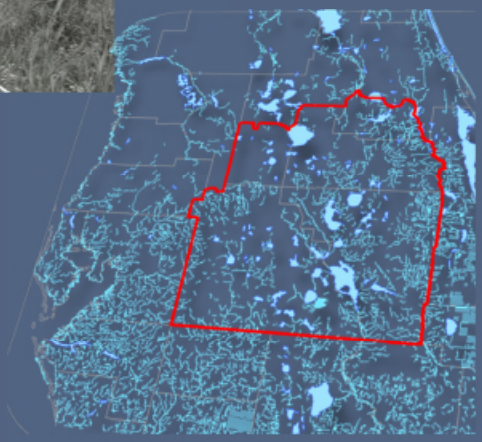

DMIT Hydrogeologic Work Plan for FY2015 – FY2020

Central Florida Water initiative

This document is the product of the Data Management and Investigations Team (DMIT) and describes efforts to further hydrogeologic testing and monitoring within the Central Florida Water Initiative covering the five county region of central Florida.

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CFWI DMIT Work Plan for FY2015 – FY2020

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 and to develop a strategy to meet existing and future consumptive use and environmental needs of the CFWI region. As part of the effort, a CFWI Guiding Document was developed that identified a work process and technical teams comprised of representatives of different CFWI stakeholders to collaboratively complete tasks identified in the guidance document. The guidance document created the Data, Monitoring, and Investigations Team (DMIT or Team) 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 the Management Oversight Committee (MOC) and Steering Committee (SC), the DMIT summarized data collection findings and activities within the CFWI region and prepared the "*CFWI Regional Monitoring Program: Summary Report*" (Summary Report). Final acceptance of the DMIT efforts was given by the SC at their meeting in June, 2014. The Summary Report document can be found on the CFWI website (www.cfwiwater.com). Following the acceptance of the Summary Report, the SC provided additional guidance to the DMIT to produce the Work Plan detailing an implementation strategy based on the Summary Report findings.

This Work Plan was produced by the DMIT and it fulfills directives set forth by the SC. The objective of the Work Plan is to describe a schedule for the construction and testing of existing and new data collection sites identified in the Summary Report as the minimum option of future data collection needs within the CFWI region. The Work Plan also identifies tasks for updating the existing data monitoring Inventory and GIS efforts for the identification of proposed but currently unidentified wetland and surficial aquifer monitoring locations. The Work Plan is proposed to be updated annually to include a review of site prioritization; to update costs for well construction, to update monitoring and testing proposed for each fiscal year; and to document work completed in preceding fiscal years. An annually updated Work Plan will provide a tool to convey information to the MOC and SC of the DMIT's progress to ensure data collection needs for the CFWI region are being met.

2.0 Previous Activities

The Summary Report provided general and specific findings for the development and expansion of a regional monitoring program within the CFWI region. As part of this effort, the DMIT surveyed water management district (WMD) and permittee resources to develop an "inventory" of existing and proposed data collection sites within the CFWI. The team reviewed monitoring networks for redundancies and deficiencies and defined minimum and optimum options for future data collection within the region. The report revealed that current data collection was reasonable but based upon interviews with the other CFWI technical teams; there was need for additional data collection to improve the regional network. The process used by the DMIT to develop these minimum and optimum options is fully described in the Summary Report found on the CFWI Water website at www.cfwiwater.com. General areas where data collection could

be improved were presented as priority circles identified in a series of figures (Figures 1, 2 and 3) found in the Summary Report.

Subsequent to the acceptance of the DMIT Summary Report, team members met with representatives of the SC who provided guidance on how best to move forward on the DMIT implementation plan. The SC's guidance on plan implementation included:

- Identify priority site locations for the DMIT minimum option,
- Consider possible associations between monitoring locations and the implementation schedule of potential water supply projects identified in the CFWI Solutions Team *Water Resource Protection and Water Supply Strategy Plan,*
- Revisit costs associated with fully implementing construction, testing, site acquisition and other expenses directly involved in implementation within a 5-year period.

2.1 DMIT Minimum Monitoring Option Implementation

The minimum monitoring option guidelines identified in the DMIT Summary Report were identified for the following monitoring sites:

- Wetland locations - *defined as one monitoring location per wetland type per physiographic region*
- Surficial Aquifer (SA) locations - *defined as the addition of a new SA well at all active and proposed Upper Floridan aquifer/Lower Floridan aquifer nested locations and the SA locations identified in the Summary Report Attachment 2*
- Upper Floridan and Lower Floridan aquifer locations - *defined for both monitoring horizons as the locations specified in the Summary Report Attachment 2*

The Summary Report identifies a number of guidance criteria and tools for the identification and prioritization of the minimum option possible monitor locations. The Summary Report further discusses completion of a desktop Geographical Information Systems (GIS) analysis to estimate the number of sites needed for each aquifer system and wetland implementation. The minimum option described in the Summary Report identifies monitoring in addition to the existing monitoring network of sites. It is assumed that current sites being monitored will continue to be monitored or replaced to maintain the level of available information.

As part of the development of this Work Plan there was a need to review the selection of certain previously identified monitoring locations for potential access restrictions and to further define implementation cost estimates. Further, the review allowed for the identification of potentially unsuitable sites and the development of a schedule for future construction of monitoring sites. As part of this review the guidance criteria described in the Summary Report were used in combination with other considerations including; known site access issues, updates to original DMIT Inventory, and the scheduling of potential water supply option projects (WSOP) being identified under the Solutions Planning effort. Attachment 2 of the Summary Report was also reviewed and updated using the most recent information.

The effort to review site conditions at possible monitoring locations resulted in the reduction in the number of potential monitoring sites from those originally identified in the Summary Report. The most significant change resulted in the reduction of potential surficial aquifer (SA) sites from 165 to 117 locations. This change resulted from a number of causes including incorrect information in the initial Data Inventory (wells previously identified as unmonitored); wells completed in FY14; and the removal of sites known to have access issues. In addition, a reduction of six locations specified Upper Floridan aquifer sites previously identified were a result from similar reasons. In order to replace many of these potential sites the DMIT has identified a GIS analysis for completion in FY2015 that will identify new SA and possible Upper Floridan aquifer sites. The intent of the GIS effort is to identify sufficient new monitor locations to meet the intent of the goals targeted in the original Summary Report. An overview of this GIS effort is provided in subsection 3.4 of this Work Plan.

2.2 Water Supply Option Projects

At the direction of the SC, a review of the preliminary schedule for implementation of WSOPs identified as part of the Solutions Team effort was conducted to address long term water supply availability. The review identified projects proposed for construction starts in the coming 5 to 10 year planning horizon. Those WSOPs identified for earlier implementation are located in central Osceola County and eastern Polk County. These projects were taken into consideration when developing a schedule for monitoring implementation.

2.3 Update on Well Construction Costs

Because the Work Plan presents a schedule for many of the actual locations for construction and testing activities, the Districts revised the program implementation costs based upon site specific conditions for each proposed monitoring location. The revised cost analysis was updated to account for differences in geology in central Florida, typical data gathering procedures completed during construction and testing, and outsourcing differences between the water management districts. The revised program implementation costs accounted for known site conditions at individual locations and incorporated actual budget costs from FY2015. The results of these were utilized in the development of the annual work tables shown in this Plan.

3.0 Site Prioritization

The objective of prioritizing monitoring sites included in the minimum option was to establish a schedule for construction of sites between fiscal years 2015 through 2020. The initial efforts by the DMIT to prioritize the minimum options in the Summary Report are shown as Attachment 2 in that report. The data collection sites listed in Attachment 2 are considered high priority to support adopted and proposed MFLs, characterize wetland response to hydrologic stress, further evaluate the Lower Floridan aquifer, and understand the hydrologic connection between the SA and the Upper and Lower Floridan aquifer systems. DMIT's methods used in prioritizing minimum option sites were different for each aquifer and a number of considerations were taken into account when prioritizing the sites. These are briefly described in subsections below.

In addition, sites proposed as part of the Hydrological Investigation of the Lower Floridan aquifer in Polk County (collectively known as P280 projects) that are managed by the SWFWMD are included in this Work Plan to meet the minimum option targeted well sites. The P280 project

locations currently include three sites and are part of this Work Plan as they align with the CFWI and DMIT objectives. The P280 project sites are designed to explore the Lower Floridan aquifer in Polk County to assess its hydrogeologic characteristics and to test the viability of the Lower Floridan aquifer as an alternative water supply source for Polk County. The construction of monitoring wells at each site will include a total of twelve permanent wells.

3.1 Surficial Aquifer

A survey of the existing data collection inventory was performed by the DMIT who identified a number of Upper Floridan and Lower Floridan aquifer data collection sites that did not have SA monitoring within a radial distance of 1,000 ft. This distance was considered reasonable to provide information on the hydraulic connection between the SA and Upper Floridan and Lower Floridan aquifer. Priority for the installation of these sites was associated with the locations of the greatest projected change in the surficial aquifer as identified from results of the East Central Florida Transient (ECFT) model for the years representing the 2005 to 2035 model simulations. Using both the model results and observations made on the location of existing SA data collection sites, the DMIT developed the priority circle map shown as Figure 1 in the Summary Report.

The targeted number for additional SA well sites presented as the minimum option in the Summary Report is 165. Of these, 57 locations are identified in the revised Attachment 2 and are given the highest priority. The remaining monitoring sites were identified to be constructed (nested) at existing Upper Floridan aquifer/Lower Floridan aquifer locations and were given a secondary priority. As discussed in subsection 2.1 above, many of these nested locations have access issues and limit the number of possible installation locations. The Work Plan identifies a total of 117 SA sites targeted for monitoring over the five-year period of construction. Additional SA sites may be identified as part of a GIS analysis described in subsection 3.4 if suitable replacement locations are found.

3.2 Upper Floridan Aquifer

The Summary Report identified regions for data improvements within the Upper Floridan aquifer in Orange, Osceola and Polk Counties. The proposed Upper Floridan aquifer sites are identified as high priority in the Summary Report and will be targeted first pending access and funding. Nine sites will be constructed to support MFLs, and three will be constructed as nested sites in support of the Hydrological Investigation of the Lower Floridan aquifer in Polk County project (P280) managed by the SWFWMD.

The target number for additional Upper Floridan aquifer well sites described as the minimum option in the Summary Report was 44 locations. When the Summary report was being drafted two of the sites were under construction and were completed in FY14 and two were mislabeled in the Data Inventory reducing the target to 40 sites. Upon further review, the highest priority well sites in the Upper Floridan aquifer were further reduced to 38 locations.

3.3 Lower Floridan Aquifer

The Summary Report identified areas for improved data collection in the Lower Floridan aquifer for portions of Polk, Lake and Osceola Counties. The addition of Lower Floridan aquifer sites in these counties 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 region. As water demands are increasingly expected to be met by water produced from Lower Floridan aquifer, the need becomes crucial to establish a viable monitoring network.

The target number for additional Lower Florida aquifer wells described as the minimum option in the Summary Report is 18, of which all are listed in Attachment 2. The Work Plan identifies a total of 29 potential Lower Floridan aquifer monitoring wells for construction at 17 sites. Three of the proposed monitoring locations (12 wells) are part of the Hydrological Investigation of the Lower Floridan Aquifer in Polk County project (P280) managed by the SWFWMD. The purpose of these multi-well sites is to test and monitor the Lower Floridan aquifer below the middle confining units I and II.

3.4 Wetland Prioritization

The Summary Report defined the minimum level of monitoring desired for wetland sites but did not provide further analysis to identify specific locations for future monitoring. The target for future wetland monitoring was discussed in the Summary Report in which it was identified that the monitoring standard for future wetlands should be similar to the Class I site qualities identified in the CFWI Environmental Measures Team (EMT) final report dated November, 2013. The Class I monitor site standard includes water level monitoring, vegetative and soil surveys and land surveying components. A copy of the EMT report can be found on the CFWIwater website at http://cfwiwater.com/pdfs/CFWI_Environmental_Measures_finalreport.pdf. Classes of wetlands data availability were identified as one of three standards which include:

- Class 1 included 44 wetlands that were studied in detail as part of the EMT investigation completed during the CFWI Planning phase. These sites have a minimum of 6-years of known hydrologic conditions (water level variability and wetland edge elevation), have collected soils and survey information, and have an assessment of the environmental condition to determine whether they are currently stressed or unstressed.
- Class 2 consisted of 313 sites where the environmental condition of the wetland is known, but there is insufficient water level data, soils, or survey work to classify their hydrologic conditions. The environmental review was sufficient to determine whether they are currently stressed or unstressed.
- For most of the remaining thousands of isolated and hydrologically unaltered wetlands in the region (Class 3), neither the water levels nor the stress conditions are known.

Based primarily upon the goal of improving Class I and II EMT sites, the following criteria was developed for ranking future wetland monitoring locations:

1. Wetlands locations identified in DMIT Attachment 2
2. EMT Class I wetland locations requiring QA/QC review or other updating
3. EMT Class II wetland locations currently monitored by permittees
4. EMT Class III wetland locations currently monitored by permittees
5. EMT Class II wetland locations not currently monitored
6. EMT Class III wetland locations to be identified through GIS

In addition to the above targeted wetland sites, a process to identify monitoring wetlands is proposed for completion by the second quarter of FY2015 and will include the following approach to determine priorities for implementation of a regional wetland monitoring program. The minimum for a wetland monitoring site is identified in the Summary Report as one location per wetland hydroclass type per physiographic region (roughly an additional 107 sites to the existing network).

The approach to determining a wetland monitoring site will generally be as follows:

1. Complete a GIS analysis that identifies monitoring sites by "intersecting" physiographic regions, existing SA locations and wetland coverage, areas susceptible to groundwater withdrawals, and wetland coverages.
2. As to the above map, overlay the proposed locations from the Revised Attachment 2.
3. The DMIT Summary Report recommended using the gap-analysis SA priority circles to develop ranking of locations.
4. Use the CFWI EMT inventory to see if potential priority locations exist in the Class I and Class II sites that satisfy the location requirements.
5. From the DMIT inventory identify permittee existing and proposed wetland monitoring stations to see if possible monitoring sites currently exist that might be upgraded to the EMT Class I standard.
6. Complete a GIS analysis to list public land ownership with the intent of constructing wetland monitoring station on these lands to minimize site access issues.

The GIS analysis described above will also be used to assist in the identification of alternative monitoring locations for SA and possible Upper Floridan aquifer sites. It is anticipated that a number of the sites identified may also provide locations for SA and Upper Floridan aquifer sites.

4.0 Proposed 5-Year Work Plan

The 5-Year Work Plan specifies the priorities for implementing the minimum option for fiscal years 2015 and 2016 and generalizes work scheduled for fiscal years 2017 through 2020. This Work Plan identifies specific well sites for fiscal years 2015 and 2016 and groups potential sites for construction during fiscal years 2017 through 2020. Construction activities for the period of FY2017 through FY2020 are grouped due to a number of factors that may influence site availability. The Work Plan also identifies a GIS analysis to identify a number of currently unidentified SA and wetland monitoring sites.

The proposed implementation schedule takes into account potential District funding and current staff availability. Implementation of this Work Plan is also predicated on obtaining assistance of local governments, water use permittees and potential funding from alternative sources. It should be noted that completion of the Work Plan within the 5-year timeframe is influenced by staffing, funding and site access constraints.

The Plan outlines a schedule for construction activities as a set of three tables and three maps representing FY2015, FY2016 and FY2017-2020. The larger construction sites may require

multiple years for completion of all the identified construction and testing activities. Each of the tables henceforth (Tables 1-3) lists only the estimated construction costs associated with the projected well construction and testing activities in that given fiscal year.

4.1 Fiscal Year 2015

Table 1 lists the permanent well sites scheduled to begin construction in fiscal year 2015. The table summarizes the costs associated with well construction materials, well drilling contractor costs, isotope sampling, aquifer performance tests (APTs), elevation surveys, wellhead completion, monitoring setup and a limited amount of other contracted services. The total cost to implement the fiscal year 2015 well construction activities and testing is estimated at $2.80 million.

In all, 13 new permanent wells are scheduled for construction in fiscal year 2015. Wells to be constructed include five surficial aquifer wells; five Upper Floridan aquifer wells; and three Lower Floridan aquifer wells below middle confining unit I. A brief description of each site is below. **Figure 1** shows the locations of the well sites to be monitored during fiscal year 2015.

In addition to the well construction sites listed in **Table 1**, five currently unidentified wetland monitoring locations are also proposed to be located and monitored during fiscal year 2015. The costs associated with these wetlands sites are anticipated to be about $50,000. These costs are currently unfunded for FY2015. These unfunded sites are not shown in **Table 1** or in **Figure 1** as their proposed locations are not yet identified.

Table 1. Well Construction and Testing Costs for Fiscal Year 2015

Site Name	Map ID	Total Number of Well(s)	Well Type(s)	Internal Construction Costs	Contractor/ Consultant Costs	Total Construction Costs
New SJR MFL site	N/A	2	1 SA, 1 UFA	$0	$0	$50,000
Crooked Lake (P280)	1	2	1 SA, 1 UFA	$0	$420,000	$420,000
Duda-Whittle	2	1	1 LFA I	$0	$0	$450,000
Econ Sandhills	3	3	1 SA, 1UFA, 1 LFA I	$0	$0	$450,000
Frostproof (P280)	4	2	1 SA, 1 UFA	$0	$420,000	$420,000
Lake Annie	5	2	1 SA, 1 UFA	$49,626	$356,601	$406,227
Pasture Preserve	6	1	1 LFA I	$0	$0	$450,000
Groveland Sunshine Water Plant	7	0	APT Testing	$0	$0	$150,000

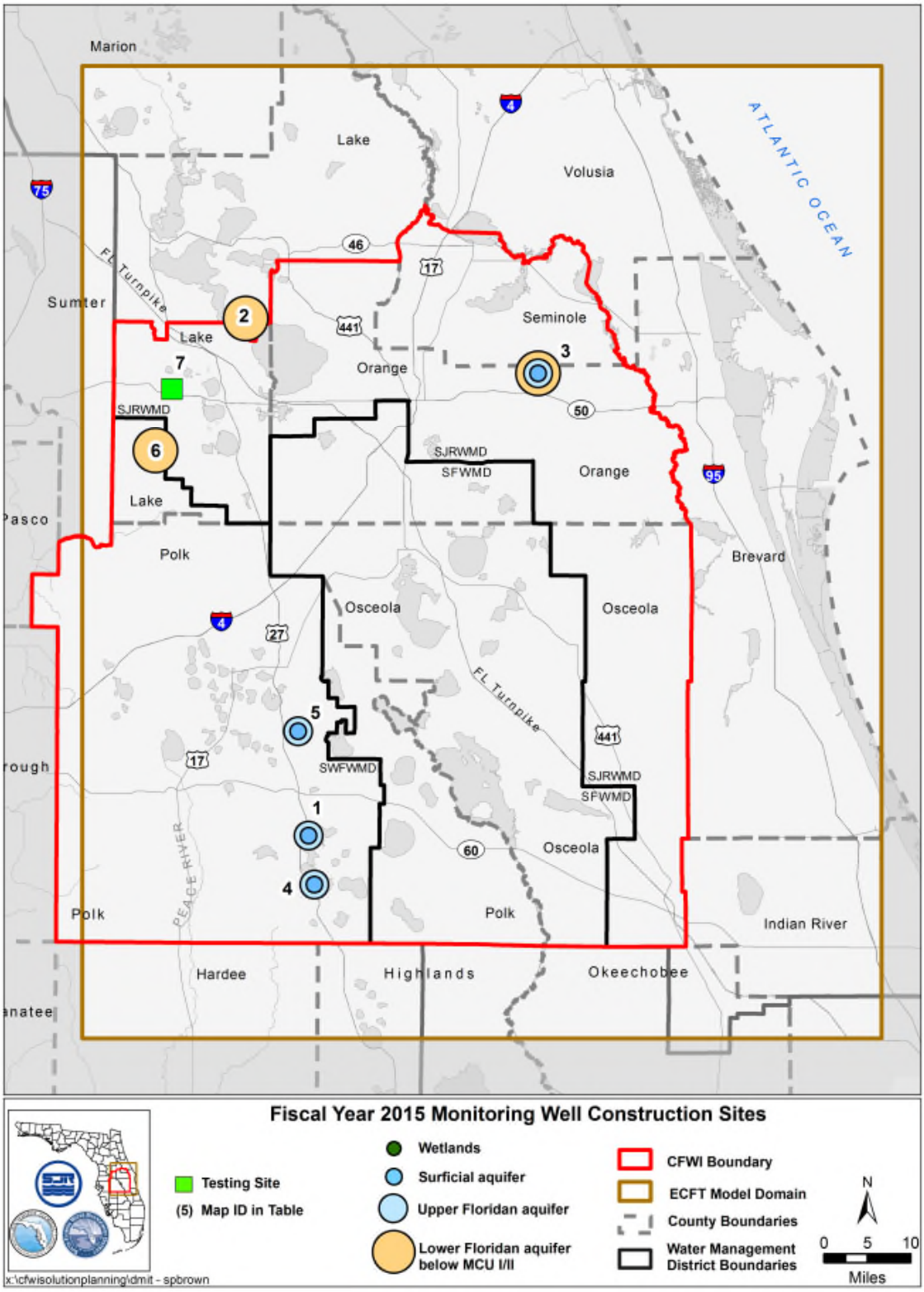

Figure 1. Fiscal Year 2015 Monitoring Well Construction Sites

Crooked Lake

This site is located in southeastern Polk County and requires well construction in surficial aquifer, Upper Floridan aquifer, and Lower Floridan aquifers below middle confining units I and II. The well site supports the data collection priority needs defined in the Summary Report to monitor all adopted and proposed MFL lakes within the CFWI region. The well site will be constructed as a nested site and is located in an area identified by the DMIT to have a deficient level of monitoring in the Upper and Lower Floridan aquifer. In addition, the well site supports the Hydrological Investigation of the Lower Floridan Aquifer in Polk County project (P280). Core drilling and an APT will be completed at this site. The well site will provide a detailed characterization of the surficial, Upper Floridan, Lower Floridan below middle confining units I and II, and will help determine the degree of hydraulic connection between the lake and the surficial, Upper Floridan and Lower Floridan aquifers. Well construction at this site is scheduled to be completed between fiscal years 2015 through 2018. It is expected that one surficial and one Upper Floridan well will be completed in fiscal year 2015.

Duda-Whittle

This site required the construction of a Lower Floridan aquifer well below middle confining unit I. The site is located in Central Lake County and has existing surficial and Upper Floridan aquifer wells. The well site supports the DMIT initiative to construct new nested well sites where practical and is located in an area identified by the DMIT to have a deficient level of monitoring in the Lower Floridan aquifer. The well site will provide a detailed characterization of the Lower Floridan aquifer and will help determine the degree of hydraulic connection between the Upper Floridan and Lower Floridan aquifers.

Econ Sandhills

This site is located in northeastern Orange County and requires well construction for the surficial, intermediate, Upper Floridan aquifer, and Lower Floridan aquifer below middle confining unit I. The well site supports the DMIT initiative to construct nested well sites where practical. The additional wells will provide a detailed characterization of the upper and lower horizons of the Floridan aquifer and will help determine the degree of hydraulic connection between these zones.

Frostproof

This site is located in southeastern Polk County and requires well construction in the surficial aquifer, Upper Floridan aquifer, and Lower Floridan aquifer below middle confining units I and II. The well site is located in an area identified by the DMIT to have a deficient level of monitoring in the Upper and Lower Floridan aquifers. In addition, the well site supports the Hydrological Investigation of the Lower Floridan Aquifer in Polk County project (P280). Core drilling and an APT will be completed at this site. The well site will provide a detailed characterization of the surficial, Upper Floridan, Lower Floridan below middle confining unit I and II, and will help determine the degree of hydraulic connection between the surficial, Upper Floridan and Lower Floridan aquifers.

Well construction at this site is scheduled to be completed between fiscal years 2015 through 2018. It is expected that one surficial aquifer and one Upper Floridan aquifer well will be completed in fiscal year 2015.

Lake Annie

This MFL site is located in southeastern Polk County and requires the construction of one surficial aquifer and one Upper Floridan aquifer well. The well site supports data collection priority needs defined in the Summary Report to monitor all adopted and proposed MFL lakes within the CFWI region. The well site will be constructed as a nested site and is located in an area identified by the DMIT to have a deficient level of monitoring in the Upper Floridan aquifer. The well site will provide a detailed characterization of the surficial and Upper Floridan aquifer and will help determine the degree of hydraulic connection between the lake and the surficial and Upper Floridan aquifers.

Pasture Preserve

This site requires the construction of a Lower Floridan aquifer well below middle confining unit I. The site is located in southern Lake County and has an existing surficial and Upper Floridan aquifer wells. The well site supports the DMIT initiative to construct new wells at existing nested well sites where practical and is located in an area identified by the DMIT to have a deficient level of monitoring in the Lower Floridan aquifer. The well site will provide a detailed characterization of the Lower Floridan aquifer and will help determine the degree of hydraulic connection between the surficial, Upper Floridan and Lower Floridan aquifer.

New SJR MFL Site

This site location is yet to be determined but will be at one of a number of MFL priority lakes identified by the SJRWMD. The wells are designed to support the data collection needs to address priority MFL lakes within the CFWI region. The well site will provide a detailed characterization of the surficial and Upper Floridan aquifers and will be part of a larger effort to determine the degree of hydraulic connection between the lake and the underlying aquifers.

Unidentified Regional Wetland Sites

Work for fiscal year 2015 includes monitoring for five currently unidentified wetland sites within the CFWI region. These sites will be identified from a GIS analysis proposed for completion in 2015. There will be one surficial aquifer well constructed per wetland monitoring site. Monitor wells are needed in the surficial aquifer in order to assess and understand the relationship between wetland conditions and hydrology.

Groveland Sunshine Water Plant

This is an existing well site located in Lake County. Core drilling and packer testing will be performed at this site in Lake County. Long term water level monitoring is not proposed for this site.

4.2 Fiscal Year 2016

Table 2 lists the well sites and associated costs of those permanent wells scheduled to begin construction in fiscal year 2016. The fiscal year 2016 costs associated with construction activities and testing is estimated at $6.57 million. Like the estimated costs for fiscal year 2015, the costs found in **Table 2** include well construction materials, well drilling contractor costs, isotope sampling, aquifer performance tests, elevation surveys, wellhead completion, monitoring setup and a limited amount of other contractual services. **Figure 2** shows the locations of projected construction activities for fiscal year 2016. The map shows continuing activities at certain

locations continued from fiscal year 2015 because certain sites are anticipated to require multiple years to complete.

In all, 29 new wells are scheduled for construction at 22 sites in fiscal year 2016; including nine surficial aquifer wells; nine Upper Floridan aquifer wells; two Lower Floridan aquifer wells below middle confining unit I; two Lower Floridan aquifer wells below middle confining unit II; and seven specified wetland monitoring locations. A brief description of each site is below.

In addition to the well construction sites listed in **Table 2**, nineteen currently unidentified wetland monitoring locations and eighteen unidentified SA sites are also proposed to be located and monitored during fiscal year 2016. The costs associated with these sites are projected to be on the order of $158,000. These sites are not shown in **Table 2** or in **Figure 2** as their proposed locations are not yet identified.

Table 2. Well Construction and Testing Costs for Fiscal Year 2016

Site Name	Map Id	Total Number of Wetland Sites	Total Number of New Well(s)	Well Type(s)	Internal Costs	Contractor / Consultant Costs	Total Costs
Auburndale	1	-	1	1 LFA II	$18,405	$434,000	$452,405
Crooked Lake (P280)	2	-	0	LFA II Testing/Production	-	$1,540,000	$1,540,000
Eagle Lake	3	-	1	1 SA	$6,020	$3,500	$9,520
West Lake Jessup	4	-	3	1 SA, 1 UFA, 1 LFA I	-	-	$450,000
Frostproof (P280)	5	-	0	LFA II Testing/Production	-	$1,540,000	$1,540,000
Lake Amoret	7	-	2	1 SA, 1 UFA	$14,209	$73,787	$87,996
Lake Easy	8	-	1	1 SA	$6,020	$3,500	$9,520
Lake Joel - Site A	9	-	4	1 SA, 1 UFA, 1 LFA I, 1 LFA II	-	-	$1,391,000
Lake Josephine	10	-	1	1 SA	$6,020	$3,500	$9,520
Lake McLeod	11	-	2	1 SA, 1 UFA	$14,209	$73,787	$87,996
ORF-60	12	-	1	1 UFA	-	-	$91,000
OUC - Air 19	13	-	1	1 UFA	-	-	$80,000
Tosahatchee	14	-	1	1 UFA	-	-	$70,000
Waverly or E. Bartow (P280)	15	-	2	1 SA, 1 UFA	$6,390	$420,000	$426,390
Lake David Estates	16	1	-	Wetland	-	-	$15,000

Table 2. Continued

Site Name	Map Id	Total Number of Wetland Sites	Total Number of New Well(s)	Well Type(s)	Internal Costs	Contractor / Consultant Costs	Total Costs
Oak Island Wetland Upgrade	17	1	-	Wetland	-	-	$15,000
Palms CC & Resort	18	1	-	Wetland	-	-	$15,000
SF-WH aka Summerlake	19	1	-	Wetland	-	-	$15,000
Summerport Village	20	1	-	Wetland	-	-	$15,000
Cane Island	21	1	-	Wetland	-	-	$15,000
Windsor Hills	22	1	-	Wetland	-	-	$15,000
SJR MFL Site-FY2016	N/A	-	2	1 SA, 1 UFA	-	-	$100,000

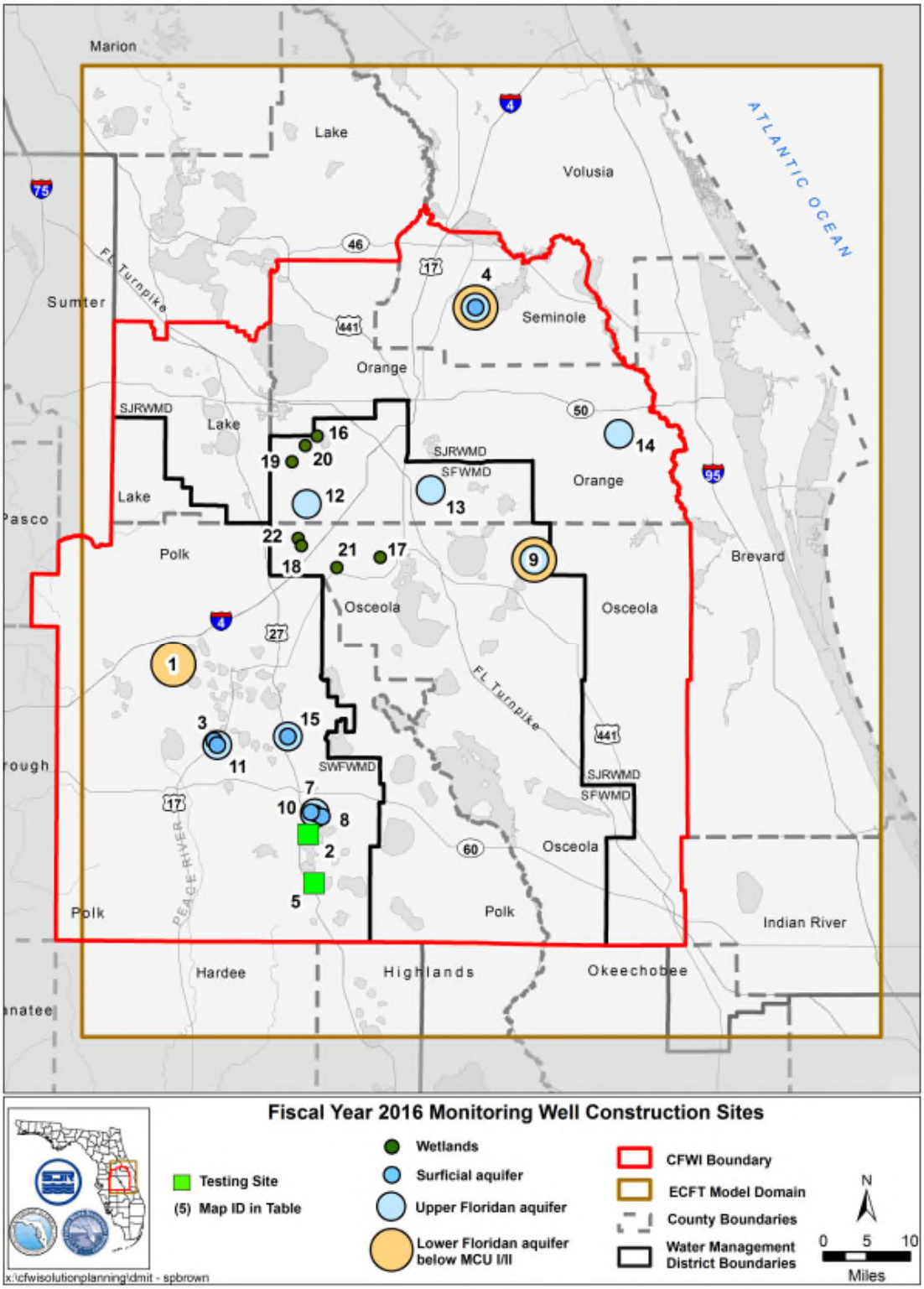

Figure 2. Fiscal Year 2016 Monitoring Well Construction Sites

ROMP 75 Auburndale

This well site requires the construction of a Lower Floridan aquifer well below middle confining unit II and is located in Polk County. The site has existing surficial and Upper Floridan aquifer wells. The well site will support the DMIT initiative to construct new wells at existing nested well sites where practical and is located in an area identified by the DMIT to have a deficient level of monitoring for the Lower Floridan aquifer. The well site will provide a detailed characterization of the Lower Floridan aquifer, will determine the geographical extent of the middle confining units I and II, and will help determine the degree of hydraulic connection between the surficial, Upper Floridan and Lower Floridan aquifers.

Eagle Lake and Lake McLeod

These SWFWMD MFL sites are located in central Polk County and require the construction of two surficial aquifer wells and one Upper Floridan aquifer well to support MFL development for both lakes. The well sites are in support of the data collection needs as defined in the Summary Report to monitor all adopted and proposed MFL lakes within the CFWI region. Because the two lakes are geographically close together, the Upper Floridan aquifer well at Lake McLeod will provide the necessary MFL support for both lakes. The well sites will provide a detailed characterization of the surficial and Upper Floridan aquifer and will help determine the degree of hydraulic connection between the lake and the surficial and Upper Floridan aquifers.

West Lake Jessup

This site proposes the construction of a surficial, intermediate, Upper Floridan aquifer and Lower Floridan aquifer wells located in Seminole County. The site supports the DMIT initiative to construct nested well sites where practical and this location west of Lake Jessup will provide a detailed characterization of the connection between the surficial, Upper Floridan, and Lower Floridan aquifers and characterizewater quality in the region.

Lake Amoret, Lake Easy, and Lake Josephine

These MFL sites are located in Polk County and require the construction of three surficial aquifer wells and one Upper Floridan aquifer well. The well sites are in support of the data collection needs as defined in the Summary Report to monitor all adopted and proposed MFL lakes within the CFWI region. Because the three lakes are geographically close together, the Upper Floridan aquifer well at Lake Amoret will also provide the necessary MFL support for Lake Easy and Lake Josephine. The well sites will provide a detailed characterization of the surficial and Upper Floridan aquifer and will help determine the degree of hydraulic connection between the lake and the surficial and Upper Floridan aquifers.

Lake Joel

This site is located in northeastern Osceola County and proposes well construction for the surficial aquifer, Upper Floridan aquifer and Lower Floridan aquifer below middle confining unit I. The well site is located in an area identified by the DMIT to have a deficient level of monitoring in the Lower Floridan aquifer. Two APTs are proposed for completion at this site. The well site will provide a detailed characterization of the surficial, Upper Floridan, Lower Floridan below middle confining unit I, and will help determine the degree of hydraulic connection between the lake and the surficial, Upper Floridan and Lower Floridan aquifers.

ORF-60

This site requires the construction of an Upper Floridan aquifer site and is located in southeastern Orange County. The site has an existing surficial and lower Floridan wells and supports the DMIT initiative to construct new wells at existing nested well sites where practical. The well site will provide a detailed characterization of the Upper Floridan aquifer and will help determine the degree of hydraulic connection between the surficial and Upper Floridan aquifer.

OUC

This site requires the construction of an Upper Floridan aquifer site and is located in Orange County. The site has an existing surficial and lower Floridan wells and supports the DMIT initiative to construct new wells at existing nested well sites where practical. The well site will provide a detailed characterization of the Upper Floridan aquifer and will help determine the degree of hydraulic connection between the surficial, Upper Floridan and Lower Floridan aquifers.

Tosahatchee

This site requires the construction of an Upper Floridan aquifer and is located in eastern Orange County. The site has an existing surficial well and supports the DMIT initiative to construct new wells at existing nested well sites where practical. The well site will provide a detailed characterization of the Upper Floridan aquifer and will help determine the degree of hydraulic connection between the surficial and Upper Floridan aquifer.

Waverly or East Bartow

These sites are located in central Polk County and will require well construction for the surficial aquifer, Upper Floridan aquifer and Lower Floridan Aquifer below middle confining units I and II. The two sites are both currently under review and only one will be selected for construction and testing. Both sites are located in an area identified by the DMIT to have a deficient level of monitoring in the Upper and Lower Floridan aquifers. In addition, both sites are proposed as part of the Hydrological Investigation of the Lower Floridan Aquifer in Polk County project. Core drilling and an APT will be completed at these sites. The sites will provide a detailed characterization of the surficial, Upper Floridan, Lower Floridan below middle confining unit I and II, and will help determine the degree of hydraulic connection between the lake and the surficial, Upper Floridan and Lower Floridan aquifers.

The well construction at this site is scheduled to be completed between fiscal years 2016 through 2019. The tables listing site activities and costs reflect the amount anticipated to be spent on well construction and testing for each fiscal year.

FY2016 SJR MFL Site

This site location is yet to be determined but will be at one of a number of MFL priority lakes identified by the SJRWMD. The wells are designed to supports the data collection needs adopted and proposed MFL lakes within the CFWI region. The well site will provide a detailed characterization of the surficial and Upper Floridan aquifer and will be part of a larger effort to determine the degree of hydraulic connection between the lake, the surficial and Upper Floridan aquifer.

Regional Wetland Sites Identified

There are a total seven identified wetland sites to be added to the network between all three Districts in fiscal year 2016. Each site is defined to collect the type of information identified to make it an EMT Class I level data collection site. This typically involves the construction of a surficial monitoring well, vegetative and land surveys and soils evaluations. Monitor wells are needed in the surficial aquifer in order to assess and understand the long term water level relationship between wetland conditions and hydrology.

Unidentified Regional Wetland and SA Sites

There are nineteen wetland and eighteen SA monitoring sites identified for construction in fiscal year 2016 but not shown in **Table 2**. These sites are in addition to those locations identified but there locations will be identified using the proposed GIS analysis proposed for completion in fiscal year 2015. These locations of these sites will be identified in future Work Plan updates.

There are 200 plus permanent wells that are identified for construction during fiscal years 2017 through 2020. Of these locations, 74 well projects have been identified leaving 133 wetland and SA locations yet to be identified during this period. **Table 3** lists the number of identified permanent wells for each monitoring type and costs for implementation period of fiscal years 2017 through 2020. The order for construction of these sites is not set and will be controlled to a degree by site access and permitting constraints. The costs are projected and it is anticipated that these costs could change before construction begins. **Figure 3** shows the locations of scheduled well sites.

In addition to the well construction sites listed in **Table 3**, 76 currently unidentified wetland monitoring locations and 57 unidentified SA sites are also proposed to be located and monitored during fiscal years 2017 through 2020. The costs associated with these sites are projected to be on the approximately $892,000 for those years. These sites are not shown in **Table 3** or in **Figure 3** as their proposed locations are not yet identified.

The total project costs directly involved in implementing this Work Plan include the construction costs, consulting services and real estate associated services. The sections below briefly describe how estimates for consulting and real estate costs were developed and applied to the schedule. Construction costs were discussed in Section 4 previously. Also discussed below are annual monitoring costs and District staff time. These are real costs to the project implementation but are not included in the total cost summary.

4.3 Fiscal Years 2017 through 2020

There are 200 plus wells that are identified for construction during fiscal years 2017 through 2020. Of these locations, 74 well projects have been identified leaving 133 wetland and SA locations yet to be identified during this period. **Table 3** lists the number of identified wells for each monitoring type and costs for implementation period of fiscal years 2017 through 2020. The order for construction of these sites is not set and will be controlled to a degree by site access and permitting constraints. The costs are projected and it is anticipated that these costs could change before construction begins. **Figure 3** shows the location of scheduled well sites.

In addition to the well construction sites listed in **Table 3**, 76 currently unidentified wetland monitoring locations and 57 unidentified SA sites are also proposed to be constructed and monitored during fiscal years 2017 through 2020. The costs associated with these sites are anticipated to be $892,000. These sites are not shown in **Table 3** or in **Figure 3** as their proposed locations are not yet identified.

Table 3. Well Construction and Testing Costs for Fiscal Year 2017 thru 2020

Site Name	Map Id	Total Number of Wetland Sites	Total Number of New Well(s)	Well Type(s)	Internal Costs	Contractor/ Consultant Costs	Total Costs
Lake Aurora	1		2	1 SA, 1 UFA	$14,209	$73,787	$87,996
Lake Starr	2		2	1 SA, 1 UFA	$14,209	$73,787	$87,996
Little Aurora	3		1	1 SA	$6,020	$3,500	$9,520
Lake Mabel	4		1	1 SA	$6,020	$3,500	$9,520
Lake Venus	5		1	1 SA	$6,020	$3,500	$9,520
Dinner Lake	6		1	1 SA	$6,020	$3,500	$9,520
Lake Lee	7		1	1 SA	$6,020	$3,500	$9,520
Lake Eva	8		2	1 SA, 1 UFA	$14,209	$73,787	$87,996
Lake Lowery	9		2	1 SA, 1 UFA	$14,209	$73,787	$87,996
Lake Bonnie	10		1	1 SA	$6,020	$3,500	$9,520
Crystal Lake	11		1	1 SA	$6,020	$3,500	$9,520
North Lake Wales	12		1	1 SA	$6,020	$3,500	$9,520
Clinch Lake	13		1	1 SA	$6,020	$3,500	$9,520
Green Swamp	14		4	1 SA, 1 UFA, 1 LFA I, 1 LFA II	$55,869	$1,218,828	$1,274,697
Frostproof (P280)	15		2	2 dual zone wells; 1 LFA I, 1 LFA II	-	$1,886,390	$1,886,390
Crooked Lake (P280)	16		2	2 dual zone wells; 1 LFA I, 1 LFA II	-	$1,886,390	$1,886,390
Waverly or E. Bartow (P280)	17		4	1 LFA III Testing/Production, 2 dual zone wells; 1 LFA I, 1 LFA II	-	$3,420,000	$3,420,000
Lake Trout	18		2	1 SA, 1 UFA	$14,209	$73,787	$87,996
EMT Wetland Wells REG	19	5		Wetlands	$1,000	$10,000	$11,000

Table 3. Continued

Site Name	Map Id	Total Number of Wetland Sites	Total Number of New Well(s)	Well Type(s)	Internal Costs	Contractor/ Consultant Costs	Total Costs
Baird/ROMP 46	20		4	1 SA, 2 UFA, 1 LFA II	$610,267	$935,200	$1,545,467
Peace River at Bartow	21		1	1 SA	$6,020	$3,500	$9,520
Peace River at Fort Meade	22		1	1 SA	$6,020	$3,500	$9,520
OSF-70 - St Cloud	23		0	Testing Only	-	-	$540,000
Intercession City - UFA monitoring start	24		1	1 UFA	-	-	$15,000
C-33	25		5	1 SA, 2 UFA, 1 LFA I, 1 LFA II	-	-	$1,040,000
HH-2-IC	26		5	1 SA, 2 UFA, 1 LFA I, 1 LFA II	-	-	$1,285,000
OSF-52	27		1	1 LFA I	-	-	$1,100,000
SR60 near Weo	28		4	1 SA, 1 UFA, 1 LFA I, 1 LFA II	-	-	$1,035,000
Prince Property	29		2	1 SA, 1 LFA I	-	-	$1,100,000
River Conservation Site	30		3	1 SA, 1 UFA, 1 LFA I	-	-	$150,000
SJR WMD Priority Sites (3 locations)	N/A		7	3 SA, 3 UFA, 1 LFA I	-	-	$1,200,000
SJR MFL sites (4 locations)	N/A		8	4 SA, 4 UFA	-	-	$400,000

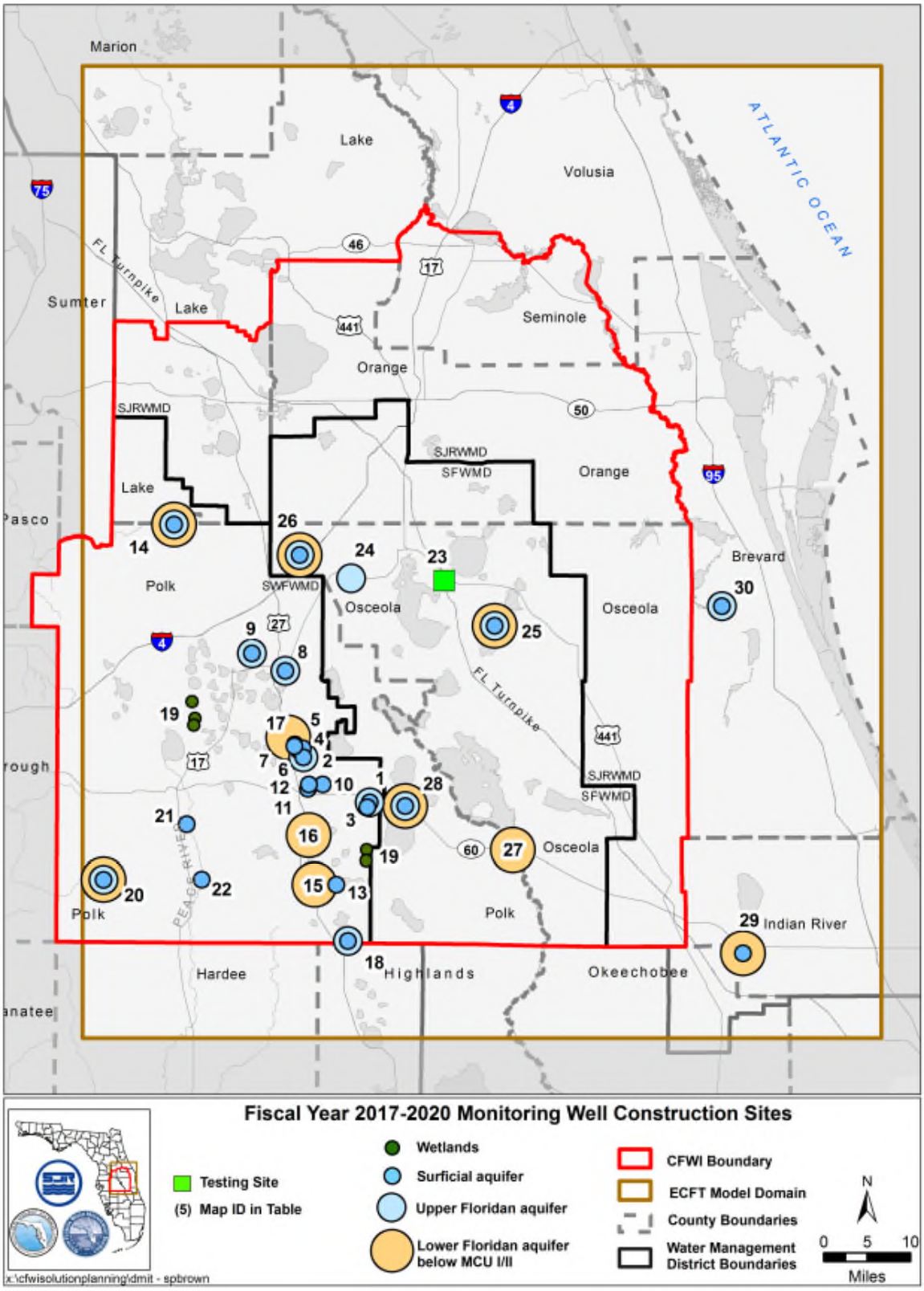

Figure 3. Fiscal Year 2017 through 2020 Monitor Well Construction Sites

5.0 Summary of Work Plan Implementation Costs

5.1 Consulting Services

The estimated well construction costs are based upon water management district's previous work and typical data gathering activities. The full implementation of the Work Plan within the five year period will require the hiring of consultants to assist in contract management, field activities and possible design elements of the project. Typically costs for adding consulting services to a project may potentially add 20 – 25% to the cost of well construction in turn-key type effort. Outside consulting services are likely necessary in the completion of the wetland field studies, SA well installations and in the management as many as four of the larger LFA well construction projects. Consulting services are estimated to add roughly $1.5 million dollars to the total project implementation cost.

This Work Plan identifies an implementation plan that considers current levels of District staffing and reasonable budgeting goals absent of possible State legislative funding assistance. It identifies full implementation of the major well components within a 5 year period as requested by the Steering Committee. The Work Plan was prepared with the idea that the Districts would take on a management role in implementing the plan but it is recognized that current levels of District staffing and funding alone are not be sufficient for timely implementation within the five-year period. Completion of the Work Plan is dependent upon obtaining outside funding assistance and the partnership of local government and consulting services. The Work Plan schedule anticipates resourcing portions of the work as turn-key construction projects with District oversight. After discussing prospects for expediting the implementation schedule, the DMIT identified these as potential options for out sourcing work efforts:

4.1 Contracting additional components for well construction currently identified as a District task.

4.2 Turn-key additional drilling services and add consultant oversight to certain construction projects.

4.3 Directing construction summary report writing as a consulting service where not previously identified.

4.4 Agencies outside of the District taking on project management for construction and testing of certain well sites with technical input from the District on well and testing design.

4.5 Assistance from agencies outside of the District investigating and acquiring site access rites to locations identified by the District. This is particularly powerful for sites identified on non-state owned lands.

4.6 Increase the use of consulting services to assist in upgrading wetland monitoring sites with surveying, wetland vegetative assessments and piezometer installations.

- Hiring vendor services as temporary District staff to manage contractual services and site procurement/ acquisition.

5.2 Real Estate Acquisition

In addition to construction and consulting services there are site costs associated with site acquisition. These costs related to site identification, boundary surveys, legal fees and potentially land purchase. Real estate costs can be estimated as much as $400,000 for a larger site if land purchase is required. The total cost of real estate components are difficult to estimate without knowing more about the site specifics or the total number of sites needed on non-government land. Where costs associated with real estate acquisition are available the amount is distributed for that given year. For those remaining sites where costs have been only generally estimated, the costs associated with real estate efforts have been equally distributed throughout the first four years of the Work Plan. For planning purposes a total estimate of $4 million dollars has been used for project implementation.

An effort is being made to identify construction sites on State and local government owned properties to keep costs and access issues to a minimum. Partnerships are also being sought with consumptive water use permit holders to utilize/upgrade existing and proposed monitoring sites developed by the permittee. A GIS analysis described earlier in this document identifies elements of land ownership and permittee monitoring as part work of that work effort.

5.3 Other Costs Not Included

Not included in the implementation plan costs are annual monitoring after the site is constructed and the monitoring equipment installed. At full implementation the plan is expected to construct or otherwise upgrade an estimated 290 new monitoring sites. Many of the additional sites are being constructed at existing locations to take advantage of existing monitoring telemetry but a large portion of the sites identified are new construction. Annual monitoring and maintenance of a new location is roughly $1500 per year per site. This cost is associated with periodic downloading of the recorded data and the maintenance of the equipment and wellhead. A twenty-year operation and maintenance of a single monitoring site is on the order of $30,000. The exact number of locations identified for installation that will require new water level recorders and telemetry is uncertain at this point but it is estimated to exceed 100 sites. A preliminary estimate for additional annual cost for monitoring these sites could add over $3 million dollars on new monitoring costs over the course of a twenty-year period. Those costs associated with the initial monitoring well setup such as recording equipment installation and wellhead protection devices are included in the cost of well construction.

District staff time related to project design, geologic interpretation, site identification, project management and other elements can run into tens of hours or hundreds of hours of time for a multiyear construction project. No estimate of District staff time is provided but it should be noted that this is a real expenditure in the course of project implementation.

5.4 Site Access and Permitting

Well sites need to be acquired to construct the wells for the CFWI. A temporary easement is required to accommodate the well construction and testing activities planned for each site. A permanent easement is required for the placement of the monitor wells and to access the wells for long-term monitoring. Both temporary and permanent site access often require months if

not years of legal efforts and permitting. Every effort is being made to locate sites on District or other State or municipally owned lands but these sites require significant effort to obtain access.

Permits may be required to discharge water during aquifer performance tests if groundwater cannot be contained onsite (allowed to percolate into the ground or discharged into a closed retention pond). Groundwater discharged to a surface water body will require a Generic Permit for the Discharge of Produced Ground Water from any Non-Contaminated Site Activity from the Florida Department of Environmental Protection (FDEP), Document number 62-621.300(2).

5.5 Summary

Table 4 below summarizes the number and type of wells to be monitored. Total implementation costs are a combination of construction, real estate and consulting costs for the five-year completion. The annual and total cost of Work Plan implementation is provided in **Table 5** below. Costs are shown in millions of dollars.

Table 4. Summary of Work Plan Well Monitoring Activities

Fiscal Year	Wetland Sites	SA Wells	UFA/APPZ Wells	LFA Wells	Annual Total
2015	5	5	5	3	18
2016	26	19	9	4	66
2017 - 2020	76	85	24	23	208
TOTAL:	107	117	38	29	292

Table 5. Summary of Work Plan Implementation Costs

Fiscal Year	Well Construction Costs*	Real Estate*	Consulting Services*	Total Implementation Costs*
2015	$2.80	$0.08	$0.05	$2.93
2016	$6.57	$0.90	$0.06	$7.53
2017 - 2020	$19.30	$3.03	$1.35	$23.67
TOTAL:	$28.67	$4.00	$1.46	$34.13

**Millions of dollars*

The successful implementation of the Work Plan is dependent upon the timely acquisition of site access, the obtaining of necessary permits, the availability of capable drilling and consulting contractors and adequate funding. Cost estimates developed in this Work Plan are subject to changes in the cost of materials and contractor availability. The Work Plan calls for the addition of approximately 290 wells to the existing monitoring network. Construction of this many wells over the 5-year period may create competition issues for a limited pool of drilling contractors, particularly for the construction of the Lower Floridan Aquifer wells. The coordination of drilling

contractor services, the availability of site access, added consulting services and acquisition of the necessary permits will be important in keeping costs to a minimum.

6.0 Funding

The construction of these monitoring sites can be a large financial commitment over a multi-year period. Long-range, forecasted costs for the next five years (through FY2020) have been prepared in accordance with the proposed construction schedule. The availability of funding in accordance with the prepared annual costs estimates is important to maintaining the schedule. Funding support below that identified could lead to a delay in project completion. Efforts not funded during the proposed fiscal year will be postponed to a following year to allow construction of sites having the highest priority. Funding availability beyond that shown in each fiscal year will have a limited benefit in shortening the schedule as site access and competition for capable drilling contractors will limit the number of possible construction activities possible.

The forecasted amount broken out by District by fiscal year can be found on **Table 5**. District funding for FY2015 have already been approved by the respective Governing Boards. Project costs for subsequent years are also identified. All costs are estimated from best available information. Construction activities for FY2015 are already underway and predominately funded under the water management district budgets. Wetland and SA site installations (shown as consulting costs) are currently unfunded efforts for FY2015.

7.0 Other DMIT Ongoing Activities

This Work Plan provides the details for implementation of the minimum option for groundwater level monitoring sites identified in the Summary Report. In addition to that work the Summary Report identifies a number of other DMIT responsibilities. Other tasks ongoing over the course of the work plan duration include the following activities:

- Updating and expanding the number of sources in the current Data Inventory,
- Completion of a GIS tool for the location of potential wetland, surficial aquifer and Upper Florida aquifer potential monitoring and testing sites.
- Reviewing and improving data gathering of other types of hydrologic data within the CFWI such as surface water and meteorological information,
- Identification of and acquiring legal access to future monitoring locations,
- Annual review of data gathering goals and report on the status of DMIT activities
- Develop an updated annual Work Plan to address changes in construction activities and costs and to report the progress of ongoing activities.

With the exception of the GIS tool development the tasks outlined above are deemed ongoing annual activities. The GIS tool development is an effort proposed for completion in the second quarter of FY2015. Priority has been given to updating the current DMIT Inventory to revise information and to add new information previously not inventoried. This Update may influence the location of future monitoring sites.