CFWI region. Additional work completed as part of the field screening in FY2017 may reduce the number of SA well sites needed for additional construction.

4.3 FY2018-FY2020 IMPLEMENTATION

There are 184 wells proposed for construction from FY2018 through FY2020. Of these wells, 68 sites have been identified, leaving 55 wetland and 61 SA locations yet to be identified and field verified. The SA wells are those proposed for co-location with existing monitored UFA and LFA sites. The GIS and field efforts proposed for completion in FY2017 will be used to locate additional SA sites for the start of construction in FY2018. Table A-3 in the **Appendix** lists the wells for each monitoring type and costs for implementation from FY2018 through FY2020. The order for construction of these sites is not set and will be influenced by site acquisition/access and permitting constraints. The costs have been projected based on experience with similar completed efforts and are estimated to be $21.14 million but are subject to change before or during construction. **Figure 3** shows the location of only currently identified well sites.

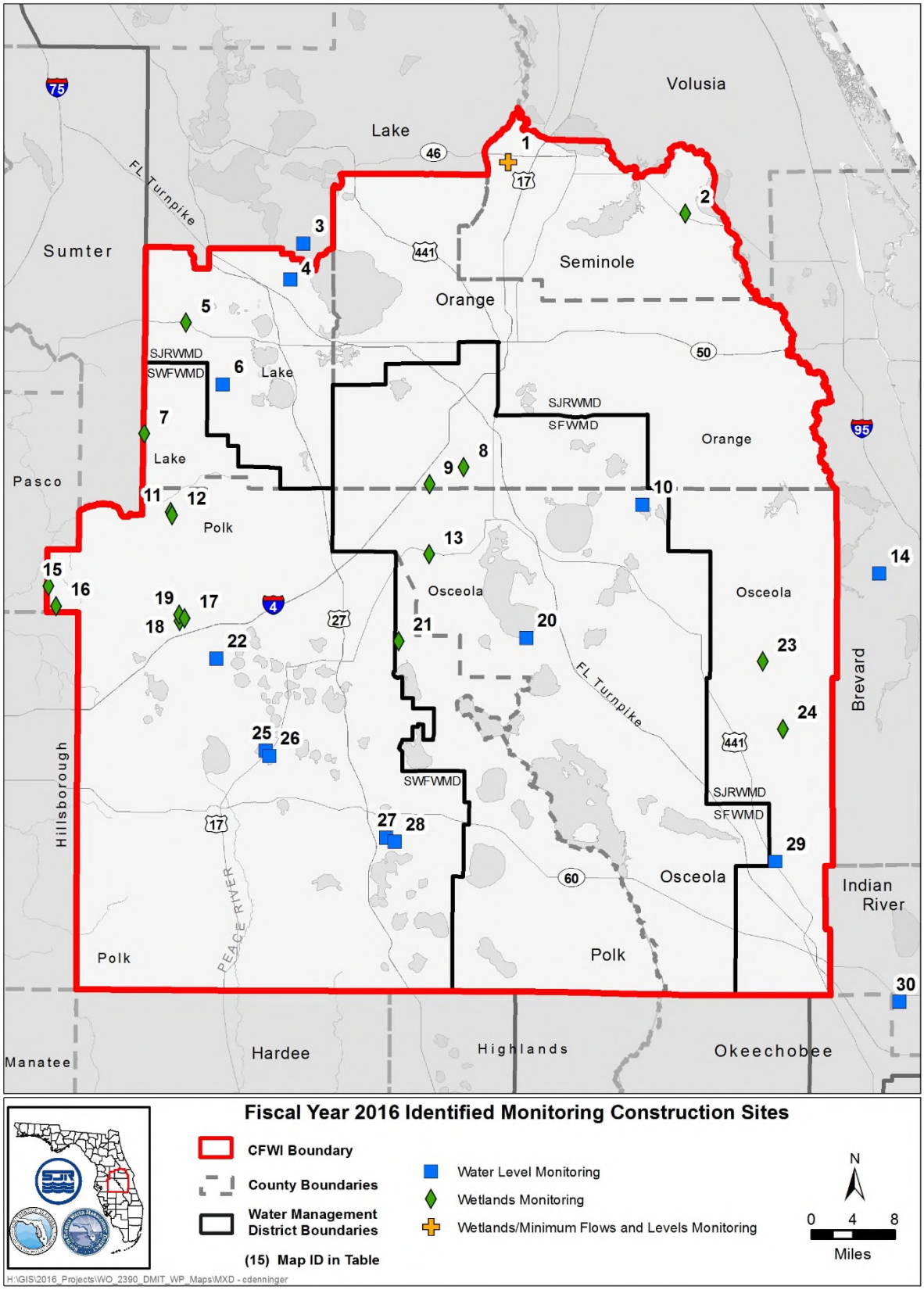


Figure 1. FY2016 monitoring construction sites in the CFWI region.

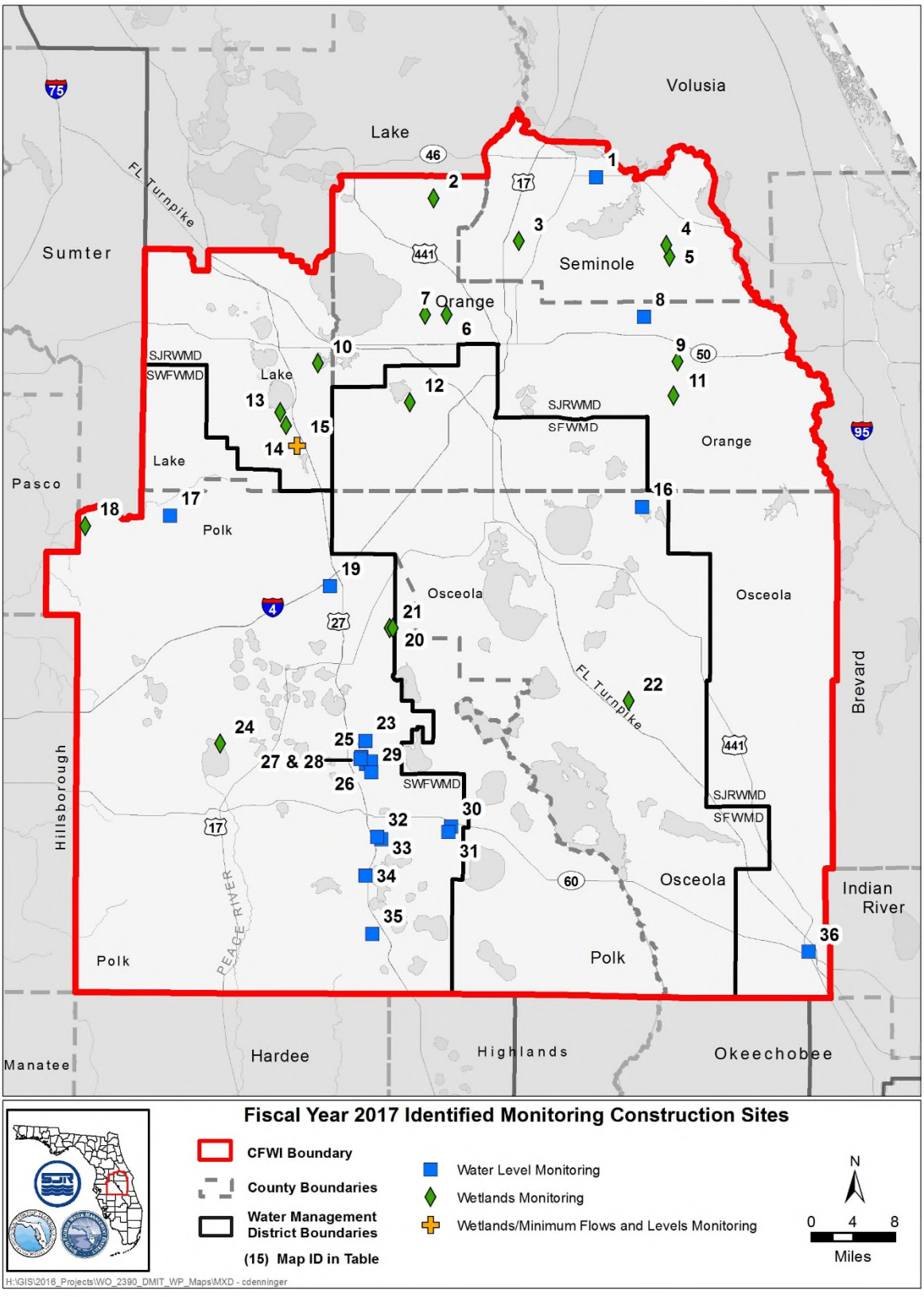


Figure 2. FY2017 identified monitoring construction sites in the CFWI region.

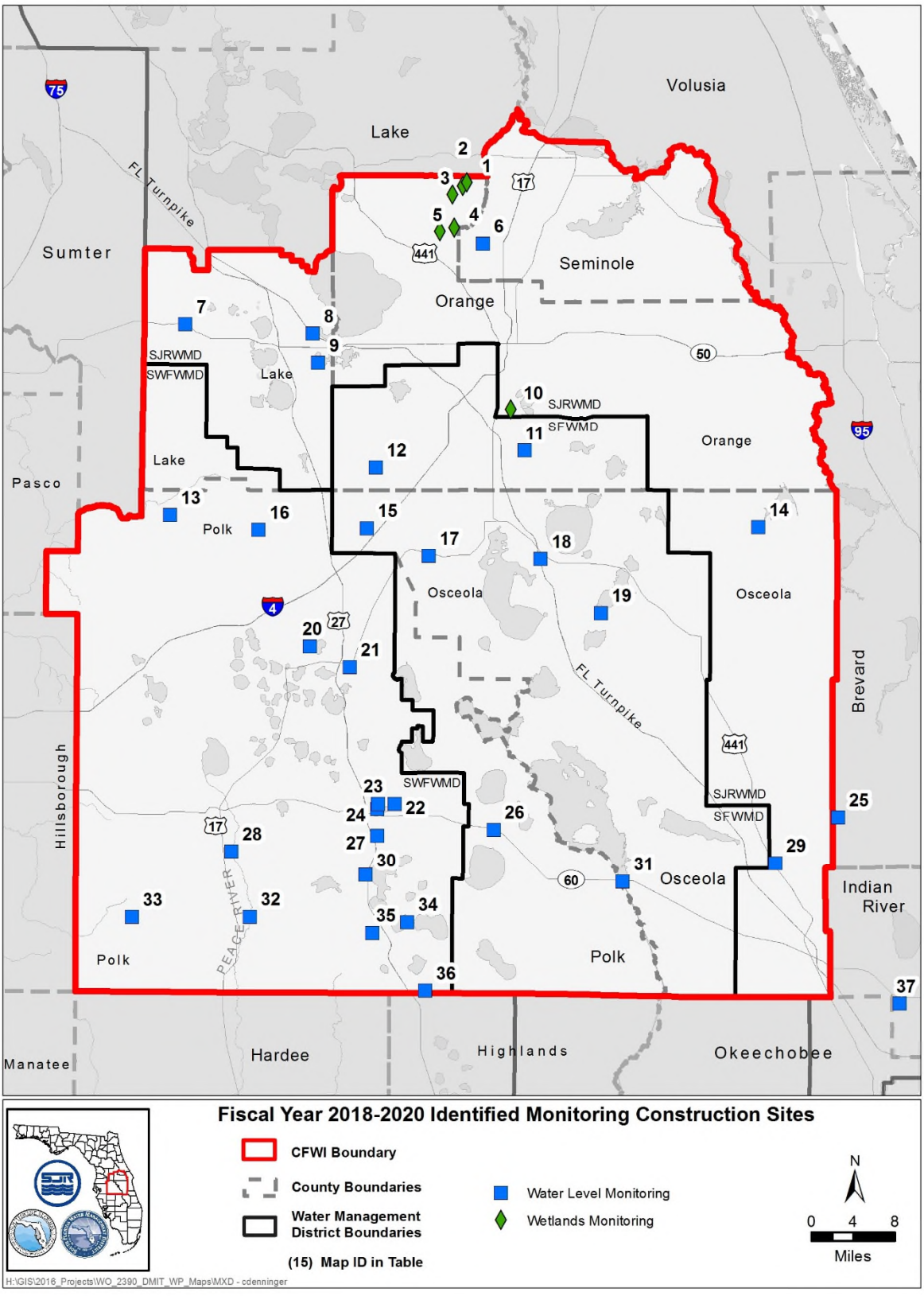


Figure 3. FY2018 to FY2020 identified monitoring construction sites in the CFWI region.

5.0 Summary of 2016 Work Plan Changes

The 2016 Work Plan represents a continuation of efforts started under the 2015 Work Plan. The 2016 Work Plan updates the construction schedule of identified well and wetland monitoring sites based on changes in site conditions, funding levels, and data priorities relative to the 2015 Work Plan. Changes in this 2016 Work Plan mainly are a result of site access and permitting issues, staffing and contractor availability, and new prioritization on gathering specific wetlands data before the end of 2017. Delivering updated wetland vegetation and water level data is driving much of the Districts' efforts through FY2016 and FY2017.

The number of wells identified for construction in the 2016 Work Plan remains relatively unchanged from the 2015 Work Plan. The number of projected wetland, UFA, and LFA well sites is expected to increase by two UFA wells. The number of future SA and IA wells will likely be adjusted as conditions at existing and future UFA monitoring sites are reviewed and field screened. Currently the number of new SA and IA wells is forecast to increase by three locations. The overall cost of program implementation is projected to decrease by $0.9 million, from $34.1 million to approximately $33.16 million. The decrease in the total cost estimate is a result of savings seen in FY2015 and FY2016 constructed wells and adjustments in well design.

In summary, the changes in the 2016 Work Plan include the following:

- An increased prioritization of wetland monitoring site construction for sites with existing historical water level records. This is proposed to be accomplished through maximizing existing District control sites and cooperative efforts with permittees.
- A decrease of $0.9 million in overall program implementation costs.
- A GIS analysis to identify additional SA sites is postponed until FY2017 to focus resources on wetland site construction. Details of the analysis will provided in future work plan updates.
- An increase in SA wells (3) to be paired with existing UFA sites is projected. Future screening of the SA sites likely will result in this number fluctuating in future plan updates.
- An increase in the construction of two UFA wells.

The 2016 Work Plan is seen as an opportunity to refocus resources to 1) address immediate data needs, 2) keep activities on track, and 3) account for limited District staff resources. However, the proposed changes are not without risks. With the exception of wetlands data gathering, the identified changes place additional pressure on increasing the rate of construction at deeper well sites from FY2017 through FY2020. For some of the Districts, additional construction activities may not be possible because of a limited number of drilling contractors with the equipment and capabilities to complete deeper exploratory wells. Moreover, the increased construction activities may require additional consulting services for project design and oversight. Costs associated with these factors are not addressed and could result in additional expenses.

This 2016 Work Plan details an implementation plan that considers current levels of District staffing and reasonable budgeting goals absent possible state legislative funding assistance. It identifies complete construction of the major well components before the end of FY2020 as requested by the SC. The 2016 Work Plan was prepared under the assumption that the Districts would take on a management role in

implementing the plan; however, it is recognized that current levels of District staffing and funding are not sufficient for timely implementation within the 5-year time frame. Completion of the 2016 Work Plan for some of the Districts depends on obtaining outside funding assistance, partnering with local governments, and using consulting services.

At the guidance of District management, this 2016 Work Plan was compiled to reflect an effort to stay the course and complete work by the end of FY2020. This will require additional upfront planning pertaining to the issues of site acquisition/access and uninterrupted funding. **Table 1** shows the completed efforts from FY2015 and the proposed efforts through FY2020. Total implementation costs are a combination of construction, real estate, and consulting costs for the 5-year completion period. The annual and total cost of implementing the 2016 Work Plan is provided in **Table 2**.

Table 1. Summary of 2016 Work Plan monitoring goals.

Fiscal Year	Wetland Sites	SA/IA Wells	UFA/APPZ Wells	LFA Wells	Annual Total
2015*	0	2	2	1	**5**
2016	19	11	8	2	**40**
2017	27	20	11	4	**62**
2018-2020	61	87	19	22	**189**
Total	**107**	**120**	**40**	**29**	**296**

*2015 are completed activities. APPZ = Avon Park Permeable Zone; IA = intermediate aquifer; LFA = Lower Floridan aquifer; SA = surficial aquifer; UFA = Upper Floridan aquifer.

Table 2. Summary of 2016 Work Plan implementation costs.

Fiscal Year	Total Implementation Costs (in millions)
2015*	$0.55
2016	$2.04
2017	$9.43
2018-2020	$21.14
Total	**$33.16**

*2015 are completed activities.

6.0 Funding

The construction of monitoring sites can be a large financial commitment over a multi-year period. Long-range forecasted costs through FY2020 have been prepared in accordance with the proposed construction schedule. The availability of funding to match the annual cost estimates is important to maintaining the schedule; insufficient funding support could delay project completion. Efforts not funded during the proposed fiscal year will be postponed to a following year to allow construction of higher priority sites. Aggressive funding more funding than currently estimated for each fiscal year will not substantially speed up the construction schedule for the deeper wells. Site acquisition and the limited number of capable drilling contractors also constrain the number of construction activities possible.

7.0 Activities Not Included in Work Plan Update

At the direction of the SC, District staff time were not to be included in the total cost of implementing the DMIT work plans. It should be noted that there are several design, project management, report preparation, and annual monitoring activities that require District resources and are not addressed under the costs associated with this 2016 Work Plan. Unless consultants are utilized for these activities, District resources are used to complete these efforts. District staff time related to project design, geologic interpretation, site identification, project management, site inspection, and other elements can run into tens or hundreds of hours for a multi-year construction project and are in addition to those expenses listed in this report.

The largest costs not accounted for in this 2016 Work Plan are those associated with annual monitoring and maintenance of equipment. At full implementation, the plan is expected to construct or otherwise upgrade more than 296 monitoring stations, each requiring data downloading and maintenance. Annual monitoring and maintenance of a new station can range substantially based on site conditions and data collected, but each station (data stream) is thought to have a median cost near $1,500 per site per year. A 5-year operation and maintenance budget for a single monitoring site can easily exceed $7,500. A preliminary estimate for additional annual costs associated with monitoring these sites could add more than $2 million over the course of 5 years. The responsibilities of annual monitoring and maintenance become that of the respective water management district or permittee at the completion of this work plan. This is a real expenditure and should be addressed in the appropriate agency operating budget.

8.0 Ongoing DMIT Activities

The 2016 Work Plan provides the details for implementing the minimum option for groundwater level monitoring sites identified in the Summary Report. In addition to that work, the Summary Report specifies several other DMIT responsibilities. Other tasks occurring over the course of the work plan duration include the following:

- Updating and expanding the number of sources in the current DMIT Data Inventory created in 2014 – update due after FY2018;
- Completing a GIS analysis and field verification process to verify the locations of potential SA monitoring sites for pairing with existing UFA stations – scheduled to start in FY2017;
- Identifying and acquiring legal access to future monitoring locations;
- Reviewing data-gathering goals and reporting the status of DMIT activities annually;
- Facilitating coordination of new information on aquifer characteristics to the Hydrologic Assessment Team for model calibration;
- Developing and updating uniform electronic database for storing field reports and digital media associated with each wetland site;
- Updating the annual work plan to address changes in construction activities and costs and to report the progress of ongoing activities; and
- Providing other support services to the CFWI effort as requested.

Appendix

Table A-1. Estimated construction and testing costs for FY2016.

Site Name	Map ID	Total Number of New Well(s)	Well Type(s)	Estimated Costs	Status
Lake Sylvan	1	0	N/A	Staff time	Work completed
Lake Proctor	2	1	1 SA	$4,295	Work completed
Duda-Whittle	3	1	1 LFA	$134,695	LFA construction in progress
Minneola	4	1	1 UFA, APT testing	$19,560	SA well on site, UFA well and APT completed
Lake Sunset	5	0	N/A	Staff time	Wetland monitoring transects completed; SA well constructed; a future UFA well will be constructed by City of Mascotte after FY2017 under their water use permit
Pine Island /SJR	6	2	1 SA, 1 UFA	$25,000	
Green Swamp Bay	7	1	1 SA	$27,941	Green Swamp Wilderness Preserve East Tract
East Pine Island – Shingle Creek Basin	8	2	2 SA, rainfall, wetlands survey	$22,500	Newly specified site
World Gateway	9	1	1 SA	$5,000	Current water level monitoring station
Deseret Ranch/Lk Myrtle	10	0	1 UFA, 1 LFA, 1 SA, 1 IA	$250,000	canal property, start of LFA in 2016
Green Swamp 7	11	1	1 SA	$27,941	Green Swamp Wilderness Preserve East Tract; 1A Depressional Mesic
Green Swamp 4	12	1	1 SA	$27,941	Green Swamp Wilderness Preserve East Tract; Existing UFA well on site, 2A-M Large Isolated
Intercession City	13	1	1 SA	$7,500	Current water level monitoring station; one new SA proposed
River Lakes Cons Area	14	3	1 SA, 1 IA, 1 UFA, Core	$46,760	Wells completed February 2016
Alston Cypress 2	15	1	1 SA	$27,941	ZephyrHillsGap_1A_WellSID18841 Active
Alston Bay	16	1	1 SA	$27,941	ZephyrHillsGap_2A-M_WellSID18839Active
NE Lakeland J	17	1	1 SA	$27,941	Newly specified site
NE Lakeland D	18	1	1 SA	$27,941	Newly specified site
NE Lakeland G	19	1	1 SA	$27,941	Newly specified site
OSF-53 – rehabilitation	20	3	1 UFA, 1 IA, 1 SA	$70,000	SFWMD property at S-53 structure
Lake Marion Creek	21	2	2 SA	$22,500	New station
Auburndale (ROMP 75)	22	1	1 LFA II	$452,405	LFA II construction summer 2016; existing SA at site
Bull Creek WMA-North Wetland	23	3	1 SA, 1 IA, 1 UFA	$151,903	Work completed
Bull Creek WMA-South Wetland (SJ-JI)	24	3	1 SA, 1 IA, 1 UFA	$45,604	Work completed

Table A-1. (Continued)

Site Name	Map ID	Total Number of New Well(s)	Well Type(s)	Estimated Costs	Status
Eagle Lake	25	2	1 SA, 1UFA	$107,049	Tentative agreement with landowner
Lake McLeod	26	1	1 SA	$35,461	Tentative agreement with landowner
Lake Amoret	27	2	1 SA, 1 UFA	$107,049	Tentative agreement with landowner
Lake Easy	28	1	1 SA	$35,461	Preparing license agreement
Campbell (Escape) Ranch	29	0	Core	$120,000	New site; LFA proposed for FY2018
Prince Parcel	30	1	1 SA	$5,000	
2 wetland sites (SFWMD)	N/A	2	N/A	$150,000	Locations TBD
Subtotal for FY2016		**41**		**$2,41,270**	

APT = aquifer performance test; FY = fiscal year; IA = intermediate aquifer; LFA = Lower Floridan aquifer; MFL = minimum flow and level; N/A = not applicable; SA = surficial aquifer; SFWMD = South Florida Water Management District; TBD = to be determined; UFA = Upper Floridan aquifer; WL = water level.

Table A-2. Estimated construction and testing costs for FY2017.

Site Name	Map ID	Total Number of New Well(s)	Well Type(s)	Estimated Costs	Status
West of Lake Jessup	1	4	Core / SA, IA, UFA, LFA	$432,000	
Rock Springs Run	2	1	1 SA	$5,000	A proposed MFL SA monitoring well; Rock Springs State Preserve
Island Lake	3	0	N/A	Staff time	The site is a OUC Monitoring Site; site recon needed to confirm suitability; existing SA well
Big-Little Econ State forested – small isolated	4	1	1 SA	$5,000	FDOT Property
Big-Little Econ State forested – slough wetland	5	1	1 SA	$5,000	FDOT Manager/SJRWMD Property
Crooked Lake (Orange County)	6	0	N/A	Staff time	Existing SA permittee well, Orange County property
Prairie Lake (SJ-GA)	7	0	1 SA	Staff time	City of Ocoee Property; OUC CUP Monitoring Site; existing SA Well, staffing costs only.
Econ Sandhills	8	1	1 LFA	$300,000	Continuation of work from FY2015
Long Branch	9	0	N/A	Staff time	Existing SA well; site recon needed to confirm suitability
Johns Lake - Scrub Point Preserve (Lake County)	10	1	1 SA	$5,000	Lake County Water Authority Property
Hal Scott Preserve – floodplain	11	1	1 SA	$5,000	Orange County Property
Keene's Pt Park	12	1	1 SA	$22,500	Current monitoring agreement with Orange County needs updated
Lake Louisa State Park (SJ-JB)	13	1	1 SA	$5,000	
Dixie Lake (SJ-HO) – Lake Louisa State Park	14	1	1 SA	$5,000	FDEP Parks and Recreation
N Boggy Marsh	15	2	1 SA, 1 UFA	$30,000	FFWCC Wetland Site with a proposed MFL site
Deseret Ranch/Lk Myrtle	16	4	1 UFA, 1 LFA, 1 SA, 1 IA	$1,100,000	Start of LFA in 2016; remaining wells and testing in FY2017
ROMP 88 – Rock Ridge (Green Swamp West)	17	0	Coring/ Testing	$450,362	Coring only for early FY2017 start (delayed because of expanding R131.5 scope)
Colt Creek 1	18	1	1 SA	$27,941	WellSID816358 Active, FDEP managed
Thornhill Deep Near Davenport	19	2	1 SA, 1 UFA	$139,059	Site acquisition is ongoing – agreement for upland easement for State lands in process
Lake Marion Creek 1	20	1	1 SA	$27,941	Lake Marion Creek Horseshoe Scrub Tract; 2F Floodplain

Table A-2. (Continued)

Site Name	Map ID	Total Number of New Well(s)	Well Type(s)	Estimated Costs	Status
Lake Marion Creek 2	21	1	1 SA	$27,941	Lake Marion Creek Horseshoe Scrub Tract; 1C Seepage
Camp Lonesome (Osceola County)	22	1	1 SA	$22,500	
Lake Annie	23	2	1 SA, 1 UFA	$432,168	Site re-scheduled from FY2015 due to site acquisition; location estimated
Lake Hancock 1	24	1	1 SA	$27,941	
Lake Lee	25	1	1 SA	$35,461	MFL location
Lake Venus	26	1	1 SA	$35,461	MFL location
Lake Mabel	27	1	1 SA	$35,461	MFL location
Dinner Lake	28	1	1 SA	$35,461	MFL location
Lake Starr	29	2	1 SA, 1 UFA	$107,049	MFL location
Lake Aurora	30	2	1 SA, 1 UFA	$107,049	MFL location
Little Aurora	31	1	1 SA	$35,461	MFL location
Lake Wales (P280)	32	2	1SA,1 UFA, 1 temp LFA II	$1,150,000	
Lake Josephine	33	1	1 SA	$35,461	Site acquisition is ongoing; MFL location
Crooked Lake (P280)	34	2	1 SA, 1 UFA, temp LFA II	$2,040,000	Temp LFA well and testing
Frostproof (P280)	35	2	1 SA, 1 UFA, temp LFA II	$2,040,000	In design, bidding in June, Fall 2016 start
Yeehaw Junction	36	4	Core / SA, IA, UFA, LFA	$437,000	
5 wetland sites (SFWMD)	N/A	5	1 SA	$150,000	TBD
4 wetland sites (SWFWMD)	N/A	4	2 SA	$111,764	TBD
Subtotal for FY2017		**57**		**$9,430,981**	

CUP = consumptive use permit; FDEP = Florida Department of Environmental Protection; FDOT = Florida Department of Transportation; FFWCC = Florida Fish and Wildlife Conservation Commission; FY = fiscal year; IA = intermediate aquifer; LFA = Lower Floridan aquifer; MFL = minimum flow and level; N/A = not applicable; OUC = Orlando Utility Commission; SA = surficial aquifer; SFWMD = South Florida Water Management District; SJRWMD = St. Johns River Water Management District; SWFWMD = Southwest Florida Water Management District; TBD = to be determined; UFA = Upper Floridan aquifer; WL = water level.

Table A-3. Estimated construction and testing costs for FY2018 to FY2020.

Site Name	Map ID	Total Number of New Well(s)	Well Type(s)	Estimated Costs	Status
Rock Springs State Preserve (SJ-FB4)	1	1	1 SA	$5,000	A proposed MFL with SA monitoring well; Rock Springs State Preserve
Rock Springs State Preserve, Isolated Marsh	2	1	1 SA	$5,000	A proposed MFL with SA monitoring well; Rock Springs State Preserve
Rock Springs State Preserve, Seepage Wetland	3	1	1 SA	$5,000	A proposed MFL with SA monitoring well; Rock Springs State Preserve
Wekiva River Swamp-Wekiva Springs State Park	4	1	1 SA	$5,000	A proposed MFL with SA monitoring well; existing UFA well on the site; Wekiva River State Park; site recon needed to confirm suitability
Lake Prevatt-Wekiva Springs State Park	5	0	N/A	Staff time	Existing SA and UFA wells on the site; Wekiva River State Park; site recon needed to confirm suitability
Lake Brantley	6	3	1 SA,1 IA, 1UFA	$50,000	MFL location
Lake Sunset	7	1	1 UFA	$14,000	Wetland monitoring and SA well previously completed in FY2016; this well will be constructed by City of Mascotte as required under their water use permit but will be reimburse by the District
L-0199	8	1	1 UFA	$30,000	MFL location
Johns Lake - Stucki Property (Orange County)	9	1	1 LFA, Core	$400,000	Lake County Water Authority property; FY2017
Bay Lake	10	1	1 SA	$5,000	Previous EMT Class II Wetland (SJ-KH1) monitoring site; site recon needed to confirm suitability
OUC – Air 19	11	1	1 UFA	$80,000	Existing SA, LFA
ORF-60	12	1	1 UFA	$91,000	Pairing UFA well with existing LFA
ROMP 88 – Rock Ridge (Green Swamp West)	13	3	1 SA, 1 LFA I, 1 LFA II	$1,646,241	Site testing of each aquifer horizon with temporary wells; early FY2017 start
North Osceola	14	3	Core / 1 SA, 1 IA, 1 UFA	$500,000	Newly identified; close to CFWI boundary
HH-2-IC	15	4	1 SA, 2 UFA	$1,285,000	
ROMP 88.5 – Northeast Polk	16	4	1 SA, 1 UFA, 1 LFA I, 1 LFA II	$2,299,433	Location still under review
Intercession City – UFA monitoring start	17	1	1 UFA	$15,000	Existing SA, IA, UFA and LFA wells on site
OSF-70 – St. Cloud	18	0	Testing only	$540,000	Existing SA
C-33	19	5	1 SA, 2 UFA, 2 LFA	$1,040,000	

Table A-3. (Continued)

Site Name	Map ID	Total Number of New Well(s)	Well Type(s)	Estimated Costs	Status
Lake Lowery	20	2	1 SA, 1 UFA	$107,049	MFL location
Lake Eva	21	2	1 SA, 1 UFA	$107,049	MFL location
Lake Bonnie	22	1	1 SA	$35,461	MFL location
North Lake Wales	23	1	1 SA	$35,461	
Crystal Lake	24	1	1 SA	$35,461	MFL location
Wolf Creek Ranch CA	25	4	Core / 1 SA, 1 IA, 1 UFA, 1 LFA	$400,000	
S.R. 60 near Lake Weo & Rosilie	26	4	1 SA, 1 UFA, 2 LFA	$1,035,000	
Lake Wales (P280)	27	3	2 LFA, 1LFA1,	$2,696,390	
Peace River at Bartow	28	1	1 SA	$35,461	
Campbell (Escape) Ranch	29	1	1 LFA	$250,000	
Crooked Lake (P280)	30	3	2 LFA II, 1 LFA	$1,806,390	Continue efforts from FY2017
OSF-52	31	1	1 LFA	$1,100,000	Existing SA
Peace River at Fort Meade	32	1	1 SA	$35,461	
ROMP 46 – Baird	33	4	1 SA, 2 UFA, 1 LFA	$1,550,467	
Clinch Lake	34	1	1 SA	$35,461	MFL location
Frostproof (P280)	35	3	2 LFA II, 1 LFA I	$1,806,390	Continuation of FY2017 drilling
Lake Trout	36	2	1 SA, 1 UFA	$107,049	MFL location
Prince Property	37	1	1 LFA, coring	$500,000	SA installed in FY2016
Regulatory/EMT Wetland Wells	N/A	5	5 SA	$140,705	TBD
20 SA sites TBD (SJRWMD)	N/A	20	20 SA	$100,000	TBD
15 SA sites TBD (SWFWMD)	N/A	15	15 SA	$75,000	TBD
21 SA sites TBD (SFWMD)	N/A	21	21 SA	$105,000	TBD
21 wetland sites (SJRWMD)	N/A	21	21 SA	$105,000	TBD
6 wetland sites (SFWMD)	N/A	6	6 SA	$135,000	TBD
28 wetland sites (SWFWMD)	N/A	28	28 SA	$782,348	TBD
Subtotal for FY2018-FY2020		**184**		**$21,137,277**	

CFWI = Central Florida Water Initiative; FY = fiscal year; IA = intermediate aquifer; LFA = Lower Floridan aquifer; MFL = minimum flow and level; N/A = not applicable; SA = surficial aquifer; SFWMD = South Florida Water Management District; SJRWMD = St. Johns River Water Management District; SWFWMD = Southwest Florida Water Management District; TBD = to be determined; UFA = Upper Floridan aquifer; WL = water level.