Wetlands Monitoring Report

Tallevast, Florida

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Acronyms and Abbreviations

ABC	American Beryllium Company
AD	Adaptive Zone
BECSD	BECSD, LLC
bgs	below ground surface
D	deep zone
DO	dissolved oxygen
F.A.C.	Florida Administrative Code
Facility	Lockheed Martin Tallevast facility
FDEP	Florida Department of Environmental Protection
FLUCCS	Florida Land Use, Cover and Forms Classification System
GPS	Global Positioning System
HNP	historical normal pool
HWE	historical wetland edge
mg/L	milligrams per liter
mi^2	square miles
msl	mean sea level
mV	millivolts
NOAA	National Oceanic and Atmospheric Administration
NTU	nephelometric turbidity unit
OD	outer deep
PVC	polyvinyl chloride
QA/QC	quality assurance/quality control
RAP	Remedial Action Plan
report	Wetlands Report
RW	Reference Wetland
SAS	Surficial Aquifer System
site	Lockheed Martin Tallevast Site
SARA	Site Assessment Report Addendum
SRQ	Sarasota Bradenton International Airport
SU	Standard Units
SWFWMD	Southwest Florida Water Management District
T	Transitional Zone
Tetra Tech	Tetra Tech, Inc.
TW	target wetland
UMAM	Uniform Management Assessment Method
UPL	uplands
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency

USGS	U.S. Geological Survey
WAP	Wetlands Assessment Procedure
WMP	Wetlands Monitoring Plan
WPI	WPI Sarasota Division, Inc.
°C	degrees Celsius
°F	degrees Fahrenheit

Section 1
Introduction

In conjunction with proposed groundwater remediation activities at the Lockheed Martin Tallevast Site (site), this Wetlands Report (report) documents the commencement of wetland monitoring pursuant to the July 2009 Wetlands Monitoring Plan (WMP), which was included as Appendix G of the July 2009 Remedial Action Plan (RAP) Addendum (approval pending). The WMP provides for the establishment, evaluation, and assessment of wetlands pursuant to agency requirements, including establishment of baseline conditions. The purpose of the WMP will be to assist in assessing if the RAP Addendum remedy is causing impacts to the wetlands.

The wetlands that are the subject of this activity were selected prior to monitoring using the 2005 Southwest Florida Water Management District (SWFWMD) Wetlands Assessment Procedure (WAP), as amended (SWFWMD 2005), and in conjunction with the Florida Department of Environmental Protection (FDEP) as part of a June 26, 2008 walkthrough of the wetland areas (see Section 2.1 of the WMP and Figure 1-1). These wetlands are being monitored to establish baseline characteristics against which subsequent annual monitoring event results will be compared. Annual monitoring data will be evaluated in conjunction with the implementation of the RAP for groundwater impacts from the former American Beryllium Company (ABC) Facility, now known as the Lockheed Martin Tallevast Facility. The "site" consists of both the Tallevast Facility (referred to as the "Facility" or "on-facility" portion of the site) located at 1600 Tallevast Road in Tallevast, Manatee County, Florida and the groundwater and surface water resources in the surrounding area as defined by the extent of groundwater impacted by contaminants of concern (COCs) (referred to as the "off-facility" portion of the site). A site location map showing the entire study area (site) is presented as Figure 1-1. Tallevast, Florida is a small, unincorporated community situated between Sarasota and Bradenton, immediately northeast of the Sarasota-Bradenton International Airport (SRQ), in southwestern Manatee County. Additional detail regarding the project and site history can be found in Sections 1.2 and 2 of the RAP Addendum.

Locations to install monitoring wells and staff gauges were determined during preliminary visits to wetland areas and during field assessments conducted in June 2008 and June 2009. Following establishment of access agreements with appropriate landowners in the Tallevast area, wetland monitoring transects were formally established and water level monitoring instruments were installed from November 2009 through February 2010. As stipulated by the FDEP, the activities detailed in the WMP will be initially conducted over 5 years, following establishment of a baseline composed of a minimum of 2 years of data, resulting in a minimum program length of 7 years. The observations presented in this report will contribute to the establishment of baseline conditions at seven reference and target wetlands. These observations include the following:

- field observations of vegetative growth, recruitment, and mortality, as well as evidence of land use, abandonment, disturbance, and indicators of surface hydrology along the established wetland monitoring transects
- water level data gathered using staff gauges and transducers in WMP monitoring wells

Subsequent events will be conducted annually for a minimum of 2 years to establish baseline conditions and then for 5 years subsequent to RAP system startup. This report documents the initial assessment that constitutes commencement of the baseline period.

Background resources used in the development of the WMP include the 1994 U.S. Geological Survey (USGS) 7.5-minute Topographic Quadrangle Bradenton, FL, 2003, and 2009 ortho(aerial)-photography from the Manatee County Geographic Information System, and Ecosystems of Florida (Myers and Ewel 1990).

Section 2
Project History

Lockheed Martin acquired ownership of the former ABC Facility through its 1996 acquisition of Loral Corporation, the parent company of ABC. Plant operations ended in late 1996. Between 1997 and 2000, Lockheed Martin prepared the property for sale and began site investigations. In early 2000, Lockheed Martin sold the property and its improvements to BECSD, LLC (BECSD), which in turn leased the Facility to WPI Sarasota Division, Inc. (WPI), a privately owned manufacturer. In March 2007, WPI was sold to Cooper Industries, Inc., which assumed the Facility lease and continued the same manufacturing processes until ceasing operations in June 2007. Beginning in July 2007, Lockheed Martin leased the Facility from BECSD, ultimately purchasing it back from BECSD in June 2009.

From 1962 until 1996, the Facility was owned by Loral Corporation and operated by ABC as an ultra-precision machine parts manufacturing plant where metals were milled, lathed, and drilled into various components. Some components were finished by electroplating, anodizing, and ultrasonic cleaning. Chemicals used and wastes generated at the Facility included oils, fuels, solvents, acids, and metals. Facility operations are described in the Phase I Environmental Assessment Report (Tetra Tech, Inc. [Tetra Tech] 1997). Additional information can be found in the Site Assessment Report Addendum (SARA) (Tetra Tech 2005).

Section 3
Monitoring Objectives

The RAP Addendum was prepared to satisfy the requirement of a March 16, 2009 FDEP request for submission of a final revised RAP that would incorporate Lockheed Martin's February 11, 2009 responses to third party comments on the September 2008 RAP. As part of the selected remedy, the July 2009 RAP Addendum scope incorporates removal of contaminated groundwater through a series of extraction wells/trenches, treatment of the extracted groundwater, and discharge of the treated groundwater using a combination of different disposal options. These options include the following:

- recharging on-facility through a series of injection wells operating in tandem with on-facility extraction wells in the surficial aquifer
- discharging to the county wastewater collection and treatment system
- recharging the local surficial aquifer in infiltration systems designed to maintain water levels within designated wetland areas, as explained below

The RAP Addendum remedy includes the likelihood that multiple treated-groundwater discharge methods will occur simultaneously. Implementation of the proposed RAP groundwater extraction system is expected to cause drawdown in the local surficial aquifer to achieve capture. Because depression of the water level of 1 foot or more is predicted to occur in the surficial aquifer at nearby wetlands, the FDEP prescribed the use of the WAP (SWFWMD 2005). The WAP specifies the process and technical methods for monitoring groundwater extraction effects on "target" wetlands (TWs) and for identifying whether mitigation is needed to offset the effects (if any) of such extraction, via comparison to "reference" wetlands (RWs).

Implementation of the WMP was based on this WAP-defined process. Field visits and consultation with the FDEP led to identification of four TWs within the area of anticipated hydrologic influence of the RAP system, as defined by the predicted 1-foot drawdown or greater extent (Figure 3-1). Also, four nearby RWs were identified for monitoring because they represent

similar wetland resources that are outside the area of anticipated hydrologic influence of the RAP system. In selecting the TWs and RWs for this evaluation, proximity and similarity of classification under the Florida Land Use, Cover, and Forms Classification System (FLUCFCS) codes for wetlands were considered. These codes are used to describe land use, vegetative, and/or urban land cover types, including the wetlands of interest for this assessment.

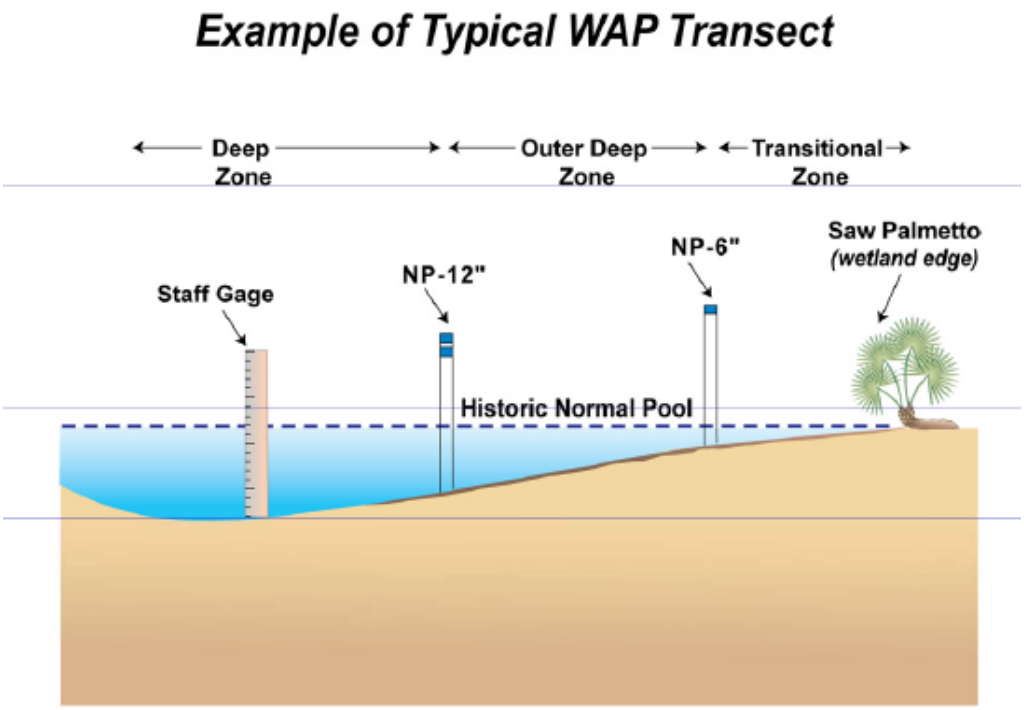
Section 4
Southwest Florida Water Management District Wetland Assessment Procedure

The WAP is generally required as a condition for the issuance of consumptive groundwater well authorization, which is required due to water extraction and disposal incorporated within the RAP. The objective of the WAP (SWFWMD 2005) is to collect information on vegetation, hydrology, soils, and other pertinent variables in isolated wetlands to accurately characterize the biological condition and health of each monitored wetland at the time of investigation. This information may be used for a variety of water management purposes, including well field management, development of minimum flows and levels in the wetlands, and assessment of recovery in areas that have experienced historical hydrologic and biologic impacts due to groundwater withdrawals.

As presented in the WAP, the following steps are taken to establish the monitoring points and their characteristics and then to initiate the baseline monitoring process. The first step consist of a 10-meter-wide monitoring transect established in each wetland. Transects are positioned to provide a representative cross section from the outermost identified historical wetland edge (HWE) to the innermost portion of the wetland interior (deep zone). Upon establishment of the monitoring transect, estimated benchmark elevations are also field-identified. They include the historical normal pool (HNP), as well as elevations 6 inches (NP-6) and 12 inches (NP-12) below the HNP.

Outside the HWE is an area that is generally referred to as the uplands (UPL), while the intermediate areas between the HWE and the HNP are referred to as the adaptive zone (AD). Areas between the HNP and NP-6 elevation are referred to as the transitional zone (T). The area between the NP-6 and NP-12 is referred to as the outer deep (OD), and the zone below the NP-12 elevation, to the lowest point within the wetland is simply referred to as the deep zone (D). A general representation of these locations is illustrated on Figure 4-1 (below).

Figure 4-1. Example of Typical WAP Transect



Source: SWFWMD, 2009

The location of each transect is based on factors such as site accessibility, minimal disturbance to existing vegetation, clear line-of-sight, and ability to assess characteristics that are representative of the transition zone along a straight line. Each transect is established with the placement of a monument at the HNP, NP-6, and NP-12 elevations. The innermost transect point within the deepest portion of the wetland pool is identified by the placement of a staff gauge and surficial aquifer monitoring well, augured to a depth of approximately 8 feet below the ground surface per the SWFWMD WAP.

Vegetative, hydrologic, and soil data are collected from each transect and each monument and the monitoring well is located and surveyed for horizontal and vertical coordinates by a professional surveyor and mapper registered in Florida. During initial and subsequent monitoring events, the provisions of the WAP prescribe that those individuals evaluating the resource should conduct annual assessments by remaining within the established transect as much as possible, while avoiding unnecessary damage to characteristic vegetation. However, the WAP also incorporates provisions to potentially walk throughout the wetland, when critical for accurate evaluation of the assessed area.

Section 5
Basis for Wetlands Assessment Procedure Deployment

The results of the WMP will compare changes from baseline conditions to those that develop during the initial RAP implementation. These comparisons will assess change in groundwater elevation, periodic inundation, and vegetative changes, if any, in each wetland zone. As discussed below, changes in wetland conditions due to regional effects will also be considered in the analysis to determine actual impacts of the groundwater remedy on wetland areas, if any. Note that although the WAP contains provisions to document and monitor many aspects of wetland health, many of these aspects are beyond the intent of the SWFWMD procedure.

Many wetlands in the landscape surrounding the site are also impacted by various land management and drainage practices, including encroachment by land development, historical and current cattle/livestock operations, introduction of exotic plant species, disease, and other variables. However, the fundamental purpose of the WAP is to collect data that can be used to assess biological changes to wetlands caused by hydrologic effects of permitted groundwater withdrawals, while considering the effects of relevant historical and current climate trends. Global/regional climate and land use factors, including floods, drought, and irrigation use, will be included in the evaluation of individual or widely occurring differences between TW and RW resources.

As determined during consultation with the FDEP, monitoring results will be evaluated for the assessment of effects from the operational RAP system. The RAP Addendum includes recharging the water table aquifer in wetland areas predicted to be within the 1-foot or greater drawdown zone resultant from proposed RAP extraction pumping to mitigate drawdown in these areas. Therefore, it is anticipated that there will be no loss of functions or acreage within the identified TWs**;** it is significantly more likely that any changes requiring mitigation of TWs would be attributable to other regional or global causes.

Section 6
Project Area Setting and Site Conditions

This section describes the physical environment, ecology, and water resources influencing the wetlands that were assessed from June 14 through 18, 2010 in the Tallevast area.

6.1 SITE LOCATION

The facility is located in the northwest quarter of Section 31, Township 35 South, Range 18 East, as shown on the Bradenton, Florida USGS 7.5-minute quadrangle (USGS 1994).

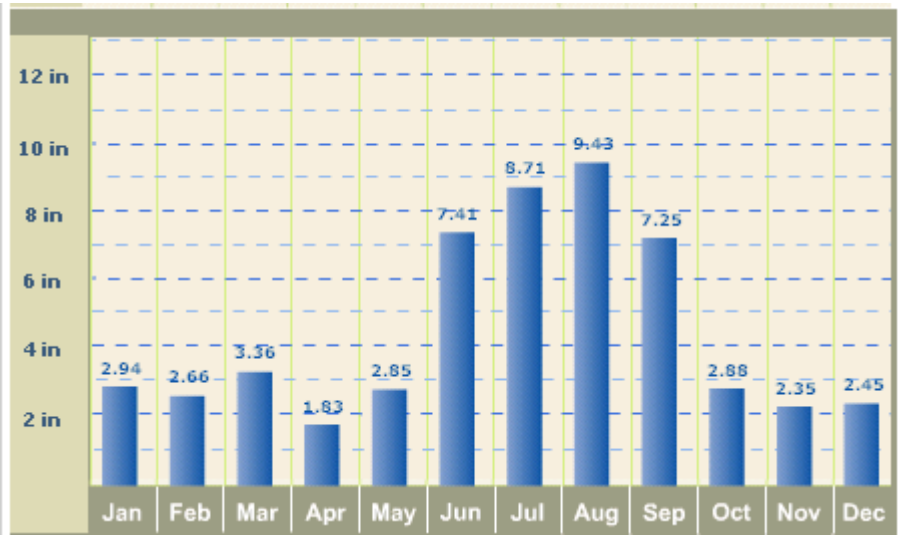
6.2 CLIMATE

The Tallevast area is located within the subtropical zone in southwest Florida. Average daytime highs in June and July are 91 degrees Fahrenheit (°F; 32 degrees Celsius [°C]). The average daytime temperatures during the winter months are in the low- to mid- 70s °F (22 °C). As shown on Figure 6-1 (below), extreme temperature records in the area range from 100 °F (38 °C) in July 1998 to 20 °F (-6 °C) in 1983.

Figure 6-1. Historical Temperature Trends

Annual rainfall totals average 54 inches (1.37 meters). The rainy season generally occurs in the Summer in the Tallevast area, with frequent afternoon thunderstorms of short duration. As shown on Figure 6-2 (below), August is usually the wettest month of the year, with an average of 9.43 inches (approximately 24 centimeters). April is generally the driest month of the year, with an average 1.83 inches of rain (approximately 4.5 centimeters). Hurricane season in Florida occurs from June through the end of November.

Figure 6-2. Historical Precipitation Trends



A period of drought preceded the 2008 and 2009 initial assessments of wetlands in the Tallevast area, including a relative lull in tropical weather events. A more typical precipitation cycle appeared to have resumed during the months preceding the 2010 WMP transect assessment. Average rainfalls at the SRQ from 2001 through 2009 are presented on Figure 6-3 (below).

Figure 6-3. Annual Precipitation Totals at Sarasota-Bradenton International Airport, 2001-2009

Annual Precipitation Totals at Sarasota-Bradenton International Airport (50-year Annual Average – 54.12 inches)								
2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
50.30 inches	**55.71 inches**	**50.42 inches**	**47.27 inches**	**51.67 inches**	**48.07 inches**	**33.47 inches**	**34.88 inches**	**32.77 inches**

Source: National Weather Service website

6.3 PHYSICAL ENVIRONMENT

The Tallevast community is located on the Gulf Coastal Lowlands, a gently sloping plain ranging from approximate elevations as high as 32 feet above mean sea level (msl) to 15 feet msl. The area is approximately 1.5 to 2 miles east (inland) of Sarasota Bay and approximately 6 miles from the Gulf of Mexico. The land surface of the study area has very little relief and slopes gently toward the south-southeast.

The Gulf Coastal Lowlands are situated in the Southwestern Flatwoods physiographic region and consist of rock and sediment ranging from the Miocene to Pleistocene eras (23.8 million to 11,000 years ago). Landforms are characterized by low plateaus and ridges, flatwoods, prairies, rockland/ marl plains, and various relict coastal features. Surface materials are dominated by sand with clayey substrata, limestone, and sumps of accumulated organic deposits.

The Gulf Coastal Lowlands region and flatwoods soils are moderate to poorly drained, fine-grained, acidic sands with low reserves of available nutrients; low organic matter; and low clay content (often less than 2 percent). These soils may contain a spodic (organic) horizon when organic matter is translocated downward by water percolation. Clay hardpans may also result from transport and accumulation of clays. Many of the soils supporting flatwoods are spodosols, but some variation exists. Soil types in upland areas of the Tallevast Site study area are largely composed of EauGallie fine-grained sand, while soil types in mapped wetlands include complexes of Canova, Anclote, and Okeelanta soils, as well as fine-grained sands of the Floridana-Immokalee-Okeelanta association.

6.4 AQUIFER SYSTEMS

The three aquifer systems, which vary in depth, that underlie the Tallevast site are as follows: Surficial Aquifer System, Intermediate Aquifer System, and Floridan Aquifer. These aquifer systems are described in detail in the RAP Addendum report, and in the investigative reports that preceded the RAP Addendum. The Surficial Aquifer System is recharged locally and the water table contained in this formation fluctuates due to seasonal and climatic variations in rainfall. In addition, artificial factors have produced impacts on groundwater levels in each of the three

aquifer systems, including the water table in the Surficial Aquifer System (SAS). Artificial factors include:

- irrigation pumping of wells in aquifers beneath the SAS for the irrigation of fields, lawns, and golf course turf or maintenance of pond levels for aesthetic purposes
- drainage canals that have, in some cases, lowered surficial groundwater elevations in their immediate vicinity

6.5 SURFACE-WATER RESOURCES/WATERSHED

The United States is divided and sub-divided into successively smaller hydrologic units which are classified by the USGS into four levels: regions, sub-regions, accounting units, and cataloging units. These hydrologic units are arranged within each other, from the smallest [cataloging units] to the largest [regions]. Each hydrologic unit is identified with a unique hydrologic unit code (HUC) consisting of two to eight digits based on the four levels of classification in the hydrologic unit system. The study area is located along the drainage divide between two stream/canal systems, Bowlees Creek and Pearce Canal, within the 8-digit Sarasota Bay watershed, HUC 03100201. Bowlees Creek, a major tributary of Sarasota Bay, is located approximately 1.25 miles northwest of Tallevast. The Pearce Canal trends at an angle to the study area and is located southeast (0.75 mile) and east (1 mile) of Tallevast. A ridge (topographical high ground) runs approximately north-south through the Facility. Surface water on the western portion of the Facility flows west toward Bowlees Creek and the improved drainage features around the SRQ, both of which drain to Sarasota Bay. Surface water on the easternmost portion of the Facility flows toward Pearce Canal, which drains both south into the Sarasota Bay watershed and north into the Manatee River watershed (HUC 03100202). The drainage divide along Pearce Canal is located approximately 1 mile north of the Manatee/Sarasota County line, where the canal crosses US 301 and 1 mile southeast of the Facility.

In addition to drainage facilities (such as Pearce Canal) and consumptive use, according to the USGS, groundwater depletion due to other impacts remains an ongoing concern throughout much of west-central Florida. To the north of the Tallevast area, saltwater intrusion and subsidence in the form of sinkhole development, land subsidence, and surface-water depletion from lakes are

issues of concern. However, Florida Geological Survey (FGS) poster number 11 (Rupert and Spencer 2004) indicates that Sarasota and Manatee Counties lie in a region where sinkholes are uncommon. Throughout Florida, broad concerns exist for the reduction of surface-water flows, deterioration of wetland water quality, and increased costs to pump needed water resources. Several small surface-water bodies (e.g., decorative ponds, stormwater ponds) are located within a 0.5-mile radius of the Facility. Shallow swales throughout the Tallevast area also convey stormwater runoff to roadside and cross-country drainage channels.

6.6 ECOLOGY

The dominant historical habitat of the project area is pine flatwoods. According to the U. S. Department of Agriculture (USDA) Natural Resources Conservation Service (formerly the Soil Conservation Service), such habitats in southwest Florida are characterized by savannas, an ecotone spanning grasslands to forests. The ecosystem in the vicinity of the assessed wetlands is now used extensively as rangeland for cattle grazing.

Once the most extensive terrestrial ecosystem in Florida, these historical pine flatwoods evolved under frequent lightning and human-induced fire, seasonal drought, and flooded conditions. Flatwoods are characterized by low, flat topography; relatively poorly drained, acidic, sandy soil and pine woodlands. This ecosystem historically had open, park-like understories managed by frequent fires.

The dominant tree species of flatwoods in the Tallevast area are limited to south Florida slash pine (*Pinus elliottii* var. *densa*) and longleaf pine (*Pinus palustris*). Other infrequently occurring trees include cabbage palm (*Sabal palmetto*) and hardwoods including live oak (*Quercus virginiana*), water oak (*Q. nigra*), sweet gum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), and ash (*Fraxinus* spp.). Commonly occurring understory shrub species include saw palmetto (*Serenoa repens*), wax myrtle (*Morella cerifera*), blueberries (*Vaccinium* spp.), and American beautyberry (*Callicarpa americana*).

The invasive Brazilian pepper tree (*Schinus terebinthofolia*) is identified as locally dominant in both the forest understory and open rangeland scrub strata. According to the University of Florida Center for Aquatic and Invasive Plants, Brazilian pepper tree is native to Argentina, Paraguay, and

Brazil. The species was brought to Florida in the middle of the 19th century for use as an ornamental plant. Distribution of Brazilian pepper tree occurs throughout the site. It is an aggressive invader of disturbed habitats; this characteristic has led to its placement on the the Florida Exotic Pest Plant Council list of invasive species. Plant communities such as hammocks and pineland forests are often invaded and dominated by Brazilian pepper tree. Other nonnative and escaped plant species identified in the Tallevast WMP area include camphor tree (*Cinnamomum camphora*), punk tree (*Melaleuca quinquenervia*), primrose willow (*Ludwigia peruviana*), tropical soda apple (*Solanum viarum*), and Caesar's weed (*Urena lobata*).

Section 7
Wetlands Assessment Procedure Implementation

7.1 TRANSECT AND MONITORING LOCATION SELECTION

Four RWs (RW-1, RW-2, RW-3, and RW-5) and four TWs (TW-1, TW-2, TW-6, and TW-18) were identified and selected for monitoring based on initial June 26, 2008 site visits with representatives from the FDEP, CDM, ARCADIS, and Lockheed Martin. The TWs were selected based on their location within the area of the Surficial Aquifer System predicted to have 1 foot or more of drawdown due to implementation of the RAP groundwater extraction system. The RWs were also selected based on proximity to the site, as well as the similarity of FLUCFCS characteristics to those associated with the TWs. However, RWs are anticipated to be beyond the area of groundwater elevation influence from the operational RAP system. RW-5 has been mitigated. The Wetland Mitigation Notice of Final Agency Action for Approval is included as Appendix F.

Pursuant to the WAP, one transect was established in each of the RWs (RW-1, RW-2, and RW-3), as well as in each of the four TWs. Transects were positioned within a representative 10-meter-wide area in each wetland, from the HWE to the wetland interior. Estimated HNP elevations were also field-identified during transect establishment. The location of each transect was based on factors including site access, minimizing disturbance to existing vegetation, clear line-of-sight, and ability to assess all aspects representative of the transition zone along a straight line.

Permanent monuments were placed in the field to identify these transects during baseline monitoring of wetland conditions. Monuments composed of steel rebar fitted with a sleeve of polyvinyl chloride (PVC) pipe were installed at elevations of 6 and 12 inches below the HNP and were labeled NP-6 and NP-12, respectively. Monument locations were recorded using a Global Positioning System (GPS) unit with sub-meter accuracy. During a June 2008 site visit with the

FDEP, vegetative, hydrologic, and soil indicators were used to establish the HNP elevation within the TWs. These same factors were used during transect placement in both TWs and RWs during the subsequent 2009 field season. Subsequent to monument placement and monitoring well installation, the NP-6, NP-12, staff gauge, and monitoring well locations were surveyed by a professional surveyor and mapper registered in Florida (March 2010).

Pursuant to the WAP, the area to be assessed along each transect will subsequently be referred to as the assessment area. The assessment area is approximately 10 meters wide and extends 10 meters beyond the transect termini (HWE and wetland interior). Subsequent monitoring events will be conducted on the established transect as much as possible to avoid unnecessary damage to vegetation, but may be conducted throughout the wetland if critical for an accurate evaluation of the assessment area.

7.2 STAFF GAUGES AND MONITORING WELL INSTALLATION

Groundwater monitoring wells and staff gauges were installed in the TWs and RWs. One monitoring well and one staff gauge were installed in the deep zone of each wetland and placed along the WAP transect, or within the assessment area. While an upland monitoring well is traditionally recommended under WAP procedures, it is not required. Under direction from the FDEP, because of the relatively small size of the wetlands, an upland monitoring well was not installed at the HWE in any of the wetlands. The ground elevation was surveyed at the wells and staff gauge locations by a professional surveyor and mapper registered in Florida. An initial water level reading was obtained manually and interim water elevation data were obtained from data logger downloads.

One well (Stilling Well-3) and one staff gauge (Staff Gauge-8) were found to already exist in TW-2. Per WAP guidelines (3.2 WAP Transect Selection and Setup; SWFWMD 2005), these locations were considered in the selection process for the monitoring transect and assessment area at TW-2. These devices are located in the outer transition zone or HWE. Therefore, they may not provide valuable data in monitoring long-term wetland response. Existing wells and staff gauges were not found at the other wetlands.

7.3 GROUNDWATER MONITORING WELL INSTALLATION

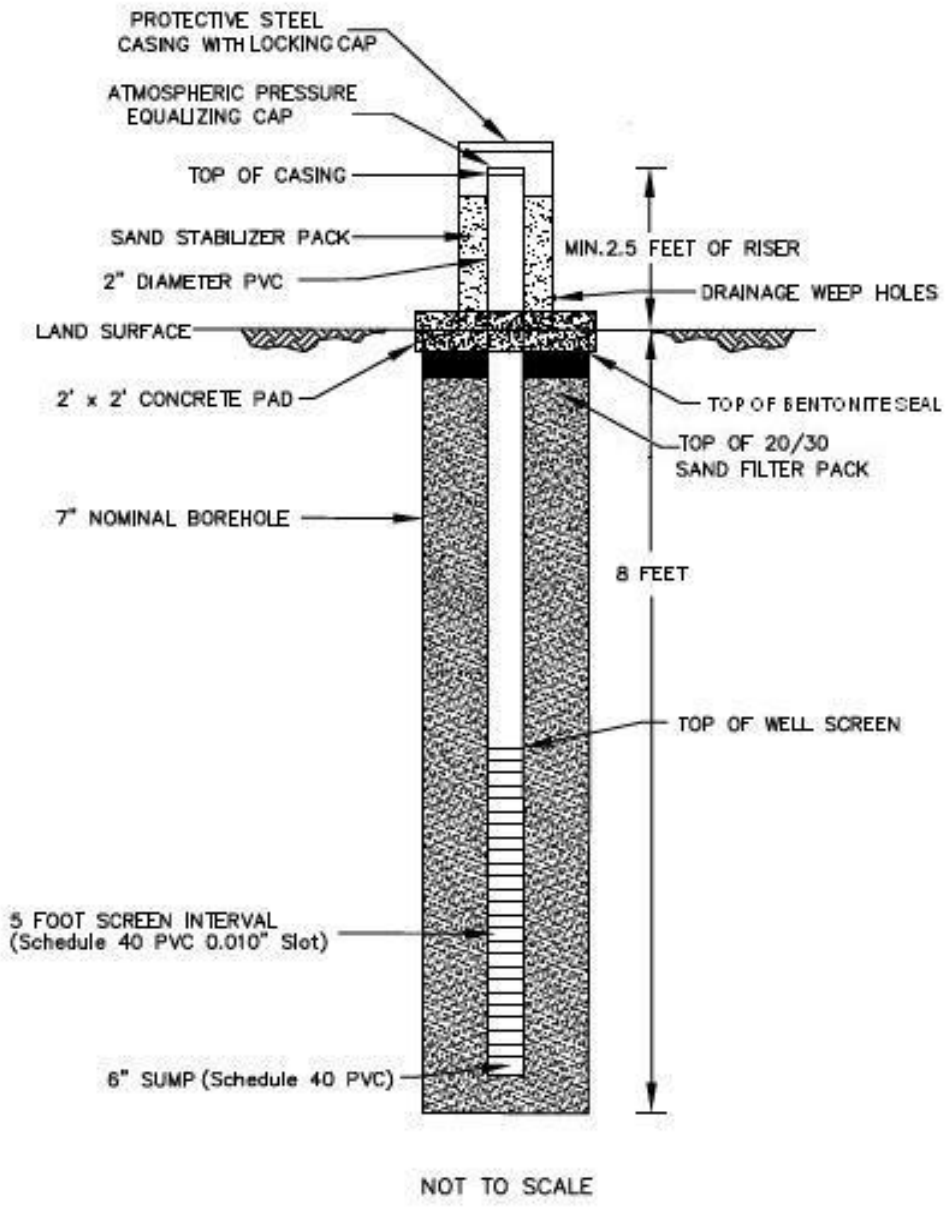
The SWFWMD well construction standards, promulgated in Florida Administrative Code (F.A.C.) Chapter 40D 3, were followed for all monitoring wells. All monitoring wells are constructed using 2-inch Schedule 40 PVC and installed to a depth of 8 feet below ground surface (bgs) using the mud rotary method (ASTM International Method D-5092), except for the monitoring well in TW-1 which was installed to approximately 10 feet bgs. Monitoring well installation in TW-1, TW-2, TW-6, TW-18, RW-1, RW-2, and RW-3 was managed by a qualified wetland scientist and geotechnical well development specialist. Monitoring well installation at TW-2, TW-6, RW-1, RW-2, and RW-3 was accomplished in November 2009 using a skid-mounted mud rotary auger. Due to landowner access restrictions, monitoring well MW-TW-18 was installed in February 2010 using a track-mounted mud rotary auger. Monitoring well installation at TW-1 was accomplished in February 2010 with a tripod-mounted manual mud rotary auger due to the presence of shallow water conditions.

The screened interval in the monitoring wells is 5 feet long and placed at 3 to 8 feet bgs (5 to 10 feet bgs in MW-TW-1) and consists of 0.010-slot, 2-inch PVC screen. A 20/30 sand filter pack was placed in the annular space from the bottom of the well to the surface (MW-TW-1) or from the bottom of the well to approximately one foot below the surface (all other wells) where a bentonite seal was installed. After well construction was complete, the land surface and top of casing elevations were surveyed by a professional surveyor and mapper registered in Florida, using horizontal and vertical control. Survey data are shown in Table 7-1.

As shown on Figure 7-1 (below), wellhead completion consisted of a 2- by 2-foot, 4-inch-thick concrete pad with a 2.5-foot-high riser with a lockable well cover. All development water from the monitoring wells was contained and disposed of via the existing on-facility treatment plant. All wells were developed according to United States Environmental Protection Agency (USEPA) guidance to meet the following standards: pH ±0.1 standard units (SU), specific conductivity ±3 percent, oxidation-reduction potential (ORP) ±10 millivolt (mV), turbidity <10 nephelometric turbidity units (NTUs), and dissolved oxygen (DO) ±0.3 milligrams per liter (mg/L), for three consecutive readings conducted no less than 1 minute apart. If during purging, a well became dry, development continued after the well recharged. Development was considered complete when the

turbidity was less than 10 NTUs and the above criteria were met. Lithologic logs, permits, and well completion reports were prepared for each monitoring well (well development logs are included as Appendix A; borehole logs and well completion diagrams are included as Appendix B).

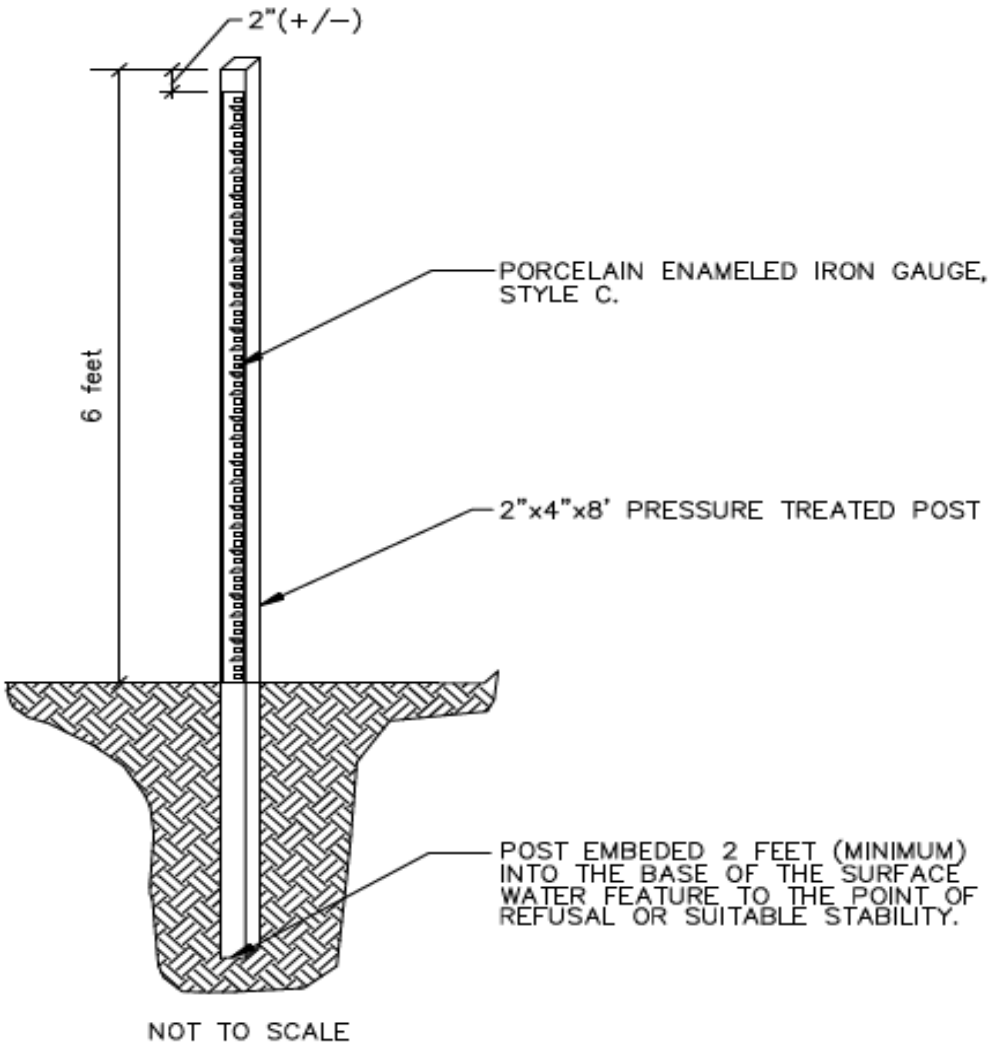
Figure 7-1 Typical Well Installation Cross-Section



7.4 STAFF GAUGE INSTALLATION

Staff gauges were installed adjacent to each monitoring well. As shown on Figure 7-2, at each staff gauge location, a porcelain-enameled iron Style C staff gauge was attached to a 2- by 4-inch by 8-foot long pressure-treated post. The staff gauges enable measuring stage heights in feet and tenths of feet. A hand level was used to ensure that the post and gauge were plumb. The pressure-treated post was driven into the mud line to the point of refusal or suitable stability. Each post was embedded at least 2 feet below the base of the surface water feature. After the monitoring well and staff gauge were installed, they were located by a professional surveyor and mapper registered in Florida. Survey data are included in Table 7-1.

Figure 7-2 Typical Staff Gauge Installation Cross-Section



7.5 DATA LOGGER DEPLOYMENT

To facilitate monitoring frequency and accuracy, automatic water level measurement devices (Solinst® brand pressure transducers) with data loggers were installed to collect real-time water level data in each of the TW and RW monitoring wells. Data loggers were programmed to collect hourly water level readings. Transducers were installed in five of the seven locations (MW-RW-1, MW-RW-2, MW-RW-3, MW-TW-2, and MW-TW-6) on November 6, 2009. Transducers were installed in the remaining two locations (MW-TW-1 and MW-TW-18) on February 23, 2010. Approximately 7 days after installation, the data loggers were checked and data downloaded to verify that they were working correctly. Replacement transducers were installed in MW-TW-1 (March 8, 2010) and MW-RW-1 (November 19, 2009). Data from the data loggers were then downloaded after approximately 90 days. The 90-day schedule coincides with existing quarterly groundwater monitoring activities. Battery life and data storage space are routinely confirmed before redeploying the equipment each quarter. While data are downloaded, groundwater levels are measured manually to confirm the accuracy of the data collected by the automatic water level recorders.

Data are transferred to an Excel spreadsheet as soon as possible after quality assurance/quality control and validation with day-of-download measurements. In addition, precipitation data are obtained from the National Oceanic and Atmospheric Administration (NOAA) climate history and transferred to the Excel spreadsheet. During any replacement of the transducer, the manual water level data is used to calibrate continuous recording. Manual water level results are compared with calculations to identify and investigate discrepancies and resolve issues with transducer performance prior to redeployment.

Section 8
Description of Monitored Wetlands and Evaluation of Baseline Conditions

Findings and observations for the monitored wetlands are presented below. Specific details of each project wetland, such as observations of habitat conditions along the selected transects, are presented on the completed field data sheets in Appendix C. Other characteristics of these wetlands are provided in Table 8-1, below. Photographic documentation of conditions at each wetland is provided in Appendix D. Graphic display of transducer data is provided in Appendix E. Table 8-2 summarizes the manual water level elevations and staff gauge measurements collected from February through June 2010. A description of the baseline conditions will be provided at the conclusion of the 2-year baseline period.

Table 8-1
Summary of Project Wetland Characteristics
Lockheed Martin Tallevast Site
Tallevast, Florida

Wetland ID	TW-1	TW-2	TW-6	TW-18	RW-1	RW-2	RW-3
Wetland Type	Emergent	Emergent/ Forested	Emergent/ Forested	Forested	Emergent/ Forested	Forested	Emergent
Estimated Historical Acreage	15.15	1.87	3.04	4.08	8.22	8.20	10.45
June 2009 Field Verified Acreage	11.4	1.66	1.1	0.39	3.42	4.9	6.3
Historically Inundated	Yes	Yes	Partially	Partially	Yes	Partially	Yes
Inundated (week of June 14, 2010)	Partially	Partially	Partially	No	No	No	No
Degree of Upland Transition	Low	Moderate	Moderate	High	Moderate	Moderate	Moderate
Evidence of Groundwater Interface	Yes	Yes	Yes	No	Yes	Yes	Yes

Table 8-2
Summary of Manual Water Level and Staff Gauge Measurements
Lockheed Martin Tallevast Site
Tallevast, Florida

Date:	2/23/10	3/4/10	3/8/10	3/11/10	6/4/10
Location	***Staff Gauge Reading/Surface-Water Elevation or Groundwater Elevation (feet NAVD)***				
SG-RW-1	NR	NR	NR	0.12/14.10	Dry
MW-RW-1	NR	NR	NR	14.25	12.28
SG-RW-2	NR	NR	NR	0.30/18.42	Dry
MW-RW-2	NR	NR	NR	17.42	17.04
SG-RW-3	NR	NR	NR	DRY	Dry
MW-RW-3	NR	NR	NR	19.65	18.32
SG-TW-1	1.34/23.81	NR	1.24/23.71	1.22/23.69	0.90/23.37
MW-TW-1	NR	23.78	NR	23.66	23.23
SG-TW-2	NR	NR	NR	1.24/22.43	0.92/22.11
MW-TW-2	NR	NR	NR	22.37	22.15
SG-TW-6	NR	NR	NR	1.08/22.03	0.90/21.85
MW-TW-6	NR	NR	NR	21.86	21.58
SG-TW-18	NR	Dry	NR	Dry	Dry
MW-TW-18	NR	21.59	NR	21.41	20.32

Note:
NR = no reading

8.1 GENERAL HABITAT CONDITIONS

Often referred to as seasonal ponds, the freshwater wetlands characterized by the monitored resources occur throughout southwest Florida in the pine flatwoods. These shallow marshes (less than 1 meter deep) occur as slight depressions ranging from 10 to a few hundred meters in diameter in the otherwise flat landscape. The most studied and best-preserved example of these wetlands occurs in eastern Sarasota County. Flatwood marshes provide an important function as groundwater recharge areas (Myers and Ewel 1990). The flat topography, soils, and seasonal precipitation of the pine flatwoods strongly influence hydrology. During the rainy season, minimal water runoff results in waterlogged and poorly aerated soils and standing water may be present for varying periods. During the dry season, high evapotranspiration draws water from upper soil horizons. Water often cannot move upward from lower horizons where there is an impermeable hardpan, frequently resulting in drought conditions. While occurring in various stages of succession and land use disturbance, all TWs and RWs subject to monitoring under the WMP are relict flatwood marshes.

A colder-than-normal winter in early 2010 decreased the observed prevalence of some previously reported dominant herbaceous vegetation in the assessment areas. These effects were most pronounced in non-native species including primrose willow, Caesar's weed, and tropical soda apple. Other species exhibiting thermal stress from the previous freezing temperatures include dogfennel (*Eupatorim capillifolium*) and Elliott's aster (*Symphiotrichum elliottii*).

Widely observed evidence of wildlife during the June 2010 baseline monitoring event was limited to animals typically found in flatwoods. Representative wildlife included mammals such as armadillo (*Dasypus novemcinctus*), eastern cottontail rabbit (*Sylvilagus floridanus*), white-tailed deer (*Odecoileus virginianus*), raccoon (*Procyon lotor*), and opossum (*Didelphis virginiana*). Birds in the area included the cardinal (*Cardinalis cardinalis*), red-shouldered hawk (*Buteo lineatus*), great blue heron (*Ardea herodias*), mockingbird (*Mimus polyglottos*), house wren (*Troglodytes aedon*), and red-winged blackbird (*Agelaius phoeniceus*). The most common amphibian observed was the pinewoods tree frog (*Hyla femoralis*).

8.2 TARGET WETLAND 1

8.2.1 Transect Location

Beginning at the co-located monitoring well/staff gauge (installed February 22, 2010) and extending to the HWE, the monitoring transect at TW-1 is oriented from east to west in the northernmost section of the three contiguous depressional areas in the wetland (Figure 1-1).

8.2.2 Habitat Description

The historical area of the overall TW-1 depressional wetland is approximately 15.15 acres in size. The June 2009 field review determined that approximately 11.4 acres of the 15.15-acre wetland parcel can currently be considered wetland habitat. A review of 2003 Manatee County aerial photography indicates that the overall TW-1 area is composed of three discrete, emergent, and shrubby depressional wetland areas. The northernmost of the three depressional areas was selected for WMP transect deployment due to favorable accessibility and representative landscape position within a functioning emergent habitat that exhibits minimal encroachment by non-native invasive vegetation. The dominant vegetation surrounding TW-1 consists of planted slash and longleaf pine trees, with hardwood scrub forest along the southern border.

8.2.3 Monitoring Well TW-1 Data Assessment

The transducer for well MW-TW-1 was installed on February 23, 2010 and was subsequently replaced on March 8, 2010 due to a sensor malfunction. Groundwater elevations at MW-TW-1 indicate that the groundwater levels were above ground surface (within 1 foot or less) during the monitoring period (March 2010 through June 2010). Staff gauge measurements collected on February 23, March 8, March 11, and June 4 also indicated surface-water levels above the ground surface (see Table 8-2). Groundwater and surface water responses to precipitation events are evident throughout the data collected to date (Appendix E).

8.2.4 June 2010 Field Observations

The northern interior sector of the TW-1 transect is dominated by a thick, matted biomass of rice cutgrass (*Leersia hexandra*), softstem rush (*Juncus effusus*), and field paspalum (*Paspalum laeve*). Vegetation types surrounding TW-1 consist of planted pine trees and upland hardwood scrub (see Attachment C field data sheet).

No inundated areas were observed within the established bounds of TW-1 during the June 2009 site visit. Conditions during a subsequent November 4, 2009 site visit, as well as during the February 2010 monitoring well and staff gauge installation, included normal seasonal inundation to the HNP elevation that was sufficient to submerge most of the previously exposed deep zone, where indicators of wetland soil subsidence caused by oxidation and gasification of carbon that result from drought and drying conditions were observed during the June 2009 site visit. Similarly, while site conditions during the June 2010 transect assessment included observed drawdown and drying of the wetland, partially inundated pools still occurred in the deep zone, below the NP-12 elevation. The area of previously reported wetland soil subsidence, observed in June 2009, was in the portion of remaining inundated deep zone during the June 2010 assessment.

No conspicuous hydrologic alterations were observed along the surface area in or near the TW-1 transect. However, the previously reported 5.25-acre stormwater retention pond, associated with an industrial facility adjacent to the northern boundary of TW-1, exhibited surface-water elevation changes similar to TW-1 during the November 2009, February 2010, and June 2010 site visits. This indicates a potential hydrologic relationship between these two areas.

8.3 TARGET WETLAND 2

8.3.1 Transect Location

Beginning at the co-located monitoring well/staff gauge (installed November 4, 2009) and extending to the HWE, the TW-2 monitoring transect is oriented from west-southwest to east-northeast, in the eastern portion of the depressional wetland (Figure 1-1).

8.3.2 Habitat Description

The historical area of TW-2 is approximately 1.87 acres in size. The June 2009 field review determined that approximately 1.66 acres of the 1.87-acre wetland parcel can currently be considered wetland habitat. A review of 2003 aerial photography indicates that the TW-2 site once contained an inundated area fed by a conveyance that appeared to drain stormwater from Tallevast Road and from a commercial/industrial facility located immediately southwest of the wetland. The northern boundary of TW-2 also contained a small stormwater conveyance.

Vegetation shown in the 2003 aerial photograph of TW-2 consisted of emergent vegetation in and near the inundated area, and shrub/scrub vegetation dominating the wetland area surrounding the inundated portion. A parcel of disturbed upland and a commercial/industrial facility bordered TW-2 to the west, with upland prairie habitat surrounding the remaining areas of TW-2. Historic hydrological indicators of TW-2 suggest that this wetland was fed both by surficial stormwater sheet flow and likely by groundwater.

8.3.3 Monitoring Well TW-2 Data Assessment

The transducer for well MW-TW-2 was installed on November 6, 2009. Groundwater elevations at MW-TW-2 generally rose steadily from November 2009 through March 2010. Groundwater elevations at MW-TW-2 were generally at or below ground surface for the majority of the monitoring period (November 2009 through mid-March 2010 and again from May through June 2010). Staff gauge measurements collected on March 11 and June 4, 2010 indicated surface-water levels above ground surface (see Table 8-2). Groundwater and surface water responses to precipitation events are evident throughout the data collected to date (Appendix E).

8.3.4 June 2010 Field Observations

No major alteration or conversion of previously reported land use or vegetative cover types in TW-2 was observed between the June 2009 preliminary investigation and the June 2010 transect assessment. The TW-2 area displayed signs of prior and ongoing conversion to upland forested and prairie habitats. A dense stand of Carolina willow (*Salix caroliniana*) trees and shrubs lies west and southwest of the historically inundated wetland area. This wooded wetland area was dominated by OD and deep zone floral species, but several transitional and adaptive species are growing on hummocks in the interior of the deep zone. As much as 20 inches of wetland soil subsidence caused by oxidation and gasification of carbon that result from drought and drying conditions was observed in the forested core of TW-2. However, conditions during November 2009 monitoring well and staff gauge installation (MW-TW-2 and SG-TW-2), as well as during the June 2010 transect assessment, included normal inundation that was sufficient to submerge most of the subsided deep zone. Vegetation in the area shown as inundated in the 2003 aerial photograph consists of transitional grass species and a minimal number of small shrubs.

Although no longer inundated, a staff gauge (Staff Gauge-8) and a monitoring well (Stilling Well-3) are currently located within the historically ponded area of TW-2. No other evidence of inundation was observed within TW-2, which is likely due to unknown hydrological alterations that may have occurred in the past few years. Lower than normal precipitation could be another variable that negatively impacted water levels at TW-2. The most typical wetland area of TW-2 occurs near willow trees, and the wetland portion dominated by grasses is in the final stages of upland transition. Soils of the wetland area are sandy and contain organic streaking, as well as other hydric soil indicators. Soils of the wetland area exhibiting signs of upland transition consist of loamy upland sands. The monitoring transect established for TW-2 roughly incorporates an axis that includes the existing historical wetland area staff gauge and monitoring well.

8.4 TARGET WETLAND 6

8.4.1 Transect Location

The TW-6 monitoring transect is oriented from south to north, beginning at the co-located monitoring well/staff gauge (installed November 2, 2009) and extending to the HWE, in the north-central portion of the depressional wetland (Figure 1-1). Due to historic disturbance within the wetland, definitive evidence of an HNP elevation was not observed outside of the excavated pond within TW-6.

8.4.2 Habitat Description

The historical area of TW-6 is approximately 3.04 acres in size. The June 2009 field review determined that approximately 1.1 acres of the 3.04-acre wetland parcel can currently be considered wetland habitat. A review of available 1970, 1980, and 2003 aerial photography indicates that the TW-6 area contained an inundated area in its southern sector. Corresponding 2009 aerial photography depicts the previously inundated area as lacking inundation, which corroborates conditions verified during the June 2009 on-site selection of an appropriate transect location. An associated forested/shrub wetland occurred north of the ponded area. Historical vegetation types consisted of emergent/shrub species in the area of inundation and a thick stand of trees/shrubs outside of the inundated area. This wetland appears to receive stormwater draining from Tallevast Road to the north, the residential property to the west, and from the pastureland to the east and south. Historical hydrological indicators of TW-6 suggest that this wetland was fed by

stormwater sheet flow as well as by a likely groundwater interface within the area of inundation. An inundated portion of TW-6 was field verified and confirmed with the long-term landowner to be an excavated pond.

8.4.3 Monitoring Well TW-6 Data Assessment

The transducer for well MW-TW-6 was installed on November 6, 2009. Groundwater elevations at MW-TW-6 generally rose steadily from November 2009 through March 2010. Groundwater elevations at MW-TW-6 were above ground surface by approximately 3 to 6 feet during the monitoring period from January 2010 through June 2010 which indicates inundation at this location during this timeframe. Staff gauge measurements collected on March 11 and June 4, 2010 also indicated surface water levels above ground surface (see Table 8-2). Groundwater and surface water responses to precipitation events are evident throughout the data collected to date (Appendix E).

8.4.4 June 2010 Field Observations

No major alteration or conversion of previously reported land use or vegetative cover types in TW-6 was observed between the June 2009 preliminary investigation and the June 2010 transect assessment. The section of TW-6 north of the historically inundated area displayed evidence of conversion to upland forested scrub. Soils in this area are composed of sand and loamy sand, with marginal hydric soil indicators.

Conditions during November 2009 monitoring well and staff gauge installation, as well as during the June 2010 transect assessment, included normal inundation that was sufficient to submerge most of the excavated pond and prohibited access to the previously described deep organic, mucky surface soils. This area was holding up to a 2-foot water column at the time of the June 2010 observations, with small duckweed (*Lemna valdiviana*) dominating the water surface. Vegetation in the excavated pond predominantly consists of OD and deep zone species. Vegetation of the wetland area north of the pond is dominated by outer deep zone and transition zone species, but migration of adaptive and upland species was noted. A minimal amount of wetland soil subsidence was observed within the wetland area outside of the pond, and no wetland soil subsidence was observed within the bed of the pond.

Observed hydrology suggests that groundwater is a partial source to the pond, but it is also fed by rainfall. An eroded, north-to-south oriented stormwater conveyance channel lies along the western boundary of TW-6. This eroded channel is likely a hydrological remnant of the historical stormwater flow path that fed the pond. Normal and capacity pool events in the pond are likely due to elevated groundwater in the areas of TW-6 to the north. These elevated groundwater events could have created the wetland conditions apparent in the northern section of TW-6. A small berm exists at the northern edge of the pond, which could have slowed stormwater sheet flow into the pond to create wetland conditions outside of the pond boundary. Lower than normal precipitation could be another variable that negatively impacts TW-6.

8.5 TARGET WETLAND 18

8.5.1 Transect Location

The TW-18 monitoring transect is oriented from southeast to northwest, beginning at the co-located monitoring well/staff gauge (installed February 22, 2010) and extending to the HWE, in the northern portion of the historical depressional wetland (Figure 1-1).

8.5.2 Habitat Description

The historic area of TW-18 is approximately 4.08 acres in size. A review of 2003 aerial photography indicates that the TW-18 area once contained an inundated area fed by a conveyance that appeared to drain stormwater from Tallevast Road and from a commercial/industrial facility southwest of the wetland. The northern boundary of TW-18 also contained a small stormwater swale.

Vegetation shown on the 2003 aerial photograph of TW-18 consisted of emergent vegetation in and near the inundated area, and shrub/scrub vegetation dominating the wetland area surrounding the inundated portion. A parcel of disturbed upland and a commercial/industrial facility bordered TW-18 to the west, with upland-prairie habitat surrounding the remaining areas of TW-18. Historical hydrological indicators of TW-18 suggest that this wetland was fed both by surficial stormwater sheet flow and by a likely groundwater interface.

8.5.3 Monitoring Well TW-18 Data Assessment

The transducer for well MW-TW-18 was installed on February 23, 2010. Groundwater elevations at MW-TW-18 were approximately 2 to 6 feet bgs during the monitoring period (February 2010 through June 2010). Groundwater and surface water responses to precipitation events are evident throughout the data collected to date (Appendix E).

8.5.4 June 2010 Field Observations

No major alteration or conversion of previously reported land use or vegetative cover types in TW-18 was observed between the June 2009 preliminary investigation and the June 2010 transect assessment. Vegetation within the historical wetland interior of TW-18 consists of a forested upland hammock of 15- to 20-year-old oak/hardwood and introduced mature punk trees (*Melaleuca quinquenervia*). Due to the elevated evapotranspiration rate of the species, which is hypothesized to "dry out" wetlands, the occurrence of punk trees within TW-18 may indicate prior habitat alteration. A minimal number of relict obligate-wetland ferns, including royal fern (*Osmunda regalis*) and Virginia chain fern (*Woodwardia virginica*), occur on hummocks within the historical wetland interior. A dense saw palmetto (*Serenoa repens*) thicket is encroaching along the northern, western, and southern borders of the HWE.

Up to 12 inches of wetland soil subsidence caused by oxidation and gasification of carbon that result from drought and drying conditions was observed within TW-18 and relict wetland vegetation is restricted to hummocks that protrude above the historical wetland floor following exposure by erosion. Soils at the TW-18 site consist of a loamy sand matrix typical of upland forested habitats in this region of Florida. TW-18 no longer contains hydrological indicators consistent with a functional wetland. The wetland habitat at TW-18 likely began transitioning to upland more than 20 years ago and is now devoid of active wetland characteristics.

8.6 REFERENCE WETLAND 1

8.6.1 Transect Location

The RW-1 monitoring transect is oriented from west to east beginning at the co-located monitoring well/staff gauge (installed November 3, 2009) and extending to the HWE, in the eastern portion of the depressional wetland (Figure 1-1).

8.6.2 Habitat Description

The historical area of RW-1 is approximately 8.22 acres in size. The June 2009 field review determined that approximately 3.42 acres of the 8.22-acre wetland parcel can currently be considered wetland habitat. A review of 2003 aerial photography indicates that this site consists of a historically inundated area, with a scrub-shrub and emergent wetland deep zone. Upland prairie habitat currently borders the historical wetland boundary, while a dense thicket of invasive Brazilian pepper tree is ubiquitous throughout the historical transition zone and innermost deep zone of RW-1.

Hydrological indicators observed in the 2003 aerial photograph of RW-1 suggest that this wetland was historically fed by groundwater, but also received stormwater runoff from adjacent agricultural lands and nearby U.S. Highway 301. In the 2003 aerial, less than 10 percent of the site was inundated, and inundation was limited to the interior of the southern one-half of the site where indicators of a former scrub-shrub and thinly forested wetland habitat were observed during the June 2009 site visit.

8.6.3 Monitoring Well RW-1 Data Assessment

The transducer for well MW-RW-1 was installed on November 6, 2009 and was subsequently replaced on November 19 due to a malfunction. Groundwater elevations at MW-RW-1 were at or slightly above ground surface in early December 2009 and from early January 2010 through the end of April 2010. Groundwater elevations were primarily below ground surface from November to early December 2009, during late December 2009, and from the end of April to early June, 2010. The staff gauge measurement collected on March 11, 2010 indicated 0.12 feet of standing surface water while the measurement on June 4, 2010 indicated no standing surface water at this location (see Table 8-2). Groundwater and surface water responses to precipitation events are evident throughout the data collected to date (Appendix E).

8.6.4 June 2010 Field Observations

No major alteration or conversion of previously reported land use or vegetative cover types in RW-1 was observed between the June 2009 preliminary investigation and the June 2010 transect assessment. Vegetation of RW-1 is dominated by a 20-year-old stand of Brazilian pepper (*Schinus terebinthifolius*) shrubs and small trees. Brazilian pepper is an AD species, which is a facultative

wetland or upland species as defined by the FDEP. Within the historical wetland interior, only relict outer deep zone species occur and are limited to a few mature Carolina willow (*Salix caroliniana*) and red maple (*Acer rubrum*) trees. These species were visibly more mature than the dominant Brazilian pepper tree, which suggest the historical nature of flatwood wetlands at this site.

Up to 14 inches of wetland soil subsidence caused by oxidation and gasification of carbon that result from drought and drying conditions was observed within RW-1, and relict herbaceous wetland vegetation (i.e., Virginia chain fern) is restricted to hummocks that protrude above the historical wetland floor following exposure by erosion. Soils observed within RW-1 consist of a loamy sand matrix typical of more upland forested habitats within this region of Florida. Empirical hydrologic indicators at RW-1 are no longer consistent with those typical of a functional wetland. This wetland likely began its transition to upland more than 20 years ago due to undetermined impacts. However, USGS 7.5-minute topographic quadrangle mapping (USGS 1994) depicts the presence of a surface conveyance draining southeast to the nearby Pearce Canal. The overall character of observed hydric soil (wetland) indicators at RW-1 indicates a transition to a successively drier habitat.

8.7 REFERENCE WETLAND 2

8.7.1 Transect Location

The RW-2 monitoring transect is oriented from southwest to northeast beginning at the co-located monitoring well/staff gauge (installed November 3, 2009) and extending to the HWE, in the southwestern portion of the depressional wetland (Figure 1-1).

8.7.2 Habitat Description

The historical area of RW-2 is approximately 8.20 acres in size. The June 2009 field review determined that approximately 4.9 acres of the 8.20-acre wetland parcel can currently be considered wetland habitat. A review of 2003 aerial photography indicates that this site consisted of a thick canopy of trees, with small areas of shrubby and emergent vegetation scattered inside of the eastern and southern boundaries. Active pastureland surrounds the historical wetland boundaries. The only evidence of probable inundation was noted in the southwestern section of RW-2.

Hydrological indicators observed on the 2003 aerial photograph of RW-2 suggest that the water source for this wetland was primarily from two linear stormwater conveyance features that enter RW-2 at the eastern and western corners of its northern historical wetland boundary. Other historical hydrological evidence suggests that RW-2 likely had a conveyance that drained the wetland area at its southeastern corner.

8.7.3 Monitoring Well RW-2 Data Assessment

The transducer for well MW-RW-2 was installed on November 6, 2009. Groundwater elevations at MW-RW-2 generally rose steadily from November 2009 through March 2010. Groundwater elevations were at or slightly above ground surface from late January through early May 2010. From the end of May to early June, groundwater elevations were below ground surface. Staff gauge measurement obtained on March 11, 2010 indicated 0.30 feet of standing surface water while measurement on June 4, 2010 indicated no standing surface water at this location (see Table 8-2). Groundwater and surface water responses to precipitation events are evident throughout the data collected to date (Appendix E).

8.7.4 June 2010 Field Observations

No major alteration or conversion of previously reported land use or vegetative cover types in RW-2 was observed between the June 2009 preliminary investigation and the June 2010 transect assessment. Several deep zone and aquatic floral species occur in the interior of RW-2, but vegetation of this wetland is increasingly dominated by outer deep zone and transition zone species. Evidence of prior conversion of RW-2 to upland forest was observed during the June 2009 field investigation. Of the 8.20-acre wetland parcel originally identified, 4.9 acres are currently functional wetland habitat.

The area of RW-2 most typical of wetland habitat occurs in the upper central sector of the historical wetland boundary (the monitoring transect was established in this location). This area is dominated by OD and deep zone floral species, but adaptive and upland species are migrating into the wetland area. The transitional and adaptive wetland floral species in the section of RW-2 south of the transected wetland are limited to an area that was excavated and dammed many years ago. According to the landowner, this excavated area was once used to collect and hold stormwater for

his livestock. A small concrete weir constructed to dam this excavated area has failed and is no longer functional, which has allowed most of this wetland to return to upland habitat.

Up to 20 inches of wetland soil subsidence caused by oxidation and gasification of carbon that result from drought and drying conditions was observed within RW-2. The subsidence of this wetland area is likely due to hydrological alterations of both surface and groundwater. Livestock appear to frequent this area of RW-2 and have increased the rate of wetland soil subsidence through soil compaction. Lower than normal precipitation could be another variable that negatively impacts RW-2.

8.8 REFERENCE WETLAND 3

8.8.1 Transect Location

The RW-3 monitoring transect is oriented from northeast to southwest beginning at the co-located monitoring well/staff gauge (installed November 2, 2009) and extending to the HWE, in the northwestern portion of the depressional wetland (Figure 1-1).

8.8.2 Habitat Description

The historical area of RW-3 is approximately 10.45 acres in size. The June 2009 field review determined that approximately 6.3 acres of the 10.45-acre wetland parcel can currently be considered wetland habitat. A review of 2003 aerial photography indicates that this site primarily consisted of an emergent wetland that was frequently inundated. Upland pasture and scrub habitat bordered the wetland boundary of RW-3. The outer perimeter of the southern half of RW-3 was bordered by thick shrub and tree vegetation.

Hydrological indicators from the 2003 aerial photograph of RW-3 suggest that the water source for this wetland was primarily groundwater, but there also was a stormwater source. The 2003 aerial photograph shows that three-quarters of the wetland area was inundated, and the interior of the northern boundary displayed obvious hydrology and vegetative patterns of a shrub wetland. Floating vegetation was prevalent within the upper portion of RW-3, and rooted vegetation appeared to be depressed or absent within the lower sections, indicating that this wetland was historically inundated throughout much of the growing season. The 2006 aerial photograph of RW 3 also shows this area as inundated.

8.8.3 Monitoring Well RW-3 Data Assessment

The transducer for well MW-RW-3 was installed on November 6, 2009. Groundwater elevations at MW-RW-3 generally rose steadily from November 2009 through March 2010. Groundwater elevations in monitoring well RW-3 were generally at or below ground surface for the entire monitoring period (November 2009 through June 2010). Staff gauge measurements collected on March 11 and June 4, 2010 indicated no standing surface water at this location (see Table 8-2). Groundwater and surface water responses to precipitation events are evident throughout the data collected to date (Appendix E).

8.8.4 June 2010 Field Observations

No major alteration or conversion of previously reported land use or vegetative cover types in RW-3 was observed between the June 2009 preliminary investigation and the June 2010 transect assessment. Evidence of prior conversion of RW-3 to upland prairie was observed. Of the 10.45-acre wetland parcel identified, approximately 6.3 acres are currently functional wetland habitat. The lower one-half of RW-3 is rapidly transitioning to upland.

The monitoring transect was established in the northwestern quadrant of RW-3, which displayed the most typical wetland habitat. This area is dominated by OD and deep zone floral species, but adaptive and upland species are migrating into the outer limits of the wetland. Opportunistic ruderal (adaptive) upland species now dominate the prairie vegetation of areas outside of the wetland area identified by the June 2009 field investigation. Soils of the wetland interior are consistent with sandy wetland soils, and the soils of the transitional and upland areas are composed of upland loamy sands.

A small amount of wetland soil subsidence caused by oxidation and gasification of carbon that result from drought and drying conditions was observed in the interior of the western wetland boundary; however, indicators of active wetland soil subsidence were obscured by previous landowner attempts (confirmed) to excavate areas within the deep zone to dewater the site and create wallows for livestock. No obvious evidence of surficial hydrological impacts was observed, but lower than normal precipitation could be another variable that negatively impacts RW-3.

Section 9
Conclusions

Implementation of the July 2009 WMP has commenced. Staff gauges and monitoring wells were installed between November 2009 and February 2010 The start of the 2-year baseline period is considered to be November 2009 except for TW-1 and TW-18 for which the start of the 2-year baseline is considered February 2010. Currently, data is being collected to establish baseline conditions in the wetlands using the SWFWMD assessment procedures. This monitoring is conducted in accordance with an FDEP requirement for wetlands monitoring associated with the anticipated installation and activation of a groundwater remediation system for the site.

In each of thearea wetlands (TWs nearer the facility and RWs in the greater Tallevast area) data will be collected and conditions will be evaluated for a minimum of 2 years (through November 2011 or February 2012, as appropriate) prior to groundwater extraction associated with the RAP Addendum implementation. A baseline of information will be established about local fluctuations in groundwater elevation and the corresponding effect on the habitat and function of the depressional wetlands within the isolated area. The collection and evaluation of these data may be used to establish thresholds for determining whether TWs require maintenance or mitigation as a result of RAP system operation and potential impacts of regional changes on wetlands.

RW-5 has been mitigated. The Wetland Mitigation Notice of Final Agency Action for Approval is included as Appendix F.

Groundwater elevation data in wetlands will continue to be collected approximately every 90 days, with annual WMP investigations occurring in May or June of each successive year. A subsequent baseline findings report and comparative analysis with local climate and previously collected data will be issued following the annual WMP investigations.

Section 10
References

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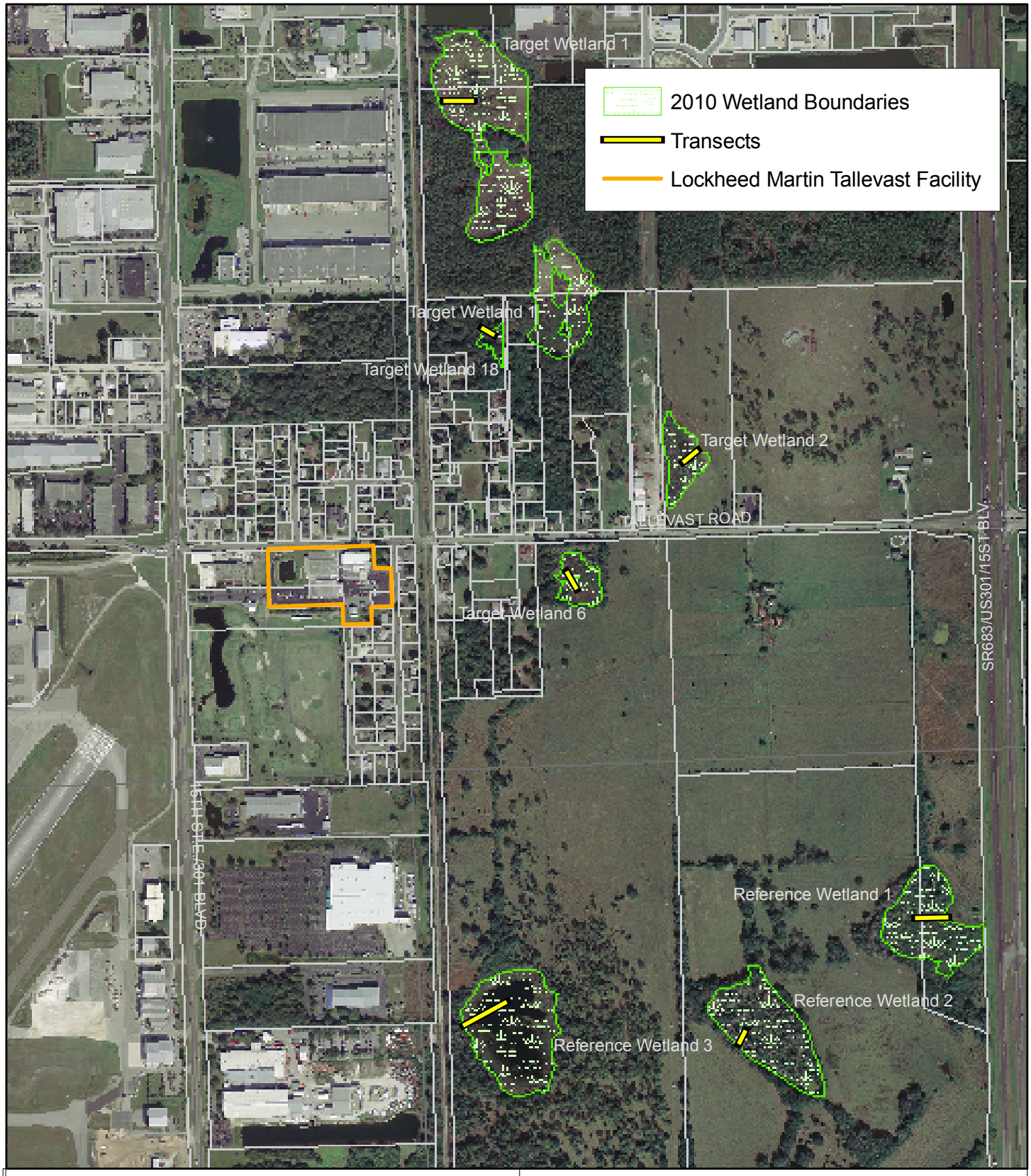
TABLES

Table 7-1
Wetlands Monitoring Report
Survey Data

Description	State Plane North	State Plane East	Top Casing/Gauge Elevation (ft msl)	Concrete Pad Elevation (ft msl)	Ground Elevation (ft msl)	3' Mark Elevation (ft msl)	1' Mark Elevation (ft msl)	0' Mark Elevation (ft msl)
RW-1								
MW-RW-1	1114069.58	482819.52	18.44	14.09	13.90	NA	NA	NA
SG-RW-1	1114070.45	482818.27	17.31	NA	13.90	16.98	14.98	NA
NP-12-RW-1	1114074.36	482833.78	NA	NA	NA	NA	NA	NA
NP-6-RW-1	1114083.95	482871.81	NA	NA	NA	NA	NA	NA
RW-2								
MW-RW-2	1113508.03	481763.66	21.19	17.40	17.40	NA	NA	NA
SG-RW-2	1113507.17	481765.54	20.45	NA	17.40	21.12	18.21	NA
NP-12-RW-2	1113487.82	481743.02	NA	NA	NA	NA	NA	NA
NP-6-RW-2	1113467.04	481724.38	NA	NA	NA	NA	NA	NA
RW-3								
MW-RW-3	1113699.69	480440.25	25.31	20.89	20.75	NA	NA	NA
SG-RW-3	1113697.44	480440.70	23.73	NA	20.77	23.40	21.40	NA
NP-12-RW-3	1113717.61	480428.18	NA	NA	NA	NA	NA	NA
NP-6-RW-3	1113744.98	480397.51	NA	NA	NA	NA	NA	NA
TW-1								
MW-TW-1	1118667.53	480476.65	26.72	23.02	22.44	NA	NA	NA
SG-TW-1	1118666.21	480478.55	25.80	NA	22.40	25.47	NA	NA
NP-12-TW-1	1118657.97	480452.50	NA	NA	NA	NA	NA	NA
NP-6-TW-1	1118658.70	480395.88	NA	NA	NA	NA	NA	NA
TW-2								
MW-TW-2	1116668.18	481552.76	26.29	22.22	21.65	NA	NA	NA
SG-TW-2	1116663.81	481546.47	24.52	NA	21.65	24.19	22.19	NA
NP-12-TW-2	1116642.28	481579.62	NA	NA	NA	NA	NA	NA
NP-6-TW-2	1116636.16	481576.79	NA	NA	NA	NA	NA	NA
TW-6								
MW-TW-6	1115977.75	480939.06	25.11	21.25	21.05	NA	NA	NA
SG-TW-6	1115975.49	480938.40	24.28	NA	21.05	23.95	NA	NA
NP-12-TW-6	1115980.54	480935.18	NA	NA	NA	NA	NA	NA
NP-6-TW-6	1115984.11	480933.62	NA	NA	NA	NA	NA	NA
TW-18								
MW-TW-18	1117379.14	480524.02	29.15	26.28	25.89	NA	NA	NA
SG-TW-18	1117379.81	480526.54	29.38	NA	25.89	29.05	27.05	26.05
NP-12-TW-18	1117386.41	480523.16	NA	NA	NA	NA	NA	NA
NP-6-TW-18	1117397.32	480519.94	NA	NA	NA	NA	NA	NA

Notes:
NA - Not applicable
RW - Reference wetland
TW - Target wetland
NP - Normal pool
ft msl - feet mean sea level

FIGURES



N

0 250 500 1,000

Scale in Feet

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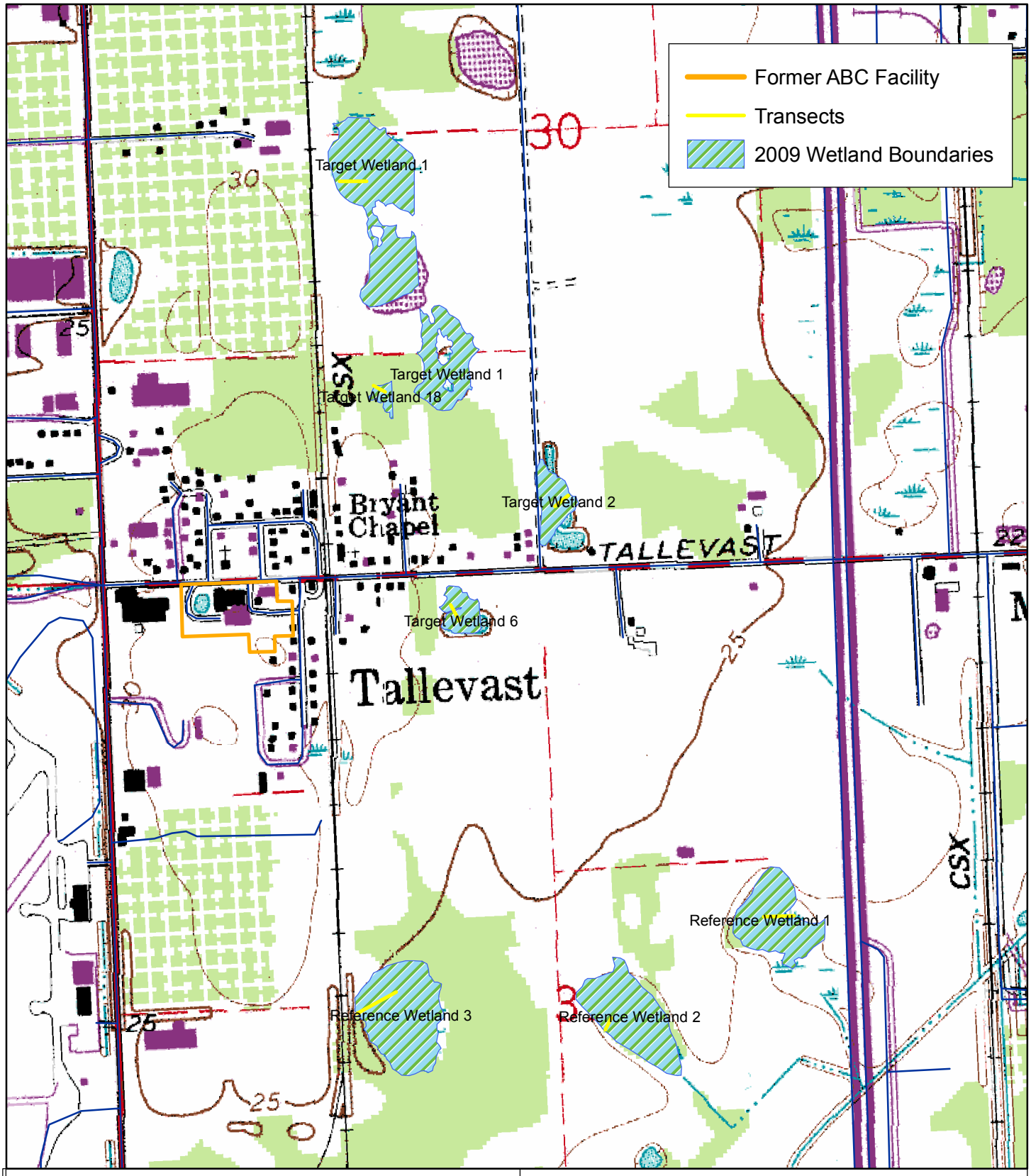
LOCKHEED MARTIN TALLEVAST SITE
TALLEVAST, FLORIDA
WETLANDS MONITORING PLAN

Wetland and Transect Location Map

ARCADIS

Figure 1-1



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Scale in Feet

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FLORIDA

LOCKHEED MARTIN TALLEVAST SITE
TALLEVAST, FLORIDA
WETLANDS MONITORING PLAN

Wetland and Transect Location Map

ARCADIS

Figure 3-1

APPENDICES

APPENDIX A - WELL DEVELOPMENT LOGS

11/2/09
800 SEK onsite (Arcadis)
810 AL onsite (Arcadis)
Trip to home depot
930 Am Drill onsite. Tim, Leon, &
1000 H&S meeting, unload rig.
mob to RW-6
Can drill there
mob to RW3
Post hole dig to 5'
1245 Start to drill
0-4 dark brown vf sand, trace grass roots moist to dry, no odor, dvi.
4-8 Brown Silt, loose, wet no odor.
1300 set pad & protective casing
1330 cleanup move at
1400 mob to RW-2
trouble finding location
1545 pick location
begin setup

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11/2/09
1610 hand auger
0-5 Dark brown organic vf sand, roots, moist to wet 3.5', no odor nvi trace Silt & Clay
1615 Begin drilling
5-8 5-8 Brown Sandy Silt, very loose, wet, no odor nvi.
1630 Well is set Sand & bentonite well
1700 offsite will set Pad in the morning.
1720 leave facility

11/3/09

730 Arcadis onsite

800 mob to RW-2

H&S meeting

Alex to TR-6 to check access, ~~Tom~~ Drill to RW-2 to set pad.

930 Done setting pad cleanup demob

1000 mobed to TR-6

walk back to well location - will take alot to clear out.

1100 still clearing out brush

1200 start drilling

0-6 Dark brown marshy vf Sandy Silt, very loose wet, little organics, organic odor, nvi.

6-8 Brown fine Sand, mod dense, no odor, nvi

1245 Done installing well & Sand pack

11/3/09

1310 finished setting pad @ TR-6

1410 mob to RW-1

1510 start hand augering

0-2 Dakbrown organic vf Sandy Silt, moist, trace organics, no odor.

2-8 Dark brown grading to brown fine Sand, mod dense wet @ 4' bgs. no odor nvi.

1530 Done drilling well. Sand pack & bentonite installed.

1630 finished setting pad. Driller load up rig

1650 call from Darren, we have permission to go on Battle property

1810 mob to Battle

1745 Done for the day

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11/4/09

730 Arcadis onsite

800 move to Bostic property TW-2

845 set three pieces of rebar for monuments @ TW-2

915 moving to drilling location

930 post hole dig

0-6" Dark brown organic rich vf sand, little roots, moist no odor, nvi.

6"-5' Brown vf sand grading to light brown fine sand water label @ 25' bgs.

950 Begin to drill

5-8 ft brown fine sand, wet loose, no odor, nvi.

1010 Begin to set well

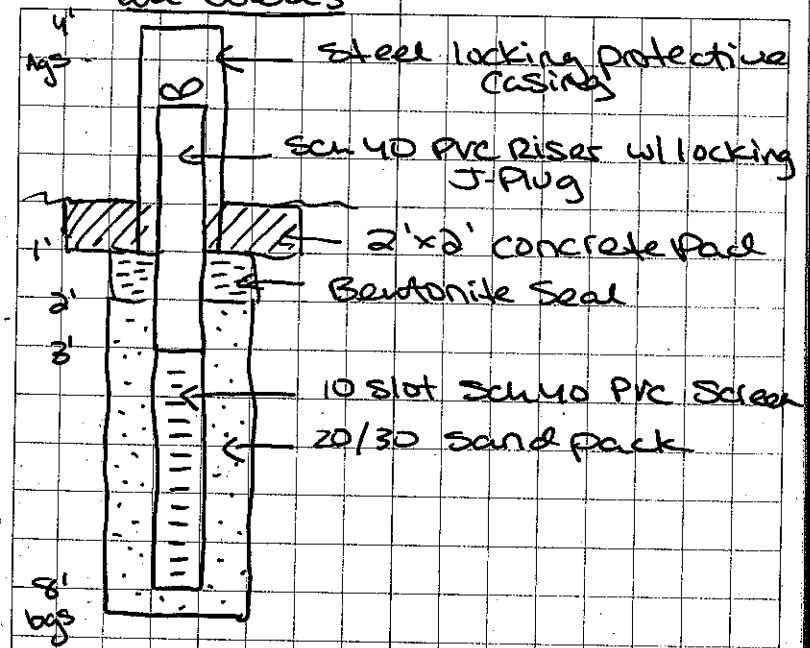
1030 set pad

1100 demob from TW-2

1200 stake out route to TW-1

1230 mob rig to TW-1 figured out we could not bring rig to location

11/4/09 all wells



1320 demob back to site.

1400 Darrin & Greame come to check out TW-2

1430 Alex, Nate & I install staff gauges & monuments

1730 done setting monuments

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11/5/09

740 SEK onsite

Fred & Joe already here

800 Collect supplies

815 H&S meeting

840 mob to develop MW-RW3

DTW @ MW-RW3 - 8.33

stickup casing ~ 4.25

Start pumping @ 925

~~1005~~	temp	cond	DO%	pH	turb
1005	28.73	682	72.6	5.84	23.4
1008	28.45	671	66.7	5.41	11.2
1011	28.51	661	65.3	5.31	6.08
1013	28.54	655	66.5	5.28	4.27
1015	28.47	649	66.1	5.26	3.51

25 gal removed.

pump stop @ 1020

DTW 8.92 DTB 12.91

1040 mob to MW-RW2

Set up to develop MW-RW2

1050 Start pumping

Alex leaves site.

11/5/09

DTW - 5.52 DTB 12.92

	temp	cond	DO%	pH	turb.
1155	28.42	340	94.2	6.24	24.6
1159	28.26	335	94.3	6.16	20.4
1202	28.34	333	91.3	6.15	17.4
1204	28.29	331	90.5	6.13	16.2
1206	28.47	332	92.6	6.12	17.0

40 gal removed

Stop pump 12:10

DTW - 6.50 DTB 12.80

1300 mob back to site

1400 mob to TE6

need more hose mob to RW-1

1500 Setup

DTW 5.35 DTB 11.52

pump start time 1510

~~1618~~	temp	cond	DO%	pH	turb
1618	25.96	297	53.8	6.16	20.2
1620	25.89	298	43.1	5.88	16.5
1623	25.80	296	35.0	5.86	16.0
1626	25.72	294	29.7	5.86	14.8

pump stop @ 1630

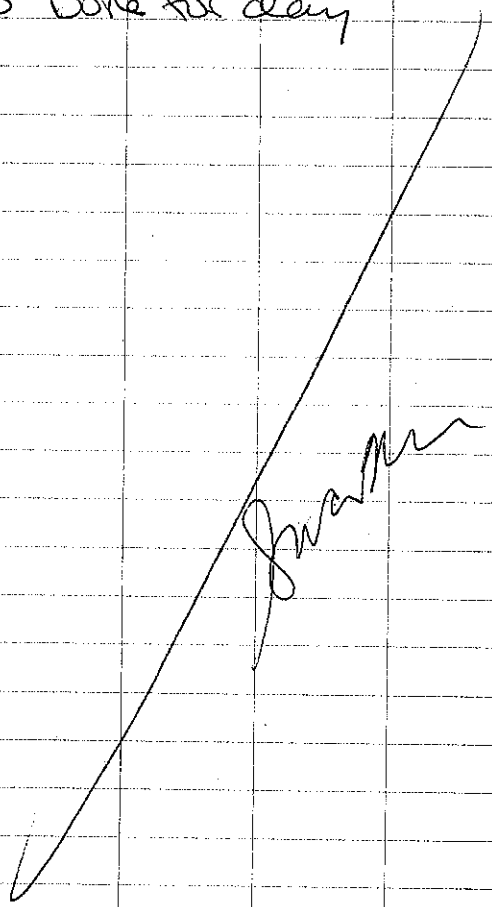
65 gal removed

17 final DTW 5.68

DTB 11.82

11/5/09

1700 mob back to site
pump purge water into
treatment system
1730 Done for day



11/6/09

730 STK onsite Freed Mixon
already onsite
800 dep for the day
H&S meeting
815 mob to TW-6
DTW 4.55 DTB 11.44
Setup pump
Strt pump time 845

time	temp	cond	DO%	pH	turb
933	23.79	265	84.1	5.86	33.2
935	23.84	264	40.8	5.26	54.5
937	23.83	262	35.0	5.15	25.8
939	2383	262	33.8	5.15	23.2
941	24.01	263	34.7	5.15	23.0
943	24.20	265	32.9	5.14	20.9
945	24.25	265	32.8	5.13	18.3

pump stop time 950
gal removed. 65
@ DTW 4.79 DTB 11.47
1010 mob back to site to
dump purge water.
1040 mob to RW-1
Setup pump
DTW 7.18 DTB 13.20

Pump Start: 11:53

11/6/09

time	temp	cond	DO%	pH	turb
~~11:42~~ 12:42	28.00°C	4041	32.1%	6.33	28.1
~~11:44~~ 12:44	27.99°C	4011	26.1%	6.21	23.5
~~11:47~~ 12:47	27.97°C	3996	26.0%	6.23	32.7
~~11:49~~ 12:49	28.03°C	3981	26.1%	6.25	18.7
~~11:51~~ 12:51	28.10°C	3979	26.4%	6.26	12.9
~~11:53~~ 12:53	28.15°C	3980	24.4%	6.27	11.7
~~11:55~~ 12:55	28.16C	3985	23.2%	6.27	15.2

pump stop time 12:57.30

gal. accumulated 65

DTW 7.02 DTB 13.20

12:18 mob back to site to dump purge water

Darrin & I deployed transducers & all five newly installed wells.

1515 SEK offsite

11/6/09

Well ID	DTW	DTB	Deployed @
MW-RW-1	7.42	13.20	@ 1350
MW-RW-2	5.52	12.80	@ 1305
MW-RW-3	8.43	12.91	@ 1324
MW-TW-6	4.68	11.47	@ 1247
MW-TW-2	5.40	11.82	@ 1130

transducers programed to start recording @ 1800

11/6/09	Northing	Easting
MW-RW3	1113706.62	480145.22
RW3-NP6	1113746.04	480399.65
RW3-NP12	1113720.98	480430.70
RW3-hnp	1113794.22	480362.03
MW-RW2	1113512.96	481769.56
RW2-NP6	1113489.23	481757.45
RW2-NP12	1113469.95	481725.92
RW2-hnp	1113458.74	481712.48
MW-TW1	1116671.43	481554.05
TW1-hnp	1116644.14	481580.78
TW1-NP12	1116631.68	481579.46

all other point were out of Satellite range

2/23/10

800 Freemixon & Joe meet Alex Levy & S. Klinek on site

815 H&S meeting
Calibrate PID
load equipment for the day
todays objective is to develop TW-1 & TW-18
equipment use
PID
Pump
drums
hosing
weather overcast 60°

900 mob to MW-TW-18
DTW 7.55' Stick up length 3'
DTB 11.21'

930 Alex installed & labeled monuments.

945 Staff gauge installed & labeled
Development Starts
PID 0.0

10:20 Stop pump 2/23/10
pump is loosing water unable to keep steady flow PID 0.0
1030 mob to MW-TW-1
call to get alternative pump for developing MW-TW-18
see next page for MW-TW-1 development details

time	temp C°	cond uS/cm	DO mg/L	pH	turb	ORP
0954	24.89	708	7.77	7.65	201	139.1

2-23-10

2-23-10

2/23/10 MW-TW-1 SEK

1045 DTW - 29.5'

casing - length - 3.60'

DTB - 13.21'

Set up hoses & pump

1100 begin pumping PID 0.0

time	temp °C	cond ms/cm	DO mg/L	turbidity NTU	pH S.U.	ORP
1115	22.97	511	4.96	356	5.13	45.0
1118	21.17	513	5.36	98.2	5.13	46.3
1121	21.35	520	4.70	24.0	5.17	40.5
1124	21.44	519	4.63	16.5	5.14	43.2
1127	21.44	516	4.40	15.1	5.18	42.2
1130	Surge well screen - 50 gal removed					
1143	22.36	536	4.21	12.2	5.26	63.4
1146	22.78	542	4.83	11.30	5.27	64.3

Will wait until turbidity drops PID 0.0

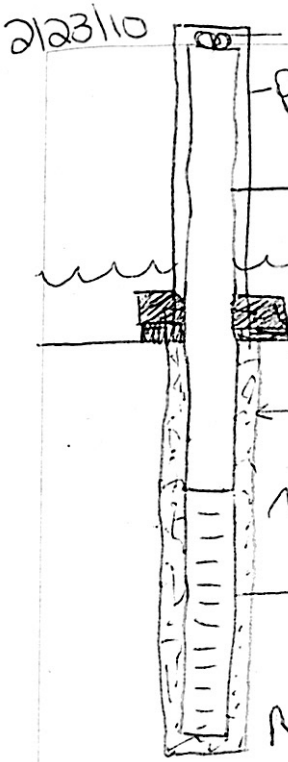
1200 water primewas lost during surging. pump stoped working 1230 to store to get fittings for second pump

1400 setting up second pump @ MW-TW-1

pump re-start time 1428

pump stop time 1456

Total gal removed → 100



Staff Gauge 1.34' reading @ 1455

DTW MW-TW-1 4.05' @ 1500

PID 0.0

MW-TW-1 well development continued (units on previous page)

time	temp	DO	cond.	turb	pH	ORP
1438	22.97	6.17	528	130	5.17	82.0
1441	22.97	7.37	526	60	5.13	83.9
1444	23.07	7.15	525	33.7	5.13	83.2
1447	23.09	7.38	524	18.3	5.13	82.7
1450	23.09	7.37	524	11.6	5.14	83.3
1453	23.13	7.36	523	9.6	5.13	86.3

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2-23-10 JEK

1500 clean up @ TW-1
1515 leave Boothe property
back to site to drop
off purge water.
1620 Done onsite mob to
MW-TW-18
1630 @ MW-TW-18 started
setting up. Wattera pump
DTW 7.55 @ MW-TW-18
pump start time 16.23
surge 4-5 section of screen
5 gal removed PID 0.0
surge 3-4 section of screen
@ 1634 35 gal removed.
surge 2-3 section of screen
@ 1642 20 gal removed
surge 1-2 section of screen
@ 1650 went dry almost
immediately.
move pump intake to
center of screen. PID 0.0
pump restart @ 1654
clogged check valve
pump restart @ 1530

Swann 2-23-10

R625-STA-002194-0

2-23-10

time	temp °C	cond µS/cm	turb NTU	DO mg/L	ORP mV	pH S.U.	
1659	20.45	838	55.2	4.26	46.1	5.69	3.5 gal removed
1631	20.14	843	61.2	4.20	24.8	6.23	
1637	20.18	843	33.6	4.08	24.5	6.15	
1640	20.20	843	18.6	3.86	20.5	6.13	
1643	20.22	843	6.64	3.96	21.0	6.09	3.5 gal

JEK

transducer
deployed @ time
MW-TW-1 1708
DTW - 2.88
PID 0.0
transducer
deployed @ time
MW-TW-18 1753
DTW - 7.6
PID 0.0
1720 Fred, Joe, Alex
& Sara @ offsite

2-23-10

APPENDIX B - BOREHOLE LOGS AND WELL COMPLETION DIAGRAMS

ARCADIS
Infrastructure, environment, facilities

DRILLING LOG

Project Name: Lockheed Martin Tallevast Site	**ID: MW-TW-1**
Project #: B0038055	Total Depth: 10 feet bls
Location: Tallevast, Florida	Screened Interval: 5-10 feet bls
Date Drilled: 2/22/2010	Well Diameter 2 inches
Drilling Contractor/Method: Huss / Mud Rotary	Monitoring Device: PID
Ground Surface Elevation: 22.44 ft msl	Logged by: Sara Klimek
Measuring Point Elevation: 26.72 ft msl	

Depth Below Surface (Feet)	Blow Counts per 6"	Recovery (%)	PID/FID reading (PPM)	Lithologic Description	Graphic Log	Well Construction Steel Protective Casing	Depth Below Surface (Feet)
						Concrete Pad	
0.0			0.0	Lithologic descriptions of drill cuttings are not available because the well was installed in water using a mud rotary tripod rig		2" Schedule 40 PVC Riser 20/30 Sand Pack	0.0
5.0						2" Schedule 40 PVC 0.010 Slot Screen	5.0
10.0							10.0

ARCADIS
Infrastructure, environment, facilities

DRILLING LOG

Project Name: Lockheed Martin Tallevast Site	**ID: MW-TW-2**
Project #: B0038055	Total Depth: 8 feet bls
Location: Tallevast, Florida	Screened Interval: 3-8 feet bls
Date Drilled: 11/4/2009	Well Diameter 2 inches
Drilling Contractor/Method: AM Drill / CME 45	Monitoring Device: A verbal interview of the field geologist indicates a PID was used and there were no readings above zero.
Ground Surface Elevation: 21.65 ft msl	Logged by: Sara Klimek
Measuring Point Elevation: 26.29 ft msl	

Depth Below Surface (Feet)	Blow Counts per 6"	Recovery (%)	PID/FID reading (PPM)	Lithologic Description	Graphic Log	Well Construction	Depth Below Surface (Feet)
0.0		Hand-Auger		**0-0.5':** Dark brown organic rich very fine sand, little roots, moist, no odor **0.5-5':** Brown very fine sand grading to light brown fine sand, water table at 2.5 ft bgs		Steel Protective Casing; Concrete Pad; Bentonite Seal; 2" Schedule 40 PVC Riser; 20/30 Sand Pack	0.0
5.0		Drill Cuttings		**5-8':** Light brown fine sand, wet, loose, no odor		2" Schedule 40 PVC 0.010 Slot Screen	5.0
10.0							10.0

ARCADIS
Infrastructure, environment, facilities

DRILLING LOG

Project Name: Lockheed Martin Tallevast Site	**ID: MW-TW-6**
Project #: B0038055	Total Depth: 8 feet bls
Location: Tallevast, Florida	Screened Interval: 3-8 feet bls
Date Drilled: 11/3/2009	Well Diamater 2 inches
Drilling Contractor/Method: AM Drill / CME 45	Monitoring Device: A verbal interview of the field geologist indicates a PID was used and there were no readings above zero.
Ground Surface Elevation: 21.05 ft msl	Logged by: Sara Klimek
Measuring Point Elevation: 25.11 ft msl	

Depth Below Surface (Feet)	Blow Counts per 6"	Recovery (%)	PID/FID reading (PPM)	Lithologic Description	Graphic Log	Well Construction	Depth Below Surface (Feet)
0.0		Hand-Auger		**0 -6':** Dark brown marshy very fine sandy silt, very loose, wet, little organics, organic odor		Steel Protective Casing; Concrete Pad; Bentonite Seal; 2" Schedule 40 PVC Riser; 20/30 Sand Pack	0.0
5.0		Drill Cuttings		**6-8':** Brown fine sand, mod dense, wet, no odor		2" Schedule 40 PVC 0.010 Slot Screen	5.0
10.0							10.0

ARCADIS
Infrastructure, environment, facilities

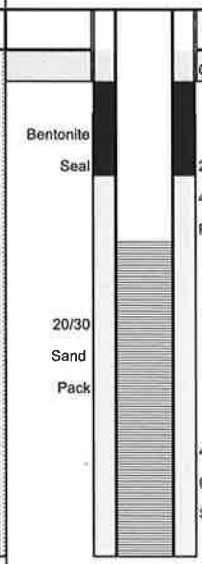
DRILLING LOG

Project Name: Lockheed Martin Tallevast Site	**ID: MW-TW-18**
Project #: B0038055	Total Depth: 8 feet bls
Location: Tallevast, Florida	Screened Interval: 3-8 feet bls
Date Drilled: 2/22/2010	Well Diameter 2-inches
Drilling Contractor/Method: Huss / Mud Rotary	Monitoring Device: PID
Ground Surface Elevation: 25.89 ft msl	Logged by: Sara Klimek
Measuring Point Elevation: 29.15 ft msl	

Depth Below Surface (Feet)	Blow Counts per 6"	Recovery (%)	PID/FID reading (PPM)	Lithologic Description	Graphic Log
0.0		Hand-Auger	0.0	**0 -2':** Dark brown fine sand, some roots, dry	
			0.0	**2-5':** Light brown fine sand, dry to moist with depth, no odor	
5.0		Drill Cuttings	0.0	**5-8':** Drill mud return - Light brown silt and fine sand, no odor	
10.0					

Well Construction

Steel Protective Casing



Depth Below Surface (Feet)
0.0
5.0
10.0

ARCADIS
Infrastructure, environment, facilities

DRILLING LOG

Project Name: Lockheed Martin Tallevast Site	**ID: MW-RW-1**
Project #: B0038055	
Location: Tallevast, Florida	Total Depth: 8 feet bls
Date Drilled: 11/3/2009	Screened Interval: 3-8 feet bls
Drilling Contractor/Method: AM Drill / CME 45	Well Diamater 2 inches
Ground Surface Elevation: 13.90 ft msl	Monitoring Device: A verbal interview of the field geologist indicates a PID was used and there were no readings above zero.
Measuring Point Elevation: 18.44 ft msl	Logged by: Sara Klimek

Depth Below Surface (Feet)	Blow Counts per 6"	Recovery (%)	PID/FID reading (PPM)	Lithologic Description	Graphic Log	Well Construction	Depth Below Surface (Feet)
0.0		Hand-Auger		**0 -2':** Dark brown organic very fine sandy silt, moist, trace organics, no odor		Steel Protective Casing; Concrete Pad; Bentonite Seal; 2" Schedule 40 PVC Riser	0.0
				2-8': Dark brown grading to brown fine sand, mod dense, wet at 4 ft bgs, no odor		20/30 Sand Pack	
5.0		Drill Cuttings				2" Schedule 40 PVC 0.010 Slot Screen	5.0
10.0							10.0

ARCADIS
Infrastructure, environment, facilities

DRILLING LOG

Project Name: Lockheed Martin Tallevast Site	**ID: MW-RW-2**
Project #: B0038055	Total Depth: 8 feet bls
Location: Tallevast, Florida	Screened Interval: 3-8 feet bls
Date Drilled: 11/2/2009	Well Diamater 2-inches
Drilling Contractor:/ Method AM Drill / CME 45	Monitoring Device: A verbal interview of the field geologist indicates a PID was used and there were no readings above zero.
Ground Surface Elevation: 17.40 ft msl	Logged by: Sara Klimek
Measuring Point Elevation: 21.19 ft msl	

Depth Below Surface (Feet)	Blow Counts per 6"	Recovery (%)	PID/FID reading (PPM)	Lithologic Description	Graphic Log	Well Construction	Depth Below Surface (Feet)
0.0		Hand-Auger		**0 -5':** Dark brown organic very fine sand, roots, moist to wet 3.5 ft, no odor, trace silt and clay		Steel Protective Casing; Concrete Pad; Bentonite Seal; 2" Schedule 40 PVC Riser; 20/30 Sand Pack	0.0
5.0		Drill Cuttings		**5-8':** Brown fine sandy silt, very loose, wet, no odor		2" Schedule 40 PVC 0.010 Slot Screen	5.0
10.0							10.0

ARCADIS
Infrastructure, environment, facilities

DRILLING LOG

Project Name: Lockheed Martin Tallevast Site	**ID: MW-RW-3**
Project #: B0038055	
Location: Tallevast, Florida	Total Depth: 8 feet bls
Date Drilled: 11/2/2009	Screened Interval: 3-8 feet bls
Drilling Contractor/Method: AM Drill / CME 45	Well Diameter 2 inches
Ground Surface Elevation: 20.75 ft msl	Monitoring Device: A verbal interview of the field geologist indicates a PID was used and there were no readings above zero.
Measuring Point Elevation: 25.31 ft msl	Logged by: Sara Klimek

Depth Below Surface (Feet)	Blow Counts per 6"	Recovery (%)	PID/FID reading (PPM)	Lithologic Description	Graphic Log	Well Construction (Steel Protective Casing)	Depth Below Surface (Feet)
0.0		Hand-Auger		**0-4':** Dark brown very fine sand, trace grass roots, moist to dry, no odor		Concrete Pad; Bentonite Seal; 2" Schedule 40 PVC Riser	0.0
5.0		Drill Cuttings		**4-8':** Brown silt, loose, wet, no odor		20/30 Sand Pack; 2" Schedule 40 PVC 0.010 Slot Screen	5.0
10.0							10.0

APPENDIX C - FIELD DATA SHEETS

WETLAND ASSESSMENT PROCEDURE

Wellfield / Property	Wetland Name	Wetland Type
H. Boothe (P-52)	Target Wetland 1	Emergent

Wetland ID	Data Owner	Data Source	Personnel	Date	Start/End
TW-1			A. Levy & S. Klimek ARCADIS	6/15/2010	

PHOTO-DOCUMENTATION

Frame	Description	Photo Pt.	Direction
			north
			east
			west
			south

WATER LEVEL INFORMATION

Dry?	Elevation (ft)	Device	Well/Gage ID
yes	n/a	SG	n/a

Description

see well data log report

Please enter Yes (Y), No (N), or Not Sure (NS) for the following questions and provide comments/explanations.

WETLAND IMPACTS

Wetland edges filled or disturbed?	No
Excessive dumping or trash in wetland?	No
Hog disturbance?	No
Signficant impact from cattle (trampling)?	No
Vehicles through wetland (includes bicycles)?	No
Insect damage?	No
Disease?	No

Explanation(s)

Some tire ruts & tracks observed through wetland. Boundary fence maintained in northern third of site.

WETLAND DRAINAGE

Augmentation equipment in place?	No
Augmentation occurring at time of WAP?	No
Clear evidence of direct stormwater inflow?	No
Clear evidence of direct drainage from wetland?	No
Other drainage activities in area?	Yes
Borrow pit/retention pond in wetland vicinity?	Yes

Explanation(s)

Borrow/irrigation pond located offsite and immediately north of wetland.

Fire

Signs of Fire? No

Explanation (year, expanse, intensity)

Lakes / Docks

Docks completely out of water
Docks touching water or with <50% of dock over water
Docks >50% out of water
(Not Applicable)

Is the littoral zone stranded? ☐

Comments

Soil Subsidence

New signs of oxidation/subsidence? north

Explanation

Up to 18 inches of moderately recent subsidence within the wetland interior was observed in 2009 screening. Additional evidence of subsidence not observed in 2010.

General Comments/Observations

Winter freezes in late 2009- early 2010 reduced visual dominance of previously noted herbaceous species in OD & D zones. Recovery anticipated in 2010 growing season. Evidence of standing water, but none present on SG-RW-1

Future users of this data may not want to analyze / compare this data with other wetlands due to the extensive level of:

- ☐ non-groundwater withdrawal-related disturbance
- ☐ soil subsidence

WILDLIFE

Wildlife	Count	Evidence	Wildlife	Count	Evidence	Wildlife	Count	Evidence
Whitetail deer		tracks	Great blue heron		tracks			
Possum		tracks						
Raccoon		tracks						

WETLAND ASSESSMENT PROCEDURE

Wellfield / Property	Wetland Name	Wetland Type
H. Boothe (P-52)	Target Wetland 1	Emergent

Wetland ID	Area Assessed	Zone Assessment Notes
TW-1		

GROUNDCOVER

For each zone assessed, please document the following: species abbreviation, WAP zone (U, AD, T, OD, or D), % cover (5% or 10-100% in increments of 10%), count (1-4), and distribution (E=edge, B=beyond a few feet, or T=throughout).

TRANSITION ZONE

transition zone assessed? ✓
check if no groundcover ☐

SPECIES	ZONE	%	#	DIST
Leersia hexandra	OD	30		T

OUTER DEEP ZONE

outer deep zone assessed? ✓
check if no groundcover ☐

SPECIES	ZONE	%	#	DIST
Leersia hexandra	OD	40		T
Ludwigia peruviana	OD	30		T
Euthamia minor	AD	5		T
Amphicarpum muhlenbergianum	OD	5		T

DEEP ZONE

deep zone assessed? ✓
check if no groundcover ☐

SPECIES	ZONE	%	#	DIST
Leersia hexandra	OD	20		E
Paspalum laeve	T	5		B

Groundcover Comments

Deep zone contains sparse groundcover and numerous obligate aquatic species, interspersed by peat-filled voids.

ZONATION

Zonation Score: 5 Please assign a score of 1 - 5 or 0 and provide an explanation.

Zonation Score Explanation

Normal zonation. Some species have migrated inward one zone, but they are not in enough numbers to be of concern.

WETLAND ASSESSMENT PROCEDURE

Wellfield / Property	Wetland Name	Wetland Type
H. Boothe (P-52)	Target Wetland 1	Emergent

Wetland ID	Area Assessed	Zone Assessment Notes
TW-1		

SHRUB / SMALL TREES

For each zone assessed, please document the following: species abbreviation, WAP zone (U, AD, T, OD, or D), percent cover (5% or 10-100% in increments of 10%), count (1-50 or ">50"), and distribution (E=edge, B=beyond a few feet, or T=throughout).

TRANSITION ZONE

transition zone assessed? ✓
check if no shrubs/small trees ☐

SPECIES	ZONE	%	#	DIST
Cephalanthus occidentalis	D	5		B
Schinus terbinthifolius	AD	5		B

OUTER DEEP ZONE

outer deep zone assessed? ✓
check if no shrubs/small trees ☐

SPECIES	ZONE	%	#	DIST
Cephalanthus occidentalis	D	5		B
Ludwigia peruviana	OD	80		B

DEEP ZONE

deep zone assessed? ✓
check if no shrubs/small trees ☐

SPECIES	ZONE	%	#	DIST
Salix carolina	OD	100		B

Shrub/Small Tree Comments

ZONATION

Zonation Score: 5 Please assign a score of 1 - 5 or 0 and provide an explanation.

Zonation Score Explanation

Normal zonation. Some species have migrated inward one zone, but they are not in enough numbers to be of concern.

STRESS

Signs of stress of appropriate shrubs and small trees (include dead species)

(Few/None)
Noticeable
Significant
Not Applicable

Signs of stress of inappropriate shrubs and small trees (include dead species)

(Few/None)
Noticeable
Significant
Not Applicable

WETLAND ASSESSMENT PROCEDURE

Wellfield / Property	Wetland Name	Wetland Type
H. Boothe (P-52)	Target Wetland 1	Emergent

Wetland ID	Area Assessed	Zone Assessment Notes
TW-1		

TREES

For each zone assessed, please document the following: species abbreviation, WAP zone (U, AD, T, OD, or D), percent cover (5% or 10-100% in increments of 10%), count (1-50 or ">50"), and distribution (E=edge, B=beyond a few feet, or T=throughout).

TRANSITION ZONE

transition zone assessed? ✓
check if no trees ✓

SPECIES	ZONE	%	#	DIST

OUTER DEEP ZONE

outer deep zone assessed? ✓
check if no trees ✓

SPECIES	ZONE	%	#	DIST

DEEP ZONE

deep zone assessed? ✓
check if no trees

SPECIES	ZONE	%	#	DIST
Salix carolina	OD	100		

Tree Comments

ZONATION

Zonation Score: 2 Please assign a score of 1 - 5 or 0 and provide an explanation.

Zonation Score Explanation

Normal zonation. Some species have migrated inward one zone, but they are not in enough numbers to be of concern.

STRESS

Signs of stress of appropriate trees (do not include dead species)

(Few/None)
Noticeable
Significant
Not Applicable

Subsided soils at base of trees, resulting in some leaning trees

Signs of stress of inappropriate trees (include dead species)

(Few/None)
Noticeable
Significant
Not Applicable

RECOVERY

Dead or leaning trees (include standing dead trees and dead trees on ground that are appropriate)

(Few/None)
Noticeable
Significant

Signs of tree recovery

Yes
No
(Not Sure)

Inappropriate vine death suggesting recovery

Yes
(No)
Not Sure

WETLAND ASSESSMENT PROCEDURE

Wellfield / Property	Wetland Name	Wetland Type
H. Boothe (P-35)	Target Wetland 2	Emergent/Forested

Wetland ID	Data Owner	Data Source	Personnel	Date	Start/End	
TW-2			A. Levy & S. Klimek ARCADIS	6/15/2010	11:30	12:30

PHOTO-DOCUMENTATION

Frame	Description	Photo Pt.	Direction
			north
			east
			south
			west

WATER LEVEL INFORMATION

Dry?	Elevation (ft)	Device	Well/Gage ID
No	0.50 feet	SG	n/a

Description

Please enter Yes (Y), No (N), or Not Sure (NS) for the following questions and provide comments/explanations.

WETLAND IMPACTS

Wetland edges filled or disturbed?	Yes
Excessive dumping or trash in wetland?	No
Hog disturbance?	No
Signficant impact from cattle (trampling)?	No
Vehicles through wetland (includes bicycles)?	No
Insect damage?	No
Disease?	No

Explanation(s)

Historic pasture

WETLAND DRAINAGE

Augmentation equipment in place?	No
Augmentation occurring at time of WAP?	No
Clear evidence of direct stormwater inflow?	No
Clear evidence of direct drainage from wetland?	No
Other drainage activities in area?	No
Borrow pit/retention pond in wetland vicinity?	No

Explanation(s)

Fire

Signs of Fire? No

Explanation (year, expanse, intensity)

Lakes / Docks

Docks completely out of water
Docks touching water or with <50% of dock over water
Docks >50% out of water
(Not Applicable)

Is the littoral zone stranded? ☐

Comments

Soil Subsidence

New signs of oxidation/subsidence? Yes

Explanation

Subsidence up to 20 inches observed in 2009 within forested portion of wetland, but subsided areas now largely inundated.

General Comments/Observations

Existing staff gauge (SG-8) and sampling well (SW-3) occur within historic area of inundation, within emergent portion of wetland. No inundation, or indicators of recent inundation, were observed.

Future users of this data may not want to analyze / compare this data with other wetlands due to the extensive level of:

- ☐ non-groundwater withdrawal-related disturbance
- ☐ soil subsidence

WILDLIFE

Wildlife	Count	Evidence	Wildlife	Count	Evidence	Wildlife	Count	Evidence
Wren		calls						
Cardinal		calls						
Mocking bird		calls						

WETLAND ASSESSMENT PROCEDURE

Wellfield / Property	Wetland Name	Wetland Type
H. Boothe (P-35)	Target Wetland 2	Emergent/Forested

Wetland ID	Area Assessed	Zone Assessment Notes
TW-2		

GROUNDCOVER

For each zone assessed, please document the following: species abbreviation, WAP zone (U, AD, T, OD, or D), % cover (5% or 10-100% in increments of 10%), count (1-4), and distribution (E=edge, B=beyond a few feet, or T=throughout).

TRANSITION ZONE

transition zone assessed? ✓
check if no groundcover ☐

SPECIES	ZONE	%	#	DIST
Eupatorium capillifolium	AD	5		T
Paspalum laeve	T	20		T
Hydrocotyle sp.	OD	60		T
Mikania scandens	T	5		T
Phyla nodiflora	AD	5		B

OUTER DEEP ZONE

outer deep zone assessed? ✓
check if no groundcover ☐

SPECIES	ZONE	%	#	DIST
Mikania scandens	T	30		T
Hydrocotyle sp.	OD	60		T

DEEP ZONE

deep zone assessed? ✓
check if no groundcover ☐

SPECIES	ZONE	%	#	DIST
Polygonum hydropiperoides	T	20		B
Hydrocotyle sp.	AD	40		E
Ludwigia peruviana	OD	20		E

Groundcover Comments

ZONATION

Zonation Score: 3 Please assign a score of 1 - 5 or 0 and provide an explanation.

Zonation Score Explanation

Species have moved in one zone in high numbers and distribution and/or species have moved in two zones in enough numbers and distribution to be of concern.

WETLAND ASSESSMENT PROCEDURE

Wellfield / Property	Wetland Name	Wetland Type
H. Boothe (P-35)	Target Wetland 2	Emergent/Forested

Wetland ID	Area Assessed	Zone Assessment Notes
TW-2		

SHRUB / SMALL TREES

For each zone assessed, please document the following: species abbreviation, WAP zone (U, AD, T, OD, or D), percent cover (5% or 10-100% in increments of 10%), count (1-50 or ">50"), and distribution (E=edge, B=beyond a few feet, or T=throughout).

TRANSITION ZONE

transition zone assessed? ✓
check if no shrubs/small trees ☐

SPECIES	ZONE	%	#	DIST
Ludwigia peruviana	OD	5		T
Schinus terbinthifolius	AD	5		T

OUTER DEEP ZONE

outer deep zone assessed? ✓
check if no shrubs/small trees ☐

SPECIES	ZONE	%	#	DIST
Ludwigia peruviana	OD	10		T
Salix caroliniana	OD	40		T

DEEP ZONE

deep zone assessed? ✓
check if no shrubs/small trees ☐

SPECIES	ZONE	%	#	DIST
Ludwigia peruviana	OD	5		T
Schinus terbinthifolius	AD	5		T
Salix carolina	OD	80		B

Shrub/Small Tree Comments

A hummock has developed within the subsided area of the Salix stand and is supporting low numbers of non-indicator upland vegetation

ZONATION

Zonation Score: 3 Please assign a score of 1 - 5 or 0 and provide an explanation.

Zonation Score Explanation

Invasion by S. terebinthifolius in early stages, but may be hindered by periodic inundation.

STRESS

Signs of stress of appropriate shrubs and small trees (include dead species)

~~Few/None~~
~~Noticeable~~
Significant
Not Applicable

Signs of stress of inappropriate shrubs and small trees (include dead species)

~~Few/None~~
~~Noticeable~~
Significant
Not Applicable

WETLAND ASSESSMENT PROCEDURE

Wellfield / Property	Wetland Name	Wetland Type
H. Boothe (P-35)	Target Wetland 2	Emergent/Forested

Wetland ID	Area Assessed	Zone Assessment Notes
TW-2		

TREES

For each zone assessed, please document the following: species abbreviation, WAP zone (U, AD, T, OD, or D), percent cover (5% or 10-100% in increments of 10%), count (1-50 or ">50"), and distribution (E=edge, B=beyond a few feet, or T=throughout).

TRANSITION ZONE

transition zone assessed? ✓
check if no trees

SPECIES	ZONE	%	#	DIST
Schinus terbinthifolius	AD	5		T

OUTER DEEP ZONE

outer deep zone assessed? ✓
check if no trees

SPECIES	ZONE	%	#	DIST
Salix caroliniana	OD	98		T

DEEP ZONE

deep zone assessed? ✓
check if no trees

SPECIES	ZONE	%	#	DIST
Salix caroliniana	OD	100		T

Tree Comments

ZONATION

Zonation Score: 3 Please assign a score of 1 - 5 or 0 and provide an explanation.

Zonation Score Explanation

Invasion by S. terebinthifolius in early stages, but may be hindered by periodic inundation.

STRESS

Signs of stress of appropriate trees (do not include dead species)

(Few/None)
Noticeable
Significant
Not Applicable

Signs of stress of inappropriate trees (include dead species)

(Few/None)
Noticeable
Significant
Not Applicable

RECOVERY

Dead or leaning trees (include standing dead trees and dead trees on ground that are appropriate)

(Few/None)
Noticeable
Significant

Signs of tree recovery

(Yes)
No
Not Sure

Vigorous new Salix growth.

Inappropriate vine death suggesting recovery

Yes
(No)
Not Sure

WETLAND ASSESSMENT PROCEDURE

Wellfield / Property	Wetland Name	Wetland Type
W. Schmid (P-66)	Target Wetland 6	Emergent/Scrub/Forested

Wetland ID	Data Owner	Data Source	Personnel	Date	Start/End	
TW-6			A. Levy & B. Sawyer - ARCADIS	6/14/2010	14:00	15:00

PHOTO-DOCUMENTATION

Frame	Description	Photo Pt.	Direction
			north
			east
			south
			west

WATER LEVEL INFORMATION

Dry?	Elevation (ft)	Device	Well/Gage ID
No	0.56 inches	SG	n/a

Description

Please enter Yes (Y), No (N), or Not Sure (NS) for the following questions and provide comments/explanations.

WETLAND IMPACTS

Wetland edges filled or disturbed?	Yes
Excessive dumping or trash in wetland?	No
Hog disturbance?	No
Signficant impact from cattle (trampling)?	No
Vehicles through wetland (includes bicycles)?	No
Insect damage?	No
Disease?	No

Explanation(s)

Overburden located along perimeter of excavated pond, within palustrine wetland

WETLAND DRAINAGE

Augmentation equipment in place?	No
Augmentation occurring at time of WAP?	No
Clear evidence of direct stormwater inflow?	Yes
Clear evidence of direct drainage from wetland?	No
Other drainage activities in area?	No
Borrow pit/retention pond in wetland vicinity?	Yes

Explanation(s)

Excavated pond located within southern sector of wetland. Evidence of stormwater drainage into site occurs along soutrhern and western wetland edge from adjacent pasture and roadway.

Fire

Signs of Fire? No

Explanation (year, expanse, intensity)

Lakes / Docks

Docks completely out of water
Docks touching water or with <50% of dock over water
Docks >50% out of water
Not Applicable

Is the littoral zone stranded? ☐

Comments

Soil Subsidence

New signs of oxidation/subsidence? Yes

Explanation

Mild subsidence observed within forested portion of wetland.

General Comments/Observations

Most typical wetland characteristics of wetland observed within the pond bed/emergent portion

Future users of this data may not want to analyze / compare this data with other wetlands due to the extensive level of:

- ☐ non-groundwater withdrawal-related disturbance
- ☐ soil subsidence

WILDLIFE

Wildlife	Count	Evidence	Wildlife	Count	Evidence	Wildlife	Count	Evidence
Cardinal	??	calls						

WETLAND ASSESSMENT PROCEDURE

Wellfield / Property	Wetland Name	Wetland Type
W. Schmid (P-66)	Target Wetland 6	Emergent/Scrub/Forested

Wetland ID	Area Assessed	Zone Assessment Notes
TW-6		

GROUNDCOVER

For each zone assessed, please document the following: species abbreviation, WAP zone (U, AD, T, OD, or D), % cover (5% or 10-100% in increments of 10%), count (1-4), and distribution (E=edge, B=beyond a few feet, or T=throughout).

TRANSITION ZONE

transition zone assessed? ✓
check if no groundcover ☐

SPECIES	ZONE	%	#	DIST
Urena lobata	U	5		T
Eupatorium capillifolium	AD	5		T
Erichtites heiraciifolius	AD	20		T

OUTER DEEP ZONE

outer deep zone assessed? ✓
check if no groundcover ☐

SPECIES	ZONE	%	#	DIST
Eupatorium capillifolium	AD	30		T
Hydrocotyle sp.	OD	10		T
Polygonum hydropiperoides	OD	5		T
Commelina diffusa	T	10		E

DEEP ZONE

deep zone assessed? ✓
check if no groundcover ☐

SPECIES	ZONE	%	#	DIST
Hydrocotyle sp.	OD	10		T

Groundcover Comments

Water's surface and margins coverd with Lemna spp.

ZONATION

Zonation Score: 4 Please assign a score of 1 - 5 or 0 and provide an explanation.

Zonation Score Explanation

Species have moved in one zone and in enough numbers and distribution to be of concern.

WETLAND ASSESSMENT PROCEDURE

Wellfield / Property	Wetland Name	Wetland Type
W. Schmid (P-66)	Target Wetland 6	Emergent/Scrub/Forested

Wetland ID	Area Assessed	Zone Assessment Notes
TW-6		

SHRUB / SMALL TREES

For each zone assessed, please document the following: species abbreviation, WAP zone (U, AD, T, OD, or D), percent cover (5% or 10-100% in increments of 10%), count (1-50 or ">50"), and distribution (E=edge, B=beyond a few feet, or T=throughout).

TRANSITION ZONE

transition zone assessed? ✓
check if no shrubs/small trees ☐

SPECIES	ZONE	%	#	DIST
Myrica cerifera	AD	5		T
Schinus terebinthifolius	AD	30		T
Baccharis spp.	AD	5		T
Sambucus nigra	AD	10		T
Salix carolina	OD	40		T

OUTER DEEP ZONE

outer deep zone assessed? ✓
check if no shrubs/small trees ☐

SPECIES	ZONE	%	#	DIST
Schinus terbinthifolius	AD	80		T
Salix carolina	OD	20		T

DEEP ZONE

deep zone assessed? ✓
check if no shrubs/small trees ☐

SPECIES	ZONE	%	#	DIST
Ludwigia peruviana	OD	10		B

Shrub/Small Tree Comments

Typha sp. constituted 30% of the deep zone scrub vegetation.

ZONATION

Zonation Score: 4 Please assign a score of 1 - 5 or 0 and provide an explanation.

Zonation Score Explanation

Species have moved in one zone and in enough numbers and distribution to be of concern.

STRESS

Signs of stress of appropriate shrubs and small trees (include dead species)

(Few/None)
Noticeable
Significant
Not Applicable

Signs of stress of inappropriate shrubs and small trees (include dead species)

(Few/None)
Noticeable
Significant
Not Applicable

WETLAND ASSESSMENT PROCEDURE

Wellfield / Property	Wetland Name	Wetland Type
W. Schmid (P-66)	Target Wetland 6	Emergent/Scrub/Forested

Wetland ID	Area Assessed	Zone Assessment Notes
TW-6		

TREES

For each zone assessed, please document the following: species abbreviation, WAP zone (U, AD, T, OD, or D), percent cover (5% or 10-100% in increments of 10%), count (1-50 or ">50"), and distribution (E=edge, B=beyond a few feet, or T=throughout).

TRANSITION ZONE

transition zone assessed? ✓
check if no trees ☐

SPECIES	ZONE	%	#	DIST
Schinus terebinthifolius	AD	30		T
Myrica cerifera	AD	5		T
Salix caroliniana	OD	20		T

OUTER DEEP ZONE

outer deep zone assessed? ✓
check if no trees ✓

SPECIES	ZONE	%	#	DIST
Salix carolina	OD	100		T

DEEP ZONE

deep zone assessed? ☐
check if no trees ✓

SPECIES	ZONE	%	#	DIST

Tree Comments

ZONATION

Zonation Score: NA Please assign a score of 1 - 5 or 0 and provide an explanation.

Zonation Score Explanation

STRESS

Signs of stress of appropriate trees (do not include dead species)

(Few/None)
Noticeable
Significant
Not Applicable

Slight impacts from subsidence

Signs of stress of inappropriate trees (include dead species)

(Few/None)
Noticeable
Significant
Not Applicable

RECOVERY

Dead or leaning trees (include standing dead trees and dead trees on ground that are appropriate)

(Few/None)
Noticeable
Significant

Signs of tree recovery

Yes
(No)
Not Sure

Inappropriate vine death suggesting recovery

Yes
(No)
Not Sure

WETLAND ASSESSMENT PROCEDURE

Wellfield / Property	Wetland Name	Wetland Type
Howard Thomas	Target Wetland 18	Forested

Wetland ID	Data Owner	Data Source	Personnel	Date	Start/End
TW-18			A. Levy & S. Klimek ARCADIS	15 June 2010	9:00 11:30

PHOTO-DOCUMENTATION

Frame	Description	Photo Pt.	Direction
			north
			east
			south
			west

WATER LEVEL INFORMATION

Dry?	Elevation (ft)	Device	Well/Gage ID
Yes	N/A		

Description

Please enter Yes (Y), No (N), or Not Sure (NS) for the following questions and provide comments/explanations.

WETLAND IMPACTS

Wetland edges filled or disturbed?	No
Excessive dumping or trash in wetland?	No
Hog disturbance?	No
Signficant impact from cattle (trampling)?	No
Vehicles through wetland (includes bicycles)?	No
Insect damage?	No
Disease?	No

Explanation(s)

Shallow embankment of 19th Street extension borders immediate east side of site

WETLAND DRAINAGE

Augmentation equipment in place?	No
Augmentation occurring at time of WAP?	No
Clear evidence of direct stormwater inflow?	No
Clear evidence of direct drainage from wetland?	No
Other drainage activities in area?	Yes
Borrow pit/retention pond in wetland vicinity?	No

Explanation(s)

Mature punk trees (Melaleuca quinqueveria) prevalent. Frequently associated with accelerated evapotranspiration and were historically planted to dry-out wetlands.

Fire

Signs of Fire? No

Explanation (year, expanse, intensity)

Lakes / Docks

Docks completely out of water
Docks touching water or with <50% of dock over water
Docks >50% out of water
(Not Applicable)

Is the littoral zone stranded?

Comments

Soil Subsidence

New signs of oxidation/subsidence? Yes

Explanation

Some soils within the historic wetland area lack hydric indicators. Up to 12 inches of subsidence within the wetland interior was observed. Prominent hummocks on otherwise sandy, flat surface suggests subsidence is not recent.

General Comments/Observations

TW-18 has not likely been altered since available 2003 aerial photography. Observed impacts primarily due to historic regional groundwater draw-down and accelerated evapotranspiration by punk trees have reduced site's value and definition as a viable WAP resource.

Future users of this data may not want to analyze / compare this data with other wetlands due to the extensive level of:

- non-groundwater withdrawal-related disturbance
- ✓ soil subsidence

WILDLIFE

Wildlife	Count	Evidence	Wildlife	Count	Evidence	Wildlife	Count	Evidence

WETLAND ASSESSMENT PROCEDURE

Wellfield / Property	Wetland Name	Wetland Type
Howard Thomas	Target Wetland 18	Forested

Wetland ID	Area Assessed	Zone Assessment Notes
TW-18		

GROUNDCOVER

For each zone assessed, please document the following: species abbreviation, WAP zone (U, AD, T, OD, or D), % cover (5% or 10-100% in increments of 10%), count (1-4), and distribution (E=edge, B=beyond a few feet, or T=throughout).

TRANSITION ZONE

transition zone assessed? ✓
check if no groundcover ✓

SPECIES	ZONE	%	#	DIST

OUTER DEEP ZONE

outer deep zone assessed? ✓
check if no groundcover ✓

SPECIES	ZONE	%	#	DIST

DEEP ZONE

deep zone assessed? ✓
check if no groundcover ✓

SPECIES	ZONE	%	#	DIST
Vitis rotundifolia	AD	5		B

Groundcover Comments

several clumps/hummocks of Osmunda cinnamomea, Osmusnda regalis, and Woodwardia virginica are all that

ZONATION

Zonation Score: 0 Please assign a score of 1 - 5 or 0 and provide an explanation.

Zonation Score Explanation

Little or no groundcover species were observed and few that are WAP species. Surface throughout TW-18 is blanketed by live oak leaf litter. Not enough vegetative cover to make a meaningful groundcover evaluation.

WETLAND ASSESSMENT PROCEDURE

Wellfield / Property	Wetland Name	Wetland Type
H. Boothe (P-52)	Target Wetland 18	Forested

Wetland ID	Area Assessed	Zone Assessment Notes
TW-18		

SHRUB / SMALL TREES

For each zone assessed, please document the following: species abbreviation, WAP zone (U, AD, T, OD, or D), percent cover (5% or 10-100% in increments of 10%), count (1-50 or ">50"), and distribution (E=edge, B=beyond a few feet, or T=throughout).

TRANSITION ZONE

transition zone assessed? ✓
check if no shrubs/small trees ☐

SPECIES	ZONE	%	#	DIST
Cinnamomium camphora	U			T

OUTER DEEP ZONE

outer deep zone assessed? ✓
check if no shrubs/small trees ✓

SPECIES	ZONE	%	#	DIST

DEEP ZONE

deep zone assessed? ✓
check if no shrubs/small trees ✓

SPECIES	ZONE	%	#	DIST

Shrub/Small Tree Comments

Little to no sapling growth of WAP-listed species in the sub-canopy.

ZONATION

Zonation Score: 0 Please assign a score of 1 - 5 or 0 and provide an explanation.

Zonation Score Explanation

Area has effectively converted to upland habitat, but though understory remains thinly vegetated, though not enough for WAP evaluation.

STRESS

Signs of stress of appropriate shrubs and small trees (include dead species)

(Few/None)
Noticeable
Significant
Not Applicable

Signs of stress of inappropriate shrubs and small trees (include dead species)

(Few/None)
Noticeable
Significant
Not Applicable

WETLAND ASSESSMENT PROCEDURE

Wellfield / Property	Wetland Name	Wetland Type
H. Boothe (P-52)	Target Wetland 18	Forested

Wetland ID	Area Assessed	Zone Assessment Notes
TW-18		

TREES

For each zone assessed, please document the following: species abbreviation, WAP zone (U, AD, T, OD, or D), percent cover (5% or 10-100% in increments of 10%), count (1-50 or ">50"), and distribution (E=edge, B=beyond a few feet, or T=throughout).

TRANSITION ZONE

transition zone assessed? ✓ *check if no trees*

SPECIES	ZONE	%	#	DIST
Quercus virginiana	U	60		T
Melaleuca quinqueveria	AD	10		B

OUTER DEEP ZONE

outer deep zone assessed? ✓ *check if no trees*

SPECIES	ZONE	%	#	DIST
Quercus virginiana	U	60		T
Melaleuca quinqueveria	AD	20		B

DEEP ZONE

deep zone assessed? ✓ *check if no trees*

SPECIES	ZONE	%	#	DIST
Quercus virginiana	U	60		B
Melaleuca quinqueveria	AD	20		T

Tree Comments

non-WAP species Sabal palmetto is also present

ZONATION

Zonation Score: 2 Please assign a score of 1 - 5 or 0 and provide an explanation.

Zonation Score Explanation

AD zone species regarded as T zone, pursuant to WAP, but prevalence of upland species dominates historic deep zone.

STRESS

Signs of stress of appropriate trees (do not include dead species)

~~Few/None~~
Noticeable
Significant
Not Applicable

Subsided soils at base of trees, resulting in some leaning trees

Signs of stress of inappropriate trees (include dead species)

~~Few/None~~
Noticeable
Significant
Not Applicable

RECOVERY

Dead or leaning trees (include standing dead trees and dead trees on ground that are appropriate)

~~Few/None~~
~~Noticeable~~
Significant

Signs of tree recovery

Yes
~~No~~
Not Sure

Inappropriate vine death suggesting recovery

Yes
~~No~~
Not Sure

WETLAND ASSESSMENT PROCEDURE

Wellfield / Property	Wetland Name	Wetland Type
Swift-Richardson Holdings (P-68)	Reference Wetland 1	Forested/Scrub/Emergent

Wetland ID	Data Owner	Data Source	Personnel	Date	Start/End	
RW-1			A. Levy & S. Klimek ARCADIS	15 June 2009	10:30	12:00

PHOTO-DOCUMENTATION

Frame	Description	Photo Pt.	Direction
			north
			east
			south
			west

WATER LEVEL INFORMATION

Dry?	Elevation (ft)	Device	Well/Gage ID
Yes	NA	SG	

Description

indicators of recent inundation evident from line on SG

Please enter Yes (Y), No (N), or Not Sure (NS) for the following questions and provide comments/explanations.

WETLAND IMPACTS

Wetland edges filled or disturbed?	Yes
Excessive dumping or trash in wetland?	No
Hog disturbance?	No
Signficant impact from cattle (trampling)?	Yes
Vehicles through wetland (includes bicycles)?	No
Insect damage?	No
Disease?	No

Explanation(s)

Periphery of entire depressional area was historically farmed/pastured and is characterized by upland old-field plant community.

WETLAND DRAINAGE

Augmentation equipment in place?	No
Augmentation occurring at time of WAP?	No
Clear evidence of direct stormwater inflow?	No
Clear evidence of direct drainage from wetland?	No
Other drainage activities in area?	Yes
Borrow pit/retention pond in wetland vicinity?	No

Explanation(s)

USGS 7.5 minute topo/quad mapping depicts nearby/offsite surface drainage (conveyance) along US 301 ditch into the Pearce Canal.

Fire

Signs of Fire? No

Explanation (year, expanse, intensity)

Lakes / Docks

Docks completely out of water
Docks touching water or with <50% of dock over water
Docks >50% out of water
(Not Applicable)

Is the littoral zone stranded? ☐

Comments

Soil Subsidence

New signs of oxidation/subsidence? Yes

Explanation

OD & D zone wetland vegetation observed on hummocks with indicators of wetland floor subsidence of up to 14 inches in wetlands interior. Subsidence mounds moderately eroded, suggesting recent history of subsidence. linear slough containing obligate wetland vegetation was employed as Deep zone for well and staff gage placement

Future users of this data may not want to analyze / compare this data with other wetlands due to the extensive level of:

- ☑ non-groundwater withdrawal-related disturbance
- ☑ soil subsidence

General Comments/Observations

This wetland has experienced moderate to severe hydrological alterations due to historic modification as a livestock pond and the provision of a discrete drainage swale to the Pearce Canal, which is depicted on USGS 7.5 minute topographic quadrangle. Observed impacts primarily due to historic agricultural use.

WILDLIFE

Wildlife	Count	Evidence	Wildlife	Count	Evidence	Wildlife	Count	Evidence
Cardinal		calls						

WETLAND ASSESSMENT PROCEDURE

Wellfield / Property	Wetland Name	Wetland Type
Swift-Richardson Holdings (P-68)	Reference Wetland 1	Forested/Scrub/Emergent

Wetland ID	Area Assessed	Zone Assessment Notes
RW-1		

GROUNDCOVER

For each zone assessed, please document the following: species abbreviation, WAP zone (U, AD, T, OD, or D), % cover (5% or 10-100% in increments of 10%), count (1-4), and distribution (E=edge, B=beyond a few feet, or T=throughout).

TRANSITION ZONE

transition zone assessed? ✓
check if no groundcover

SPECIES	ZONE	%	#	DIST
Ampelopsis arborea	AD	80		T

OUTER DEEP ZONE

outer deep zone assessed? ✓
check if no groundcover

SPECIES	ZONE	%	#	DIST
Ampelopsis arborea	AD	30		B

DEEP ZONE

deep zone assessed? ✓
check if no groundcover

SPECIES	ZONE	%	#	DIST
Ampelopsis arborea	AD	5		E
Polygonum hydropiperoides	OD	20		T

Groundcover Comments

Rumex verticillatus (20%) FACW+ and Saururus cernuus (40%) OBL round-out the dominant species in the Deep Zone

ZONATION

Zonation Score: 4 Please assign a score of 1 - 5 or 0 and provide an explanation.

Zonation Score Explanation

Species have moved in one zone in enough numbers to be of concern.

WETLAND ASSESSMENT PROCEDURE

Wellfield / Property	Wetland Name	Wetland Type
Swift-Richardson Holdings (P-68)	Reference Wetland 1	Forested/Scrub/Emergent

Wetland ID	Area Assessed	Zone Assessment Notes
RW-1		

SHRUB / SMALL TREES

For each zone assessed, please document the following: species abbreviation, WAP zone (U, AD, T, OD, or D), percent cover (5% or 10-100% in increments of 10%), count (1-50 or ">50"), and distribution (E=edge, B=beyond a few feet, or T=throughout).

TRANSITION ZONE

transition zone assessed? ✓
check if no shrubs/small trees ☐

SPECIES	ZONE	%	#	DIST
Sambucus canadensis	AD	100		T

OUTER DEEP ZONE

outer deep zone assessed? ✓
check if no shrubs/small trees ☐

SPECIES	ZONE	%	#	DIST
Schinus terebinthifolius	AD	85		T
Sambucus canadensis	AD	10:30		T
Salix carolina	OD	5		T

DEEP ZONE

deep zone assessed? ✓
check if no shrubs/small trees ☐

SPECIES	ZONE	%	#	DIST
Schinus terbinthifolius	AD	90		T
Salix carolina	OD	10:30		T

Shrub/Small Tree Comments

ZONATION

Zonation Score: 2 Please assign a score of 1 - 5 or 0 and provide an explanation.

Zonation Score Explanation

Species have moved in two zones and in high numbers and distribution, and/or some species with an upland classification have moved into the deep zone in enough numbers and distribution to be of concern. For scoring purposes, AD species are treated the same as T species when they are found in the Outer Deep and Deep Zones.

STRESS

Signs of stress of appropriate shrubs and small trees (include dead species)

(Few/None)
Noticeable
Significant
Not Applicable

Signs of stress of inappropriate shrubs and small trees (include dead species)

(Few/None)
Noticeable
Significant
Not Applicable

WETLAND ASSESSMENT PROCEDURE

Wellfield / Property	Wetland Name	Wetland Type
Swift-Richardson Holdings (P-68)	Reference Wetland 1	Forested/Scrub/Emergent

Wetland ID	Area Assessed	Zone Assessment Notes
RW-1		

TREES

For each zone assessed, please document the following: species abbreviation, WAP zone (U, AD, T, OD, or D), percent cover (5% or 10-100% in increments of 10%), count (1-50 or ">50"), and distribution (E=edge, B=beyond a few feet, or T=throughout).

TRANSITION ZONE

transition zone assessed? ✓
check if no trees ✓

SPECIES	ZONE	%	#	DIST

OUTER DEEP ZONE

outer deep zone assessed? ■
check if no trees ■

SPECIES	ZONE	%	#	DIST

DEEP ZONE

deep zone assessed? ■
check if no trees

SPECIES	ZONE	%	#	DIST
Acer rubrum	OD	10		B
Salix carolina	OD	80		B

Tree Comments

ZONATION

Zonation Score: 4 Please assign a score of 1 - 5 or 0 and provide an explanation.

Zonation Score Explanation

Species have moved in one zone in enough numbers to be of concern.

STRESS

Signs of stress of appropriate trees (do not include dead species)

Few/None
(Noticeable)
Significant
Not Applicable

tree cover sparse and limited to margin between D & OD, where Brazilian peppertree dominates

Signs of stress of inappropriate trees (include dead species)

Few/None
Noticeable
Significant
(Not Applicable)

RECOVERY

Dead or leaning trees (include standing dead trees and dead trees on ground that are appropriate)

Few/None
(Noticeable)
Significant

Signs of tree recovery

Yes
(No)
Not Sure

Inappropriate vine death suggesting recovery

Yes
(No)
Not Sure

WETLAND ASSESSMENT PROCEDURE

Wellfield / Property	Wetland Name	Wetland Type
W. Schmid (P-69)	Reference Wetland 2	Forested/Scrub/Emergent

Wetland ID	Data Owner	Data Source	Personnel	Date	Start/End	
RW-2			A. Levy & B. Sawyer - ARCADIS	6/14/2010	15:30	17:00

PHOTO-DOCUMENTATION

Frame	Description	Photo Pt.	Direction
			north
			east
			south
			west

WATER LEVEL INFORMATION

Dry?	Elevation (ft)	Device	Well/Gage ID
Yes	NA		

Description

Please enter Yes (Y), No (N), or Not Sure (NS) for the following questions and provide comments/explanations.

WETLAND IMPACTS

Wetland edges filled or disturbed?	Yes
Excessive dumping or trash in wetland?	No
Hog disturbance?	No
Signficant impact from cattle (trampling)?	Yes
Vehicles through wetland (includes bicycles)?	No
Insect damage?	No
Disease?	No

Explanation(s)

Southeastern edge of wetland historically excavated with now-forested overburden stockpiled along historic wetland boundary.

WETLAND DRAINAGE

Augmentation equipment in place?	No
Augmentation occurring at time of WAP?	No
Clear evidence of direct stormwater inflow?	No
Clear evidence of direct drainage from wetland?	Yes
Other drainage activities in area?	Yes
Borrow pit/retention pond in wetland vicinity?	Yes

Explanation(s)

Historic excavation and impoundment for livestock pond in southeast side of wetland. Wier and outfall on SE corner of resource drains offsite to Pearce Canal.

Fire

Signs of Fire? No

Explanation (year, expanse, intensity)

Lakes / Docks

Docks completely out of water
Docks touching water or with <50% of dock over water
Docks >50% out of water
(Not Applicable)

Is the littoral zone stranded? ☐

Comments

Soil Subsidence

New signs of oxidation/subsidence? No

Explanation

Deep zone wetland vegetation on hummocks and indicators of wetland floor subsidence of up to 18 inches within Deep & Outer Deep observed. Subsided mounds not too eroded, which suggests subsidence is moderately recent, but heavily trampled by cattle.

Future users of this data may not want to analyze / compare this data with other wetlands due to the extensive level of:

- ☐ non-groundwater withdrawal-related disturbance
- ☐ soil subsidence

General Comments/Observations

This wetland has experienced moderate to severe hydrological alterations due to historic modification as a livestock pond and the provision of a discrete drainage swale to the Pearce Canal, which is depicted on USGS 7.5 minute topographic quadrangle. Observed impacts primarily due to historic agricultural use.

WILDLIFE

Wildlife	Count	Evidence	Wildlife	Count	Evidence	Wildlife	Count	Evidence

WETLAND ASSESSMENT PROCEDURE

Wellfield / Property	Wetland Name	Wetland Type
W. Schmid (P-69)	Reference Wetland 2	Forested/Scrub/Emergent

Wetland ID	Area Assessed	Zone Assessment Notes
RW-2		

GROUNDCOVER

For each zone assessed, please document the following: species abbreviation, WAP zone (U, AD, T, OD, or D), % cover (5% or 10-100% in increments of 10%), count (1-4), and distribution (E=edge, B=beyond a few feet, or T=throughout).

TRANSITION ZONE

transition zone assessed? ✓
check if no groundcover

SPECIES	ZONE	%	#	DIST
Polygonum hydropiperoides	OD	90		T

OUTER DEEP ZONE

outer deep zone assessed? ✓
check if no groundcover

SPECIES	ZONE	%	#	DIST
Commelina diffusa	T	40		B
Paspalum laeve	T	5		B
Carex longii	T	10		T

DEEP ZONE

deep zone assessed? ✓
check if no groundcover

SPECIES	ZONE	%	#	DIST
Ecclipta prostrata	T	10		T
Polygonum hydropiperoides	OD	40		T
Hydrocotyle sp.	OD	10		T

Groundcover Comments

Rumex verticillatus (10%) FACW+ , Saururus cernuus (10%) OBL, Apios americana round-out the dominant species in the Outer Deep and Deep Zones

ZONATION

Zonation Score: 3 Please assign a score of 1 - 5 or 0 and provide an explanation.

Zonation Score Explanation

Species have moved in one zone in high numbers and distribution and/or species have moved in two zones in enough numbers and distribution to be of concern.

WETLAND ASSESSMENT PROCEDURE

Wellfield / Property	Wetland Name	Wetland Type
W. Schmid (P-69)	Reference Wetland 2	Forested/Scrub/Emergent

Wetland ID	Area Assessed	Zone Assessment Notes
RW-2		

SHRUB / SMALL TREES

For each zone assessed, please document the following: species abbreviation, WAP zone (U, AD, T, OD, or D), percent cover (5% or 10-100% in increments of 10%), count (1-50 or ">50"), and distribution (E=edge, B=beyond a few feet, or T=throughout).

TRANSITION ZONE

transition zone assessed? ✓
check if no shrubs/small trees ☐

SPECIES	ZONE	%	#	DIST
Urena lobata	UPL	10		T

OUTER DEEP ZONE

outer deep zone assessed? ✓
check if no shrubs/small trees ☐

SPECIES	ZONE	%	#	DIST
Schinus terebinthifolius	AD	5		T
Myrica cerifera	AD	10		T
Vitis rotundifolia	AD	5		T

DEEP ZONE

deep zone assessed? ✓
check if no shrubs/small trees ☐

SPECIES	ZONE	%	#	DIST
Cephelanthus occidentalis	D	10		T
Myrica cerifera	AD	30		T
Ludwigia peruviana	OD	10		T

Shrub/Small Tree Comments

ZONATION

Zonation Score: 3 Please assign a score of 1 - 5 or 0 and provide an explanation.

Zonation Score Explanation

Species have moved in one zone in high numbers and distribution and/or species have moved in two zones in enough numbers and distribution to be of concern.

STRESS

Signs of stress of appropriate shrubs and small trees (include dead species)

Few/None
(Noticeable)
Significant
Not Applicable

Impacts from moderate to severe trampling and compaction by livestock

Signs of stress of inappropriate shrubs and small trees (include dead species)

(Few/None)
Noticeable
Significant
Not Applicable

WETLAND ASSESSMENT PROCEDURE

Wellfield / Property	Wetland Name	Wetland Type
W. Schmid (P-69)	Reference Wetland 2	Forested/Scrub/Emergent

Wetland ID	Area Assessed	Zone Assessment Notes
RW-2		

TREES

For each zone assessed, please document the following: species abbreviation, WAP zone (U, AD, T, OD, or D), percent cover (5% or 10-100% in increments of 10%), count (1-50 or ">50"), and distribution (E=edge, B=beyond a few feet, or T=throughout).

TRANSITION ZONE

transition zone assessed? ☐
check if no trees ☐

SPECIES	ZONE	%	#	DIST
Acer rubrum	OD	25		T
Nyssa sylvatica biflora	D	20		
Quercus laurifolia	T	20		

OUTER DEEP ZONE

outer deep zone assessed? ☐
check if no trees ☐

SPECIES	ZONE	%	#	DIST
Acer rubrum	OD	25		T
Ulmus americana	T	20		T
Nyssa sylvatica biflora	D	20		B
Magnolia virginiana	OD	20		B

DEEP ZONE

deep zone assessed? ☐
check if no trees ☐

SPECIES	ZONE	%	#	DIST
Acer rubrum	OD	30		T
Ulmus americana	T	15		T

Tree Comments

ZONATION

Zonation Score: 3 Please assign a score of 1 - 5 or 0 and provide an explanation.

Zonation Score Explanation

Species have moved in one zone n high numbers and distribution, and/or some species have moved in two zones in enough numbers and distribution to be of concern.

STRESS

Signs of stress of appropriate trees (do not include dead species)

Few/None
Noticeable
(Significant)
Not Applicable

Sporadic impacts from severe trampling by livestock

Signs of stress of inappropriate trees (include dead species)

Few/None
Noticeable
Significant
Not Applicable

RECOVERY

Dead or leaning trees (include standing dead trees and dead trees on ground that are appropriate)

Few/None
(Noticeable)
Significant

Signs of tree recovery

Yes
(No)
Not Sure

Inappropriate vine death suggesting recovery

Yes
(No)
Not Sure

WETLAND ASSESSMENT PROCEDURE

Wellfield / Property	Wetland Name	Wetland Type
W. Schmid (P-66)	Reference Wetland 3	Emergent

Wetland ID	Data Owner	Data Source	Personnel	Date	Start/End	
RW-3			A. Levy & S. Klimek ARCADIS	14 June 2010	14:00	15:30

PHOTO-DOCUMENTATION

Frame	Description	Photo Pt.	Direction

WATER LEVEL INFORMATION

Dry?	Elevation (ft)	Device	Well/Gage ID
Yes	NA		

Description

Please enter Yes (Y), No (N), or Not Sure (NS) for the following questions and provide comments/explanations.

WETLAND IMPACTS

Wetland edges filled or disturbed?	No
Excessive dumping or trash in wetland?	No
Hog disturbance?	No
Signficant impact from cattle (trampling)?	No
Vehicles through wetland (includes bicycles)?	No
Insect damage?	No
Disease?	No

Explanation(s)

No observed impacts or drainage to/from wetland. However, evidence of perpetual saturation was absent from NP-12 at time of site visit. While cattle are admitted into the wetland, impacts from livestock use are not evident.

WETLAND DRAINAGE

Augmentation equipment in place?	No
Augmentation occurring at time of WAP?	No
Clear evidence of direct stormwater inflow?	No
Clear evidence of direct drainage from wetland?	No
Other drainage activities in area?	No
Borrow pit/retention pond in wetland vicinity?	No

Explanation(s)

Fire

Signs of Fire? No

Explanation (year, expanse, intensity)

Lakes / Docks

Docks completely out of water
Docks touching water or with <50% of dock over water
Docks >50% out of water
Not Applicable

Is the littoral zone stranded? ☐

Comments

Soil Subsidence

New signs of oxidation/subsidence? No

Explanation

Indicators of wetland floor subsidence not observed within Deep Zone. Modest indicators of recent subsidence was observed among hummock-borne wax myrtles along southern historic wetland boundary.

General Comments/Observations

This wetland has experienced recent moderate to severe hydrological alterations due drought and unknown hydrogeologic factors.

Future users of this data may not want to analyze / compare this data with other wetlands due to the extensive level of:

- ☐ non-groundwater withdrawal-related disturbance
- ☐ soil subsidence

WILDLIFE

Wildlife	Count	Evidence	Wildlife	Count	Evidence	Wildlife	Count	Evidence
Cardinal		calls						

WETLAND ASSESSMENT PROCEDURE

Wellfield / Property	Wetland Name	Wetland Type
W. Schmid (P-66)	Reference Wetland 3	Emergent

Wetland ID	Area Assessed	Zone Assessment Notes
RW-3		

GROUNDCOVER

For each zone assessed, please document the following: species abbreviation, WAP zone (U, AD, T, OD, or D), % cover (5% or 10-100% in increments of 10%), count (1-4), and distribution (E=edge, B=beyond a few feet, or T=throughout).

TRANSITION ZONE

transition zone assessed? ✓
check if no groundcover

SPECIES	ZONE	%	#	DIST
Urena lobata	UPL	5		T
Ludwigia peruviana	OD	25		T
Eupatoruim capillifolium	AD	60		T
Carex longii	T	5		
Phyla nodiflora	AD	5		

OUTER DEEP ZONE

outer deep zone assessed? ✓
check if no groundcover

SPECIES	ZONE	%	#	DIST
Eupatorium capillifolium	AD	60		T
Polygonum hydropiperoides	OD	30		T
Phyla nodiflora	AD	10		T

DEEP ZONE

deep zone assessed? ✓
check if no groundcover

SPECIES	ZONE	%	#	DIST
Solanum varium	UPL	5		T
Polygonum hydropiperoides	OD	10		T
Phyla nodiflora	AD	30		T
Paspalum laeve	T	50		T
Ecclipta prostrata	T	5		B

Groundcover Comments

Winter freezes in late 2009- early 2010 reduced visual dominance of some previously noted Solanum varium in OD & D zones.

ZONATION

Zonation Score: 3 Please assign a score of 1 - 5 or 0 and provide an explanation.

Zonation Score Explanation

Species have moved in one zone in high numbers and distribution and/or species have moved in two zones in enough numbers and distribution to be of concern.

WETLAND ASSESSMENT PROCEDURE

Wellfield / Property	Wetland Name	Wetland Type
W. Schmid (P-66)	Reference Wetland 3	Emergent

Wetland ID	Area Assessed	Zone Assessment Notes
RW-3		

SHRUB / SMALL TREES

For each zone assessed, please document the following: species abbreviation, WAP zone (U, AD, T, OD, or D), percent cover (5% or 10-100% in increments of 10%), count (1-50 or ">50"), and distribution (E=edge, B=beyond a few feet, or T=throughout).

TRANSITION ZONE

transition zone assessed? ✓
check if no shrubs/small trees ☐

SPECIES	ZONE	%	#	DIST
Myrica cerifera	AD	75		E
Cephelanthus occidentalis	D	5		E
Schinus terebinthifolius	AD	20		E

OUTER DEEP ZONE

outer deep zone assessed? ✓
check if no shrubs/small trees ✓

SPECIES	ZONE	%	#	DIST

DEEP ZONE

deep zone assessed? ✓
check if no shrubs/small trees ✓

SPECIES	ZONE	%	#	DIST

Shrub/Small Tree Comments

ZONATION

Zonation Score: NA Please assign a score of 1 - 5 or 0 and provide an explanation.

Zonation Score Explanation

STRESS

Signs of stress of appropriate shrubs and small trees (include dead species)

Few/None
Noticeable
Significant
Not Applicable

Signs of stress of inappropriate shrubs and small trees (include dead species)

Few/None
Noticeable
Significant
Not Applicable

WETLAND ASSESSMENT PROCEDURE

Wellfield / Property	Wetland Name	Wetland Type
W. Schmid (P-66)	Reference Wetland 3	Emergent

Wetland ID	Area Assessed	Zone Assessment Notes
RW-3		

TREES

For each zone assessed, please document the following: species abbreviation, WAP zone (U, AD, T, OD, or D), percent cover (5% or 10-100% in increments of 10%), count (1-50 or ">50"), and distribution (E=edge, B=beyond a few feet, or T=throughout).

TRANSITION ZONE

transition zone assessed? ✓
check if no trees ✓

SPECIES	ZONE	%	#	DIST

OUTER DEEP ZONE

outer deep zone assessed? ✓
check if no trees ✓

SPECIES	ZONE	%	#	DIST

DEEP ZONE

deep zone assessed? ✓
check if no trees ✓

SPECIES	ZONE	%	#	DIST

Tree Comments

ZONATION

Zonation Score: NA Please assign a score of 1 - 5 or 0 and provide an explanation.

Zonation Score Explanation

STRESS

Signs of stress of appropriate trees (do not include dead species)

Few/None
Noticeable
Significant
(Not Applicable)

Signs of stress of inappropriate trees (include dead species)

Few/None
Noticeable
Significant
(Not Applicable)

RECOVERY

Dead or leaning trees (include standing dead trees and dead trees on ground that are appropriate)

(Few/None)
Noticeable
Significant

Signs of tree recovery

Yes
(No)
Not Sure

Inappropriate vine death suggesting recovery

Yes
(No)
Not Sure

APPENDIX D - PHOTOGRAPHIC DOCUMENTATION

ARCADIS

Wetland Site
TW – 1

Photo 1 – TW1 Facing North

Photo 2 - TW1 Facing South

Photo 3 – TW1 Facing East

Photo 4 – TW1 Facing West

Photo 5 – TW2 Facing North

Photo 6 – TW2 Facing South

Photo 7 – TW2 Facing East

Photo 8 – TW2 Facing West

Photo 9 – TW6 Facing North

Photo 10 – TW6 Facing South

Photo 11 – TW6 Facing East

Photo 12 – TW6 Facing West

Photo 13 – TW18 Facing North

Photo 14 – TW18 Facing South

Photo 15 – TW18 Facing East

Photo 16 – TW18 Facing West

Photo 17 – RW1 Facing North

Photo 18 – RW1 Facing South

Photo 19 – RW1 Facing East

Photo 20 – RW1 Facing West

Photo 21 – RW2 Facing North

Photo 22 – RW2 Facing South

Photo 23 – RW2 Facing East

Photo 24 – RW2 Facing West

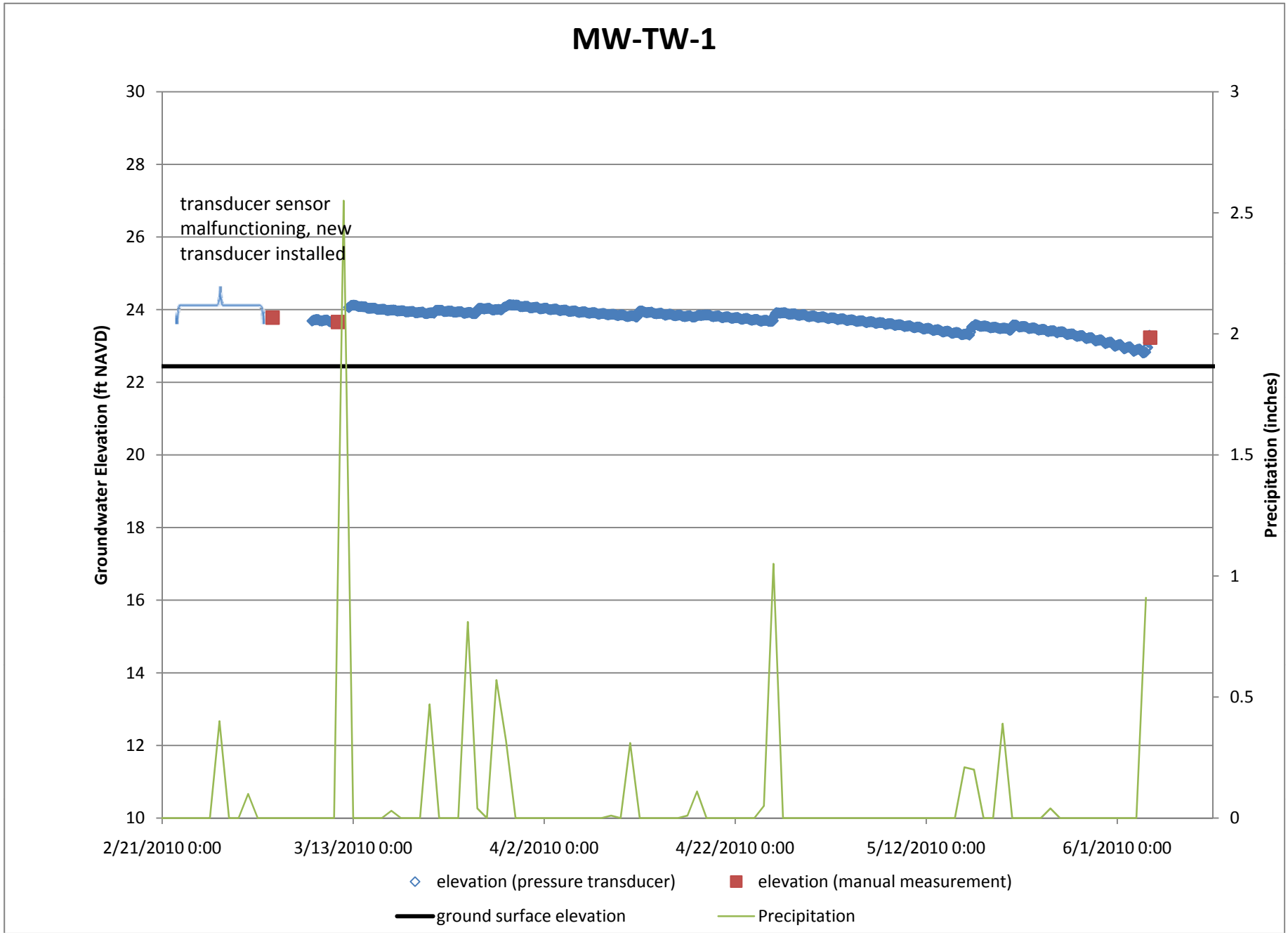
Photo 25– RW3 Facing North

Photo 26– RW3 Facing South

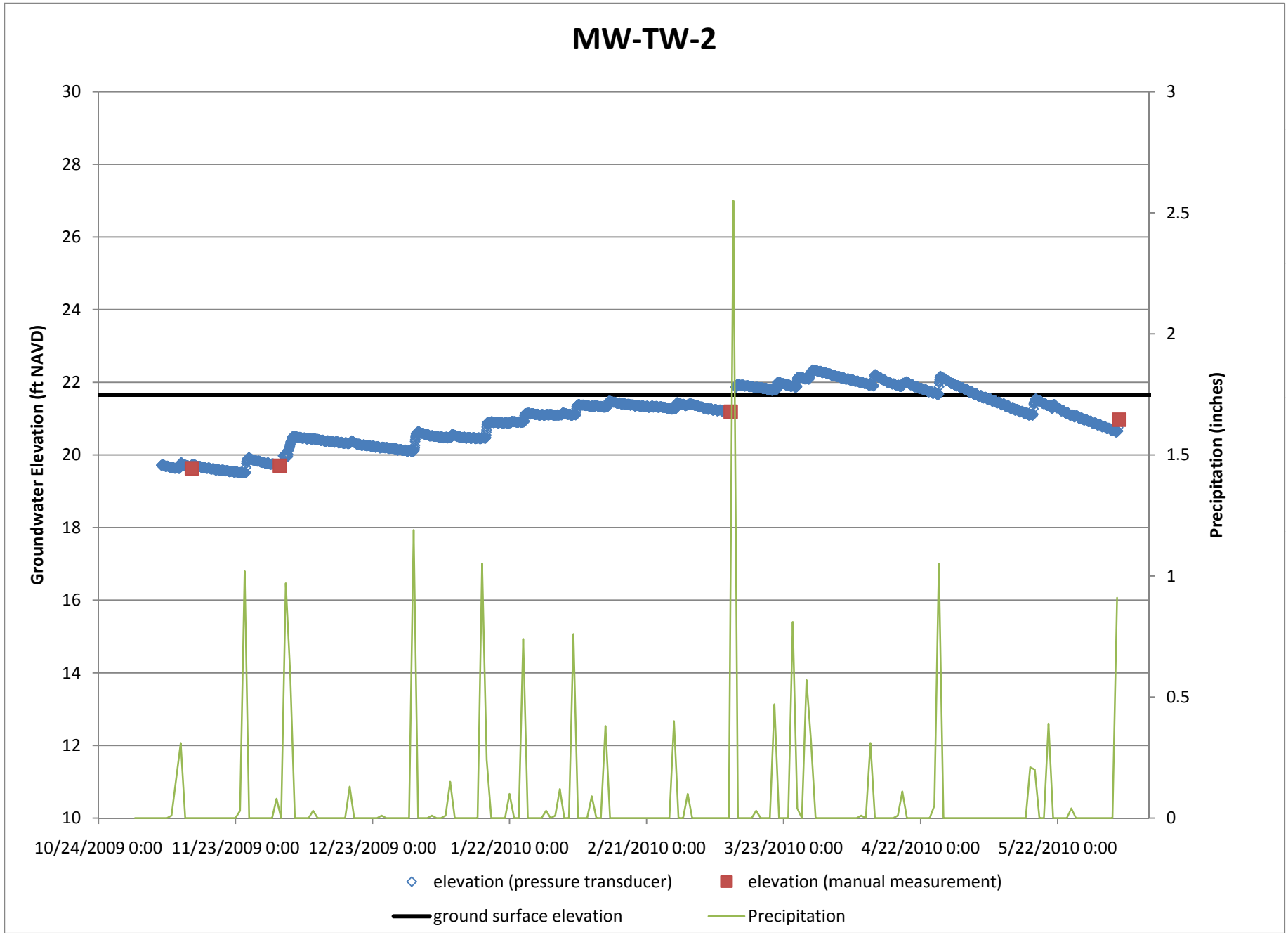
Photo 27 – RW3 Facing East

Photo 28 – RW3 Facing West

APPENDIX E - HYDROPERIOD GRAPHS



R625-STA-002194-0



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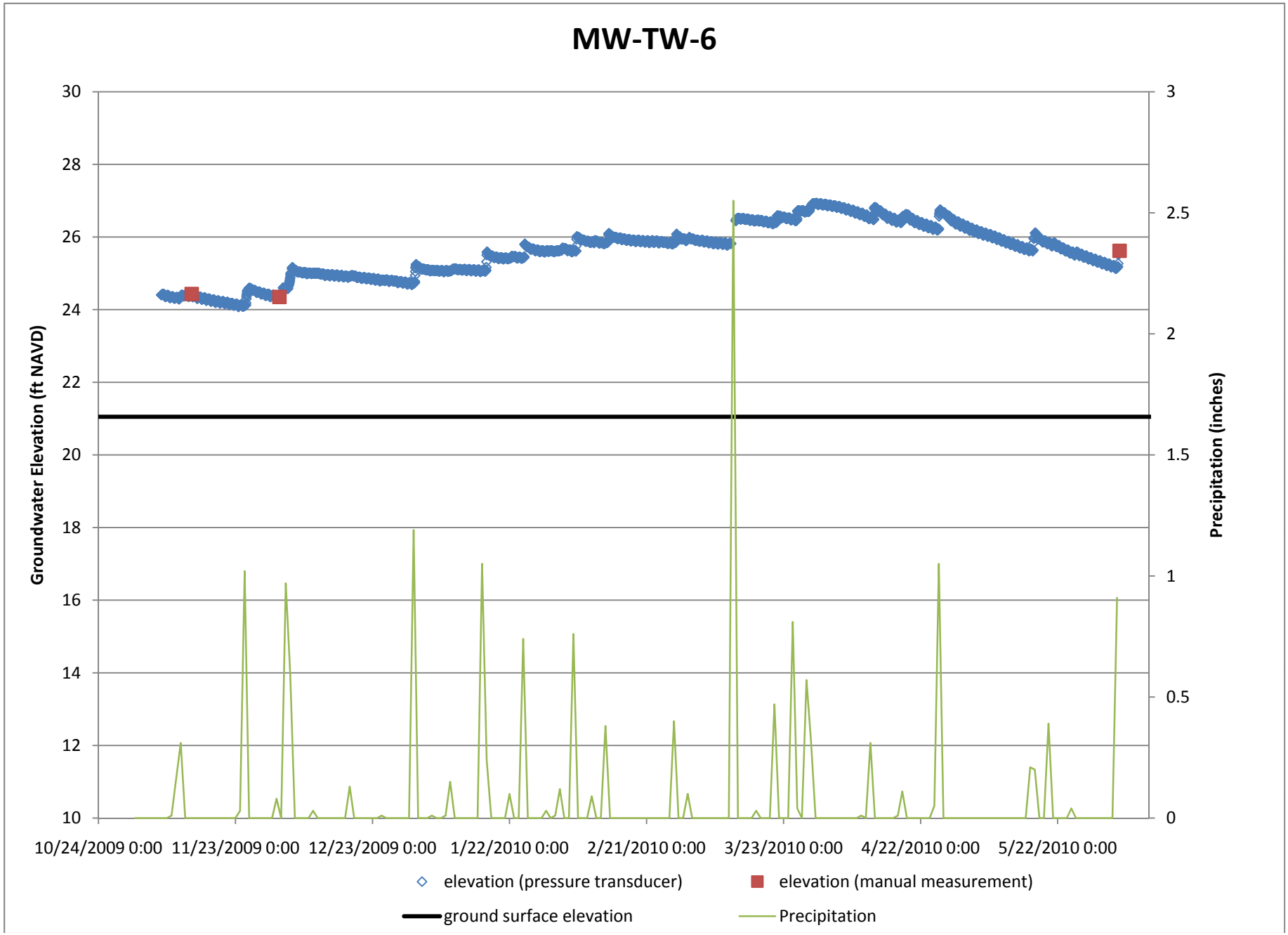
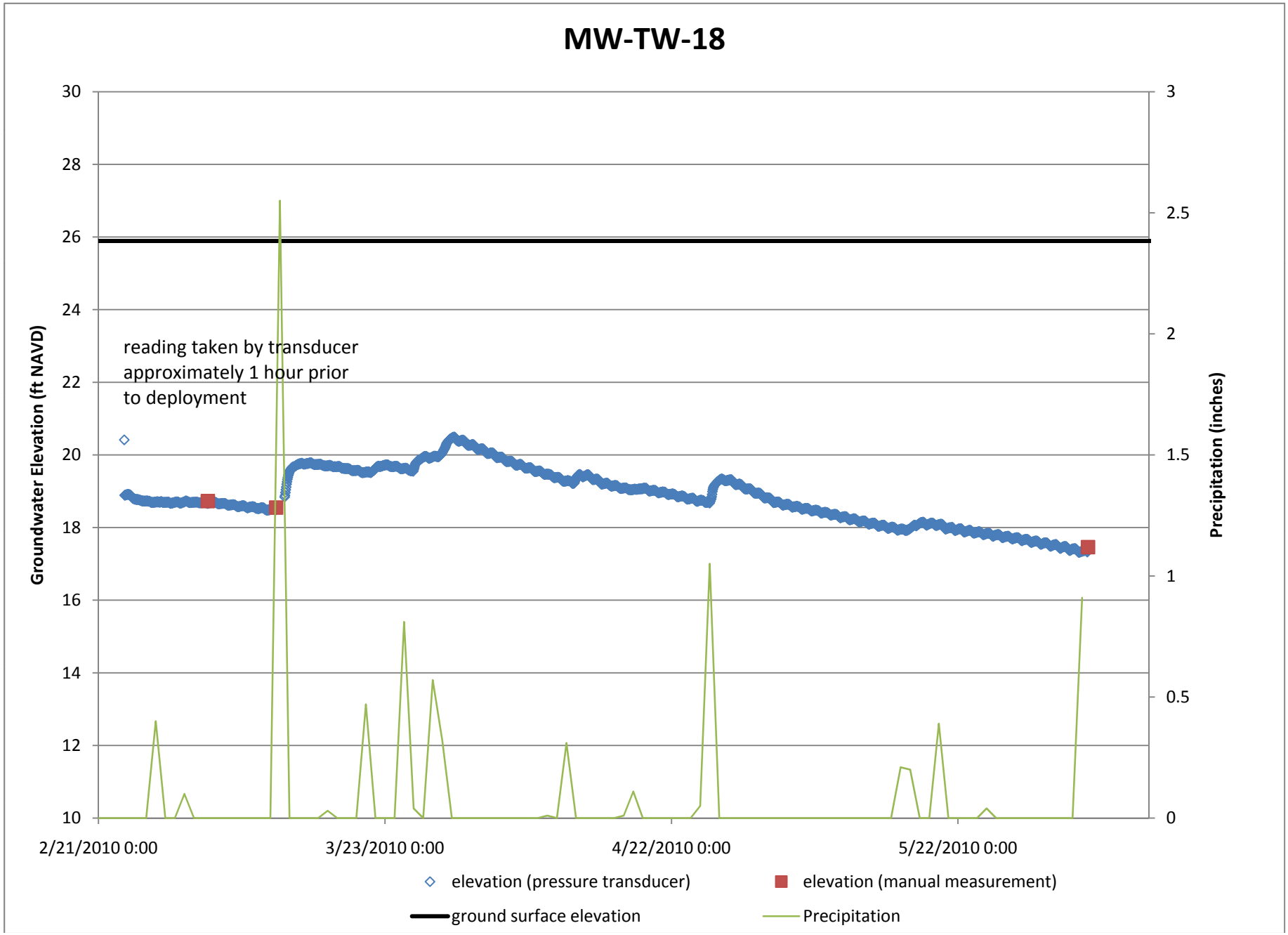
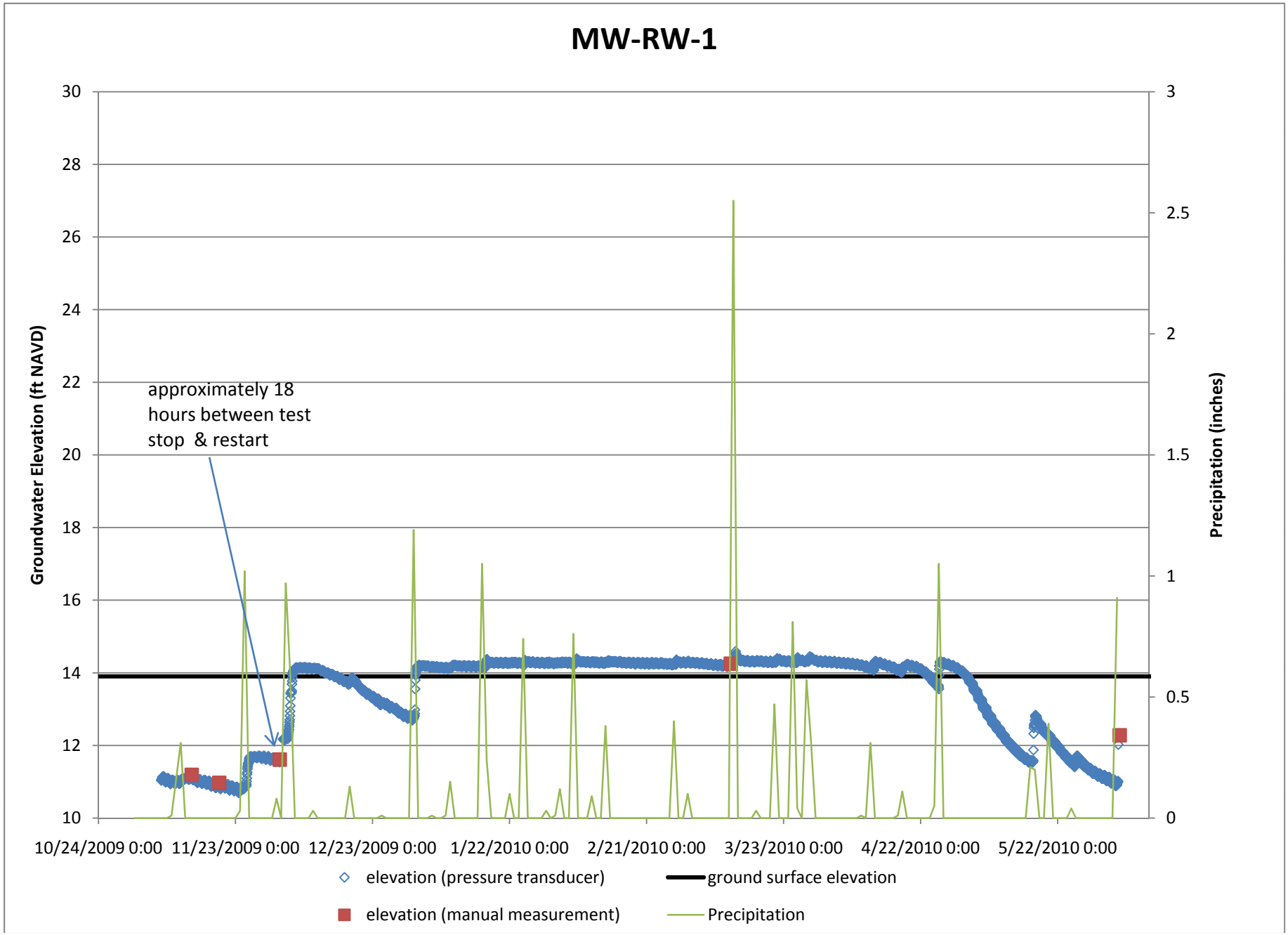


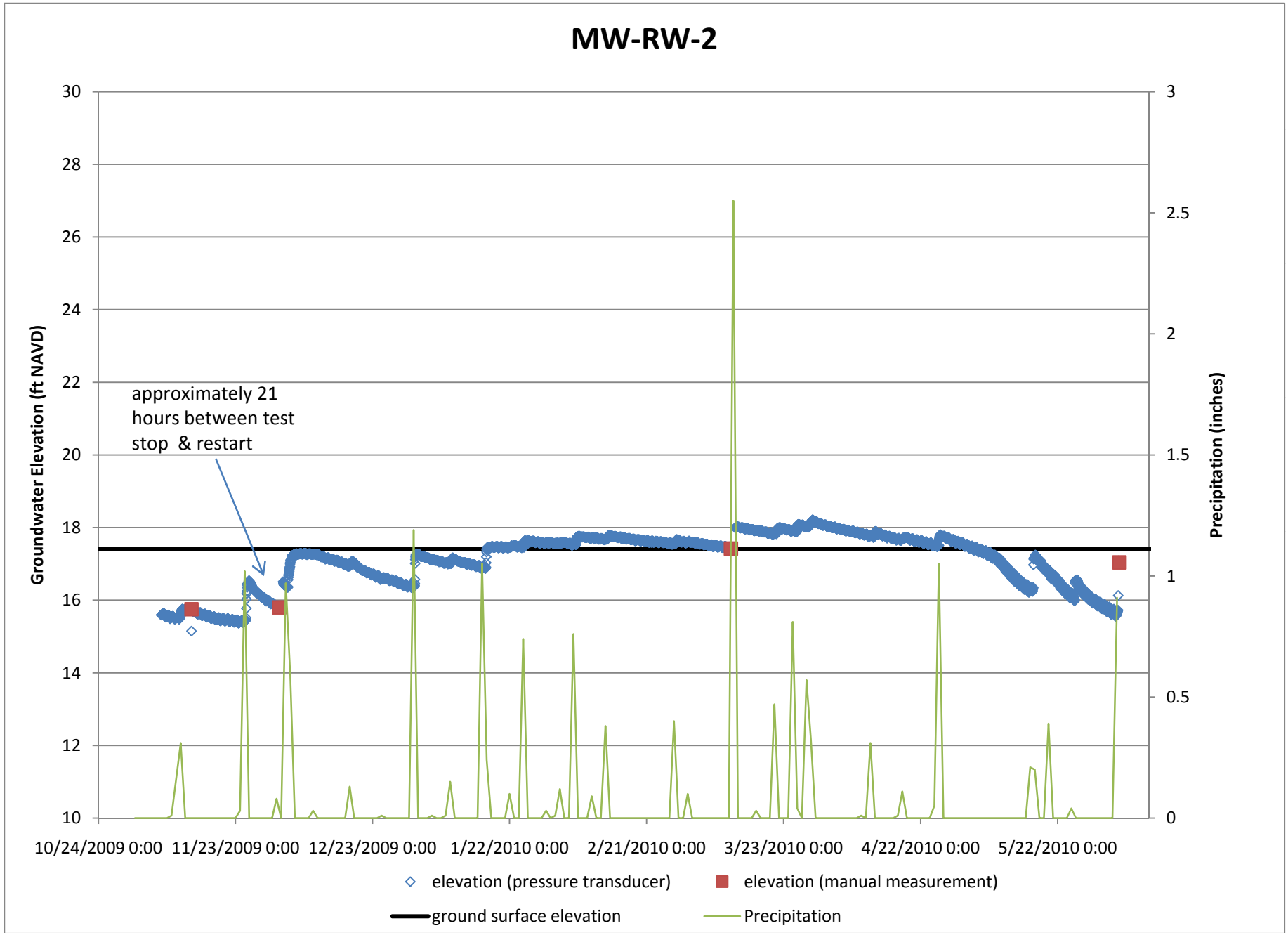
R625-STA-002194-0



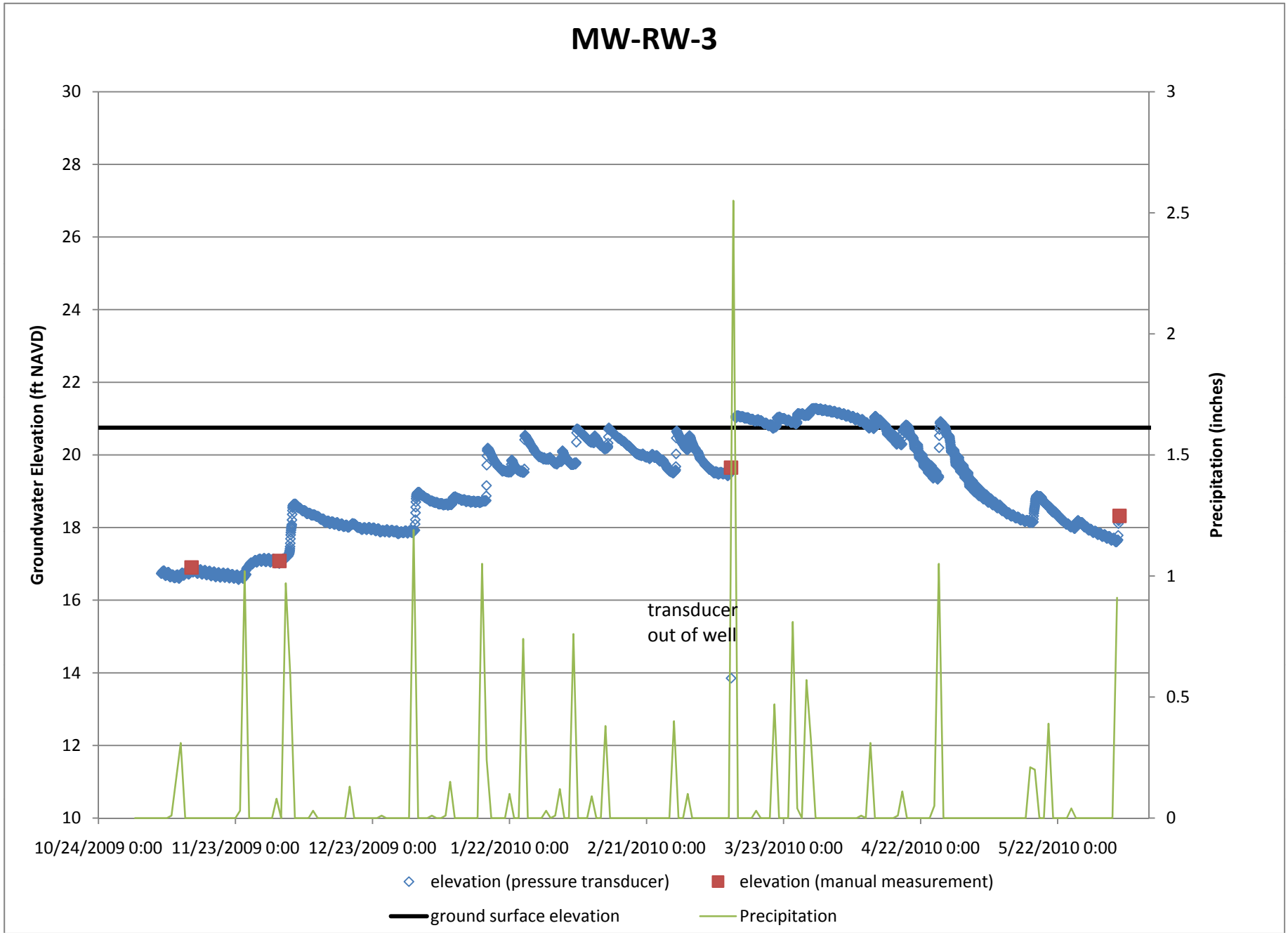
R625-STA-002194-0



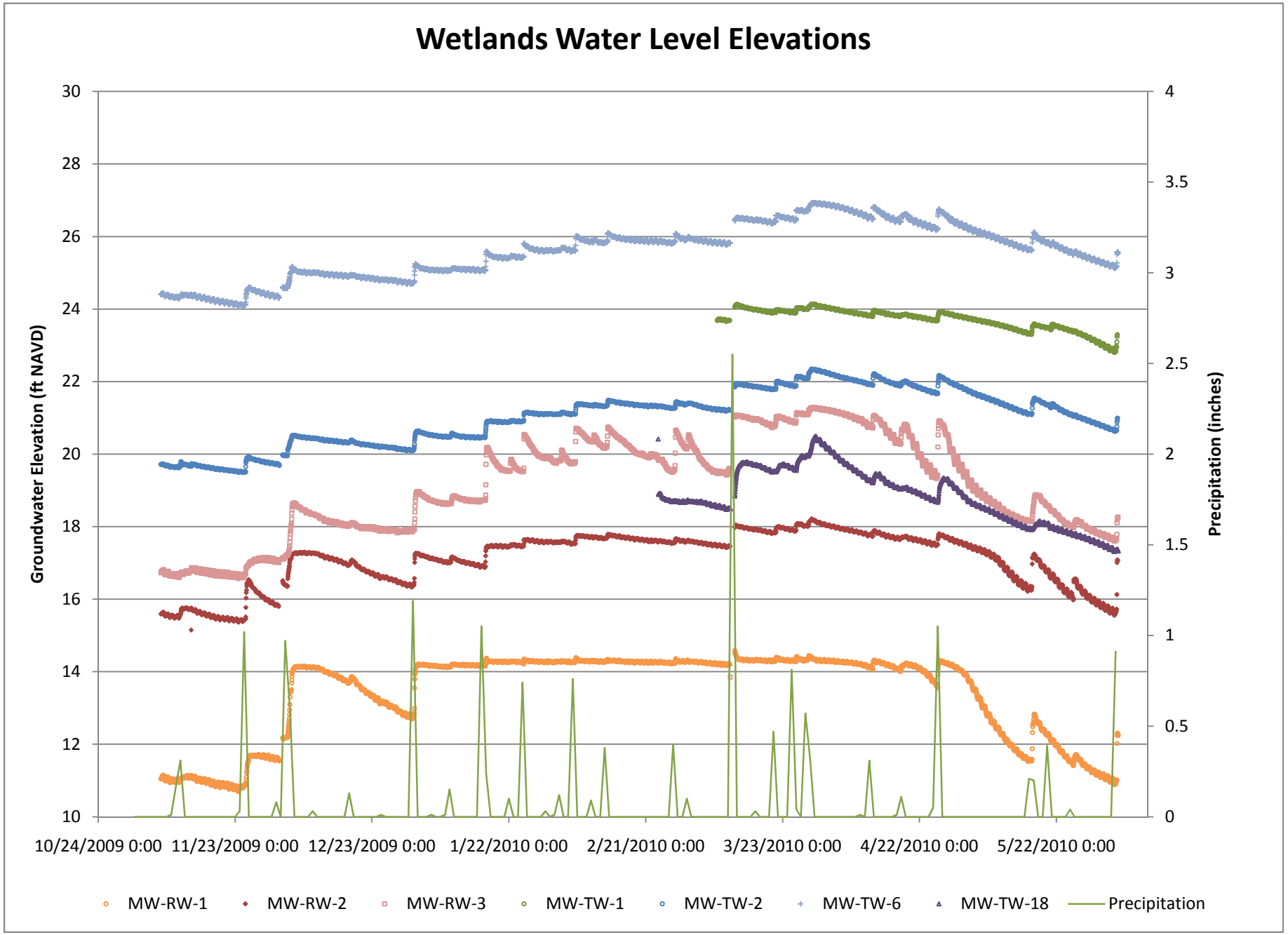
R625-STA-002194-0



R625-STA-002194-0



R625-STA-002194-0



R625-STA-002194-0

APPENDIX F - WETLAND MITIGATION NOTICE OF FINAL AGENCY ACTION FOR APPROVAL

Complete

Southwest Florida Water Management District
2379 Broad Street, Brooksville, Florida 34604-6899
(352) 796-7211 or 1-800-423-1476 (FL only)
SUNCOM 628-4150 TDD only 1-800-231-6103 (FL only)
On the Internet at: WaterMatters.org

An Equal Opportunity Employer

Bartow Service Office
170 Century Boulevard
Bartow, Florida 33830-7700
(863) 534-1448 or
1-800-492-7862 (FL only)

Sarasota Service Office
6750 Fruitville Road
Sarasota, Florida 34240-9711
(941) 377-3722 or
1-800-320-3503 (FL only)

Tampa Service Office
7601 Highway 301 North
Tampa, Florida 33637-6759
(813) 985-7481 or
1-800-836-0797 (FL only)

October 27, 2010

Swift Holdings
Tallevast Comm Ctr

Lakewood Ranch Town Center Owners Association
14400 Covenant Way
Lakeweood Ranch, FL 34202

Subject: **Notice of Final Agency Action for Approval**
ERP Short Form

Project Name:	Braden River Mitigation Bank
App ID/Permit No:	640067 / 44024579.003
County:	MANATEE
Letter Received:	October 01, 2010
Expiration Date:	October 27, 2015
Sec/Twp/Rge:	23/35S/19E

Reference: Chapters 40D-4 and 40, Florida Administrative Code (F.A.C)
Sections 373.4141 and 120.60, Florida Status (F.S)

Dear Permittee(s):

Your request to modify Permit No. 43024579.000 by Short Form has been approved. This modification authorizes:

1. The withdrawal of 0.50 mitigation credits to mitigate for wetland impacts associated with ERP No. 43014262.003, entitled "Tallevast Commercial Center". The 0.50 credits will be withdrawn from the following credit categories: 0.50 credits from Freshwater Herbaceous.

2. The updated and attached Attachment 5, Exhibits A and B (Mitigation Credit Ledger) is a part of this Short Form Modification.

3. All other terms and conditions of Permit No. 43024579.000, dated March 28, 2006, and entitled "Braden River Mitigation Bank", apply.

Plans and information you submitted to support your request to modifiy this permit will be kept on file.

Final approval is contingent upon no objection to the District's action being received by the District within the time frames described below.

You or any person whose substantial interests are affected by the District's action regarding a permit may request an administrative hearing in accordance with Sections 120.569 and 120.57, F.S., and Chapter 28-106, F.A.C., of the Uniform Rules of Procedure. A request for hearing must: (1) explain how the substantial interests of each person requesting the hearing will be affected by the District's action, or proposed action, (2) state all material facts disputed by the person requesting the hearing or state that there are no disputed facts, and (3) otherwise comply with Chapter 28-106, F.A.C. Copies of Sections 28-106.201 and 28-106.301, F.A.C. are enclosed for reference. A request for hearing must be filed with (received by) the Agency Clerk of the District at the District's Brooksville address within 21 days of receipt of this notice. Receipt is deemed to be the fifth day after the date on which this notice is deposited in the United States mail. Failure to file a request for hearing within this time period shall constitute a waiver of any right you or such person may have to request a hearing under Sections 120.569 and 120.57, F.S. Mediation pursuant to Section 120.573, F.S., to settle an administrative dispute regarding the District's action in this matter is not available

prior to the filing of a request for hearing.

Enclosed is a "Noticing Packet" that provides information regarding District Rule, 40D-1.1010, F.A.C., which addresses the notification of persons whose substantial interests may be affected by the District's action in this matter. The packet contains guidelines on how to provide notice of the District's action, and a notice that you may use.

Approved construction plans are part of the permit, and construction must be in accordance with these plans. *These drawings are available for viewing or downloading at* www.watermatters.org.

If you have questions regarding this letter modification, please contact Tasha Bowers, at the Sarasota Service Office, extension 6538. For assistance with environmental concerns, please contact Tasha Bowers, extension 6538.

Sincerely,

Ross T. Morton, P.W.S.
Authorized Signature
Director, Sarasota Regulation Department

Enclosures: Section 28-106.201 and 28-106.301, F.A.C.
Notice of Packet (42.00-039)

cc: Gary S. Comp, WilsonMiller Stantec

R625-STA-002194-0

ATTACHMENT 5, EXHIBIT A
Braden River Mitigation Bank
ERP 43024579.004
Mitigation Credit Ledger
Freshwater Herbaceous Wetland Credits

Date	Source of Credits (If Crediting)	Entity Using Credits (If Debiting)	Permit Number of Credit User (If Debiting)	Credits Currently Available	Credits Added (If Crediting)	Credits Used (If Debiting)	Credit Balance
24-Jan-07	Polygons 3, 8, 9,10, 11	N/A	N/A	0.00	21.05	0.00	21.05
1-Sep-10	N/A	Ring Power Corporation	43026960.002	21.05	N/A	0.72	20.33
8-Oct-10	N/A	Tallevast Commerce Center	43024579.003	20.33	N/A	0.50	19.83