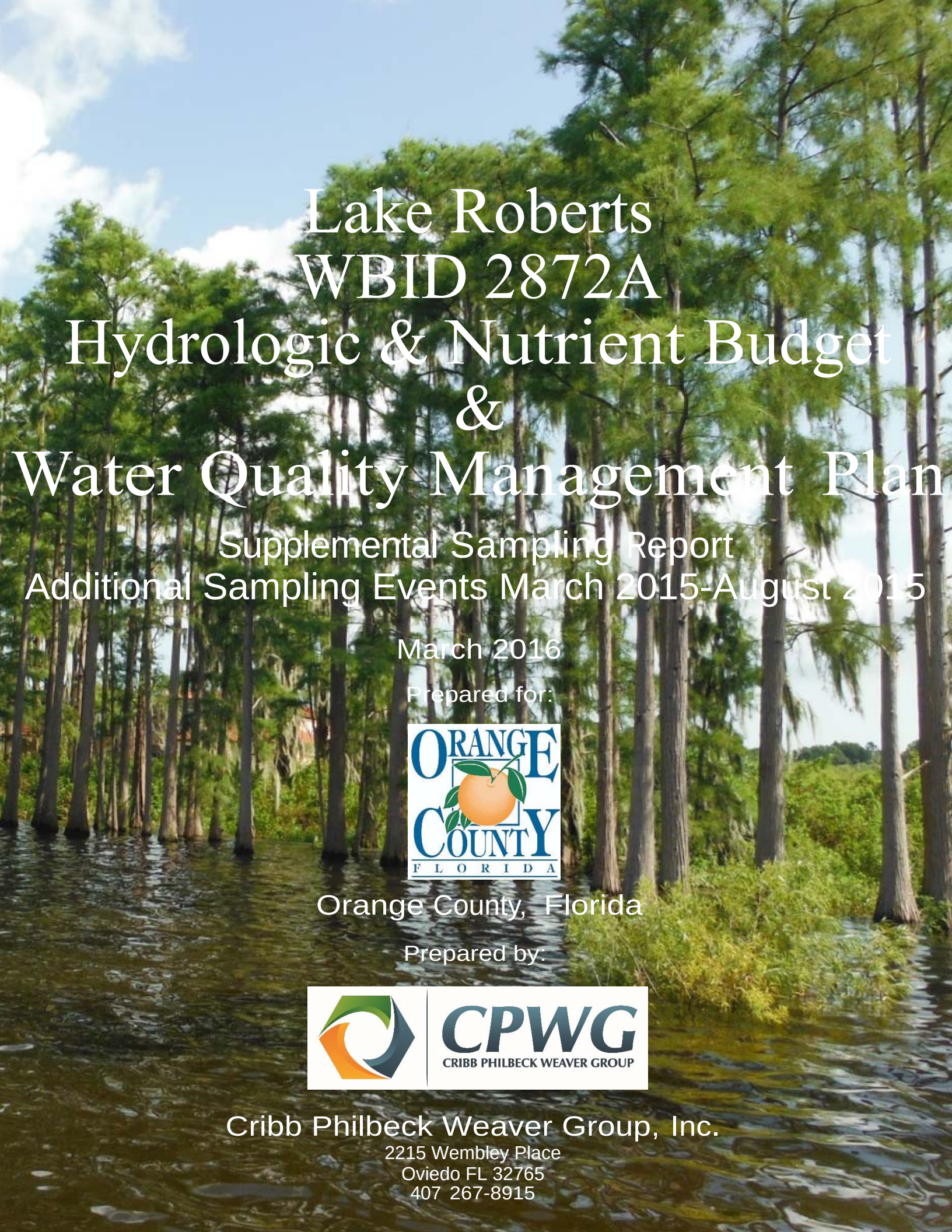

Lake Roberts WBID 2872A Hydrologic & Nutrient Budget & Water Quality Management Plan

Supplemental Sampling Report
Additional Sampling Events March 2015-August 2015

March 2016

Prepared for:

Orange County, Florida

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1.0 INTRODUCTION

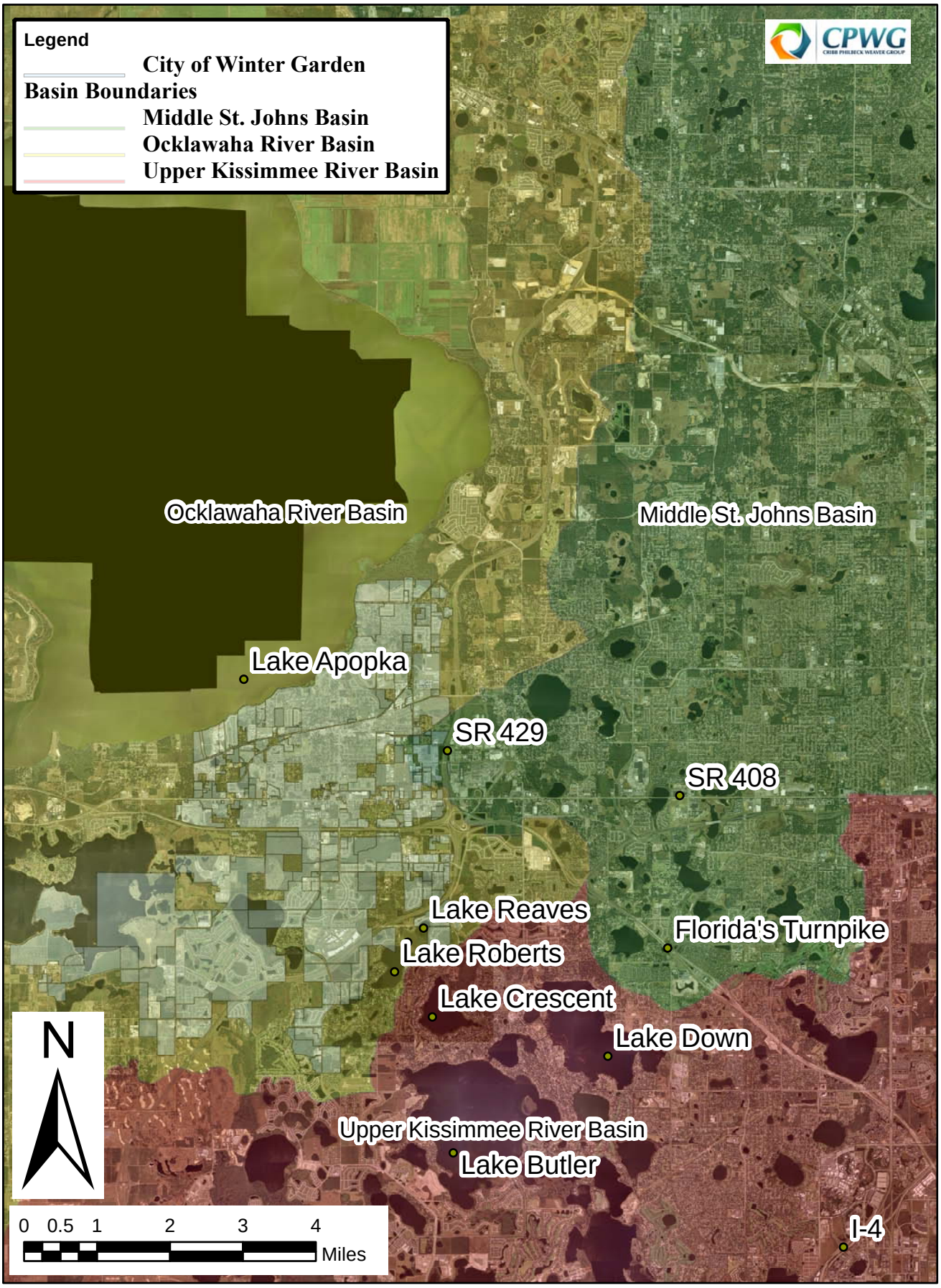
This report provides a summary of work efforts performed by Cribb Philbeck Weaver Group (CPWG) and Team Engineering (TEAM) for Orange County Environmental Protection Division (OCEPD) during the supplemental sample collection on Lake Roberts. Lake Roberts is a 108-acre urban lake located approximately 10 miles southwest of downtown Orlando and just south of the City of Winter Garden.

The shape of Lake Roberts is similar to an hourglass with distinct north and south lobes. A wetland tussock is located along the east border of the lake's north lobe and connects Lake Roberts and Lake Reaves. The predominant direction of surface water flow is from east to west, with Lake Reaves draining through the wetland tussock into Lake Roberts. Outfall from Lake Roberts is on the west side of the north lobe and drains to Lake Tilden through a series of stormwater culverts, ditches and wetlands. The overall project location is shown in Figure 1-1.

During September 2013 to August 2014, monthly samples were collected from five sampling sites, including three fixed locations in Lake Roberts (north lobe, center lobe - a.k.a. A33 and south lobe), one fixed location in the wetland tussock, and one location in Lake Reaves near the wetland tussock. Lake Reaves is covered by a floating hyacinth mat and monthly sample locations depended on the location of the floating mat. The project area and locations of the five original surface water monitoring sites are shown on Figure 1-2. The data collected during the year-long monitoring events was used to quantify pollutant loadings and assess the overall health of Lake Roberts, evaluate potential sources of nutrients to Lake Roberts and identify areas of opportunities where nutrient load reductions could be achieved to improve water quality within the lake.

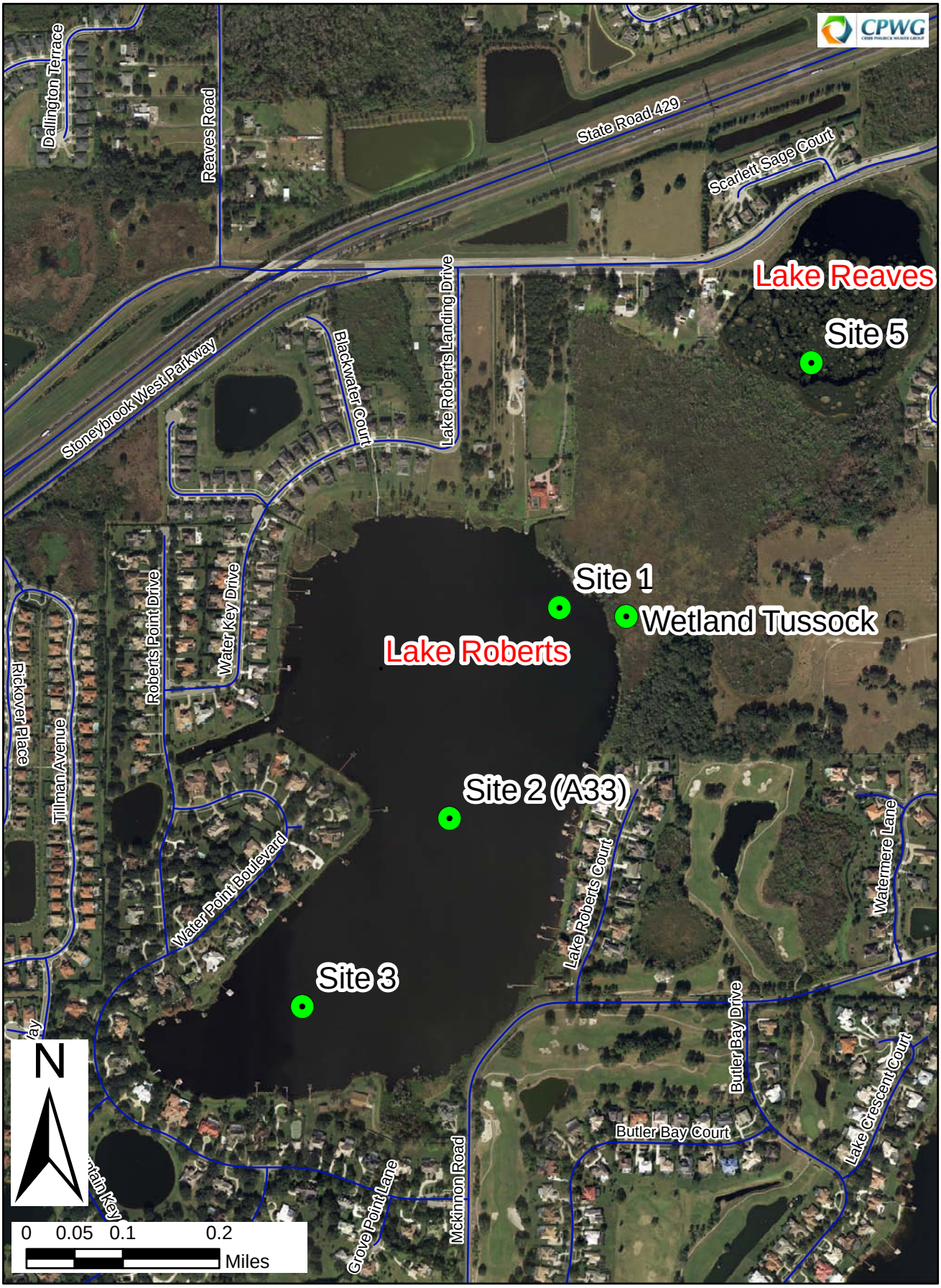
1.1 SUPPLEMENTAL MONITORING PROGRAM

The OCEPD requested that CPWG conduct a supplemental monitoring program on Lake Roberts to further evaluate nutrient loading from the wetland tussock into the north lobe of Lake Roberts and the transport of nutrients across the north lobe to the outfall structure. This report documents the findings of the Lake Roberts Supplemental Sampling.



Lake Roberts Location Map

Figure 1-1



Location of Surface Water Monitoring Sites

Figure 1-2

2.0 SUPPLEMENTAL SAMPLING

A supplemental monitoring program was conducted on Lake Roberts between March 2015 and August 2015 to further evaluate nutrient loading from the wetland tussock into the north lobe of Lake Roberts and the transport of nutrients across the north lobe to the outfall structure. Surface water samples were collected monthly from a total of eight separate locations, including six sites in the North Lobe of Lake Roberts, one site in the wetland tussock and one site in Lake Reaves. The locations of these supplemental surface water monitoring sites are shown on Figure 2-1.

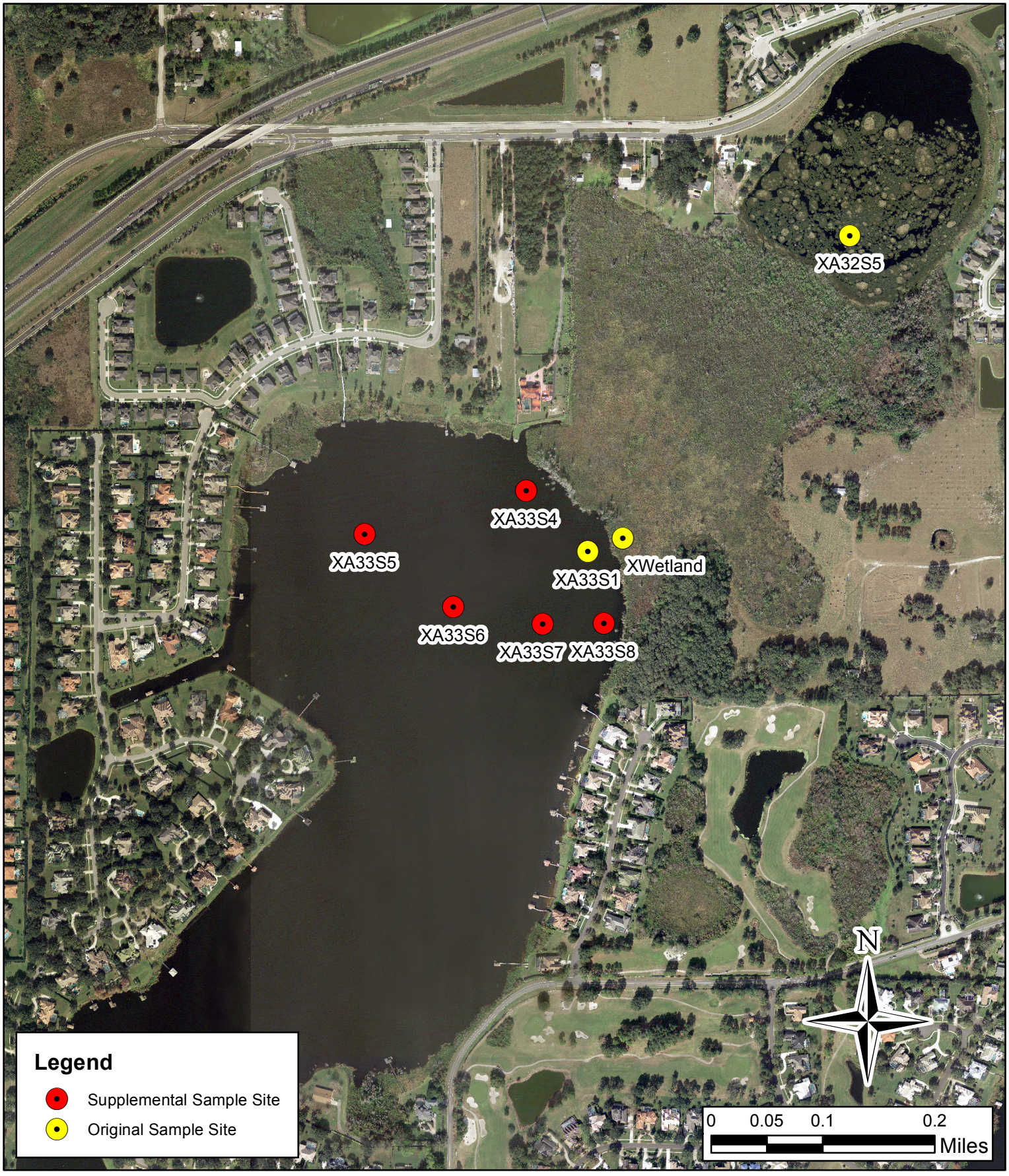
Monitoring sites in the North Lobe of Lake Roberts were designated as XA33S1, XA33S4, XA33S5, XA33S6, XA33S7 and XA33S8. The monitoring site in the wetland tussock was designated as XWetland and the monitoring site in Lake Reaves was designated as XA32S5. Three of the monitoring sites, XA32S5 (Lake Reaves), XWetland (Wetland Tussock) and XA33S1 (North Lobe) are existing sites that were sampled during the original monitoring program.

2.1 MONITORING ACTIVITIES

Monitoring and sampling was performed in accordance with FDEP's standard operating procedures outlined in DEP-SOP-001/01 titled “Department of Environmental Protection Standard Operating Procedures for Field Activities”. Surface water samples were collected using a Van Dorn sampler consisting of a Plexiglas cylinder closed at both ends by rubber force cups. The cups were locked outside the cylinder to open the sampler. Once the desired depth of sample was reached, a weight was lowered to release the cups, retaining the sample in the cylinder. Collected samples were transferred to sample bottles prepared by the laboratory.

Surface water samples were collected at 0.5 meters below water surface and bottom water samples were collected at 0.5 meters above the bottom sediment from the six sites in Lake Roberts North Lobe. Only surface samples were collected from the wetland tussock and Lake Reaves. Samples were field filtered and/or preserved as appropriate for the parameter to be analyzed, stored on ice, and returned to the laboratory for chemical analyses. Laboratory measurements performed are shown in Table 1, along with a summary of analytical methods and laboratory detection limits.

After four months of sampling, it was observed that the analytical results at sites XA33S7 and XA33S8 were very similar. Therefore, sample collection at site XA33S7 was stopped in June 2015 and only a total of four monthly samples were collected from the site during the supplemental monitoring program.



CPWG
CRIBB PHILBECK WEAVER GROUP

Lake Roberts
Supplemental Sample Site Location Map

Figure
2-1

TABLE 1
Analytical Methods and Detection Limits for Laboratory Analyses

Measurement Parameter		Method[1]	Method Detection Limits (MDLs)[2&3]
General Parameters	TSS Color	SM-21, Sec. 2540 B SM-21, Sec. 2120 C	1 mg/l 2 Pt-Co Unit
Nutrients	Ammonia-N (NH_3-N) Nitrate + Nitrite (NO_x-N) Total Nitrogen SRP (Orthophosphorus) Total Phosphorus	SM-21, Sec. 4500-NH3 G SM-21, Sec. 4500-NO3 F SM-21, Sec. 4500-N C SM-21, Sec. 4500-P F SM-21, Sec. 4500-P B.5	0.03 mg/l 0.007 mg/l 0.007 mg/l 0.003 mg/l 0.002 mg/l
Biological Parameters	Chlorophyll-a	SM-19, Sec. 10200 H.1.3	0.004 mg/m^3

1. Standard Methods for the Examination of Water and Wastewater, 21st Ed., 2005.
2. MDLs are calculated based on the EPA method of determining detection limits. Actual value may vary with different laboratories. Values reported in table are from Orange County EPD laboratory.

During each monitoring event, vertical profiles of pH, temperature, conductivity, dissolved oxygen, ORP, and turbidity were conducted at each site. Field measurements were collected at water depths of 0.5 meters and at 0.5 meter intervals to the bottom of each sampling site. All field measurements were performed using YSI Data Sonde. A measurement of Secchi disk depth was also performed at each site.

2.2 FIELD PROFILES

A listing of vertical field profiles collected in Lake Roberts, the wetland tussock and Lake Reaves from March 2015 - August 2015 is given in Appendix A. A discussion of vertical field profiles collected at each of the monitoring sites is given in the following sections.

2.2.1 NORTH LOBE: ALONG WETLAND TUSSOCK EDGE

Three of the North Lobe monitoring sites were located along the edge of the wetland tussock to assess the uniformity of flow from the wetland tussock into Lake Roberts. The average depth of these three sites was 2.0 meters.

The vertical field profile measurements for temperature, pH and dissolved oxygen collected during the monthly monitoring events were graphed to show variations that might occur.

Monthly temperature measurements were relatively uniform throughout the water column at each site except during May 2015 at Site 4 and June 2015 at Sites 1 and 4 when surface elevations were higher and a drop in temperature was observed.

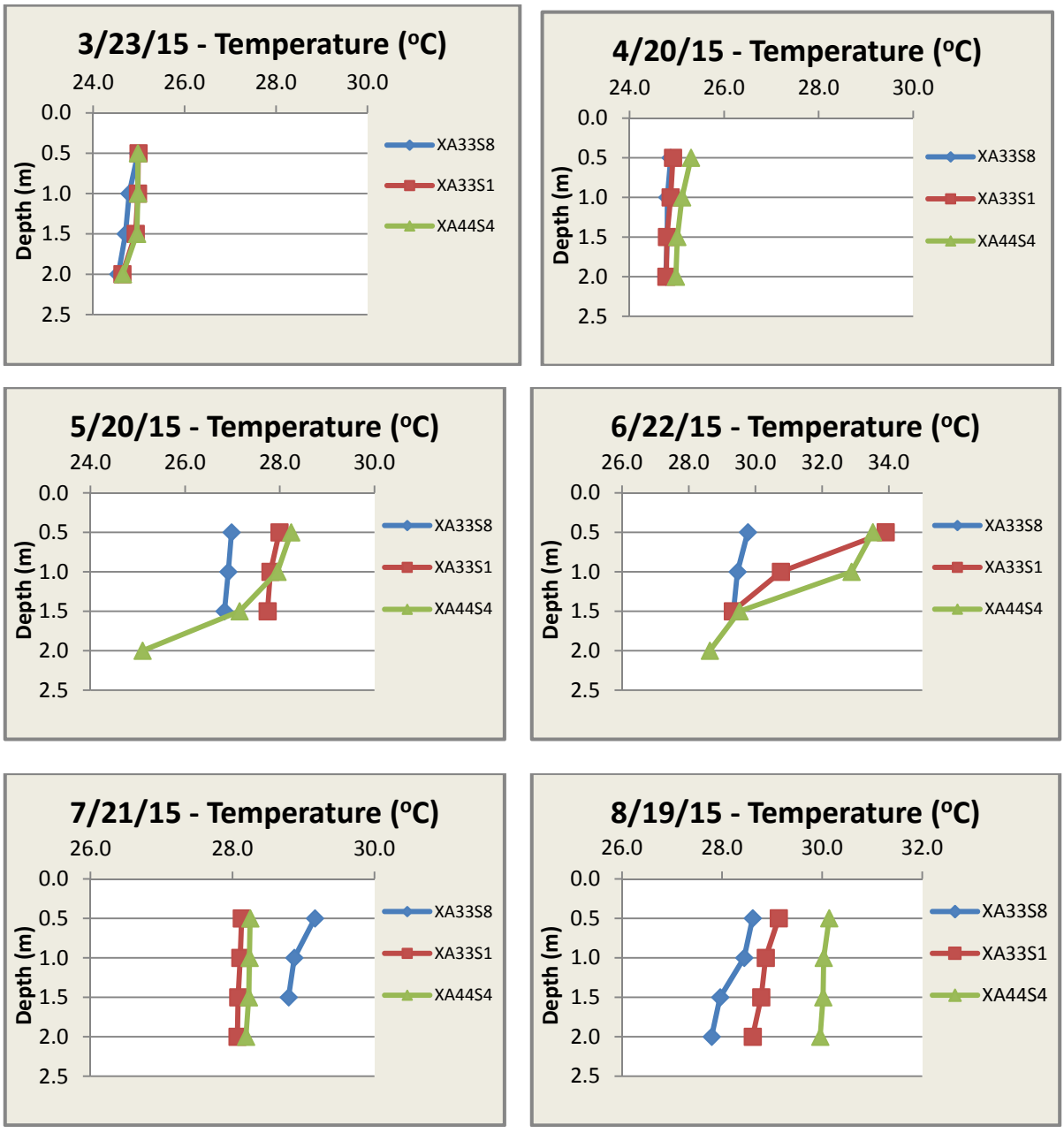


Figure 2-2. Vertical Field Profiles of Temperature Measured in the North Lobe at the Edge of the Wetland Tussock from March 2015-August 2015.

Field measured pH values were relatively uniform in the shallow water column during the monitoring events except during May and June when pH measurements dropped in water depth below 1.5 meters. During monthly sampling events except August, water column pH varied between 8.0 and 9.5

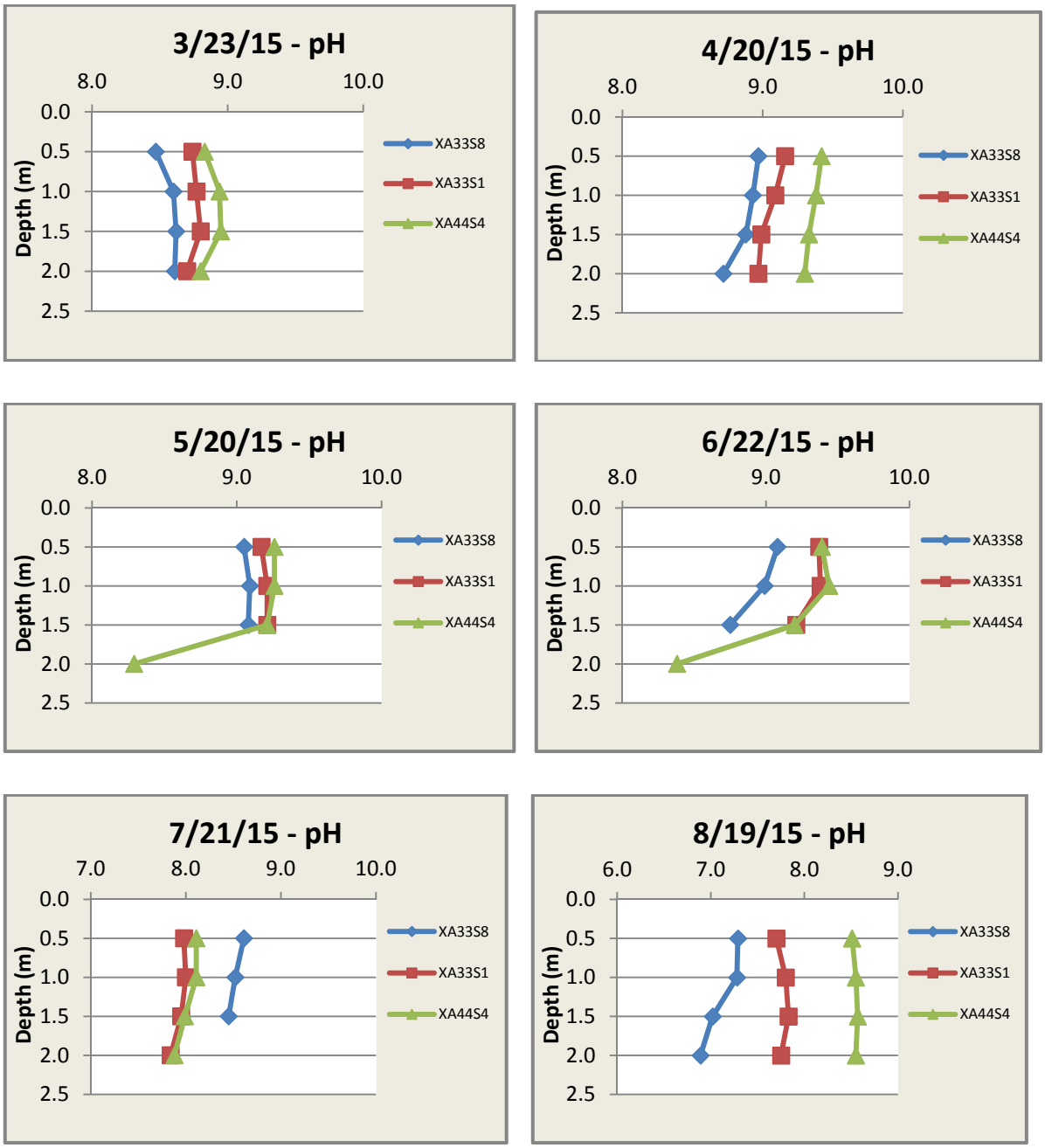


Figure 2-3. Vertical Field Profiles of pH Measured in the North Lobe at the Edge of the Wetland Tussock from March 2015-August 2015.

Dissolved oxygen concentrations generally decreased with increasing water depths during the monitoring events. Only one sampling event during May 2015 showed concentrations reaching anoxic conditions at the water-sediment interface. It appears that there is minimal internal recycling occurring at the edge of the wetland tussock.

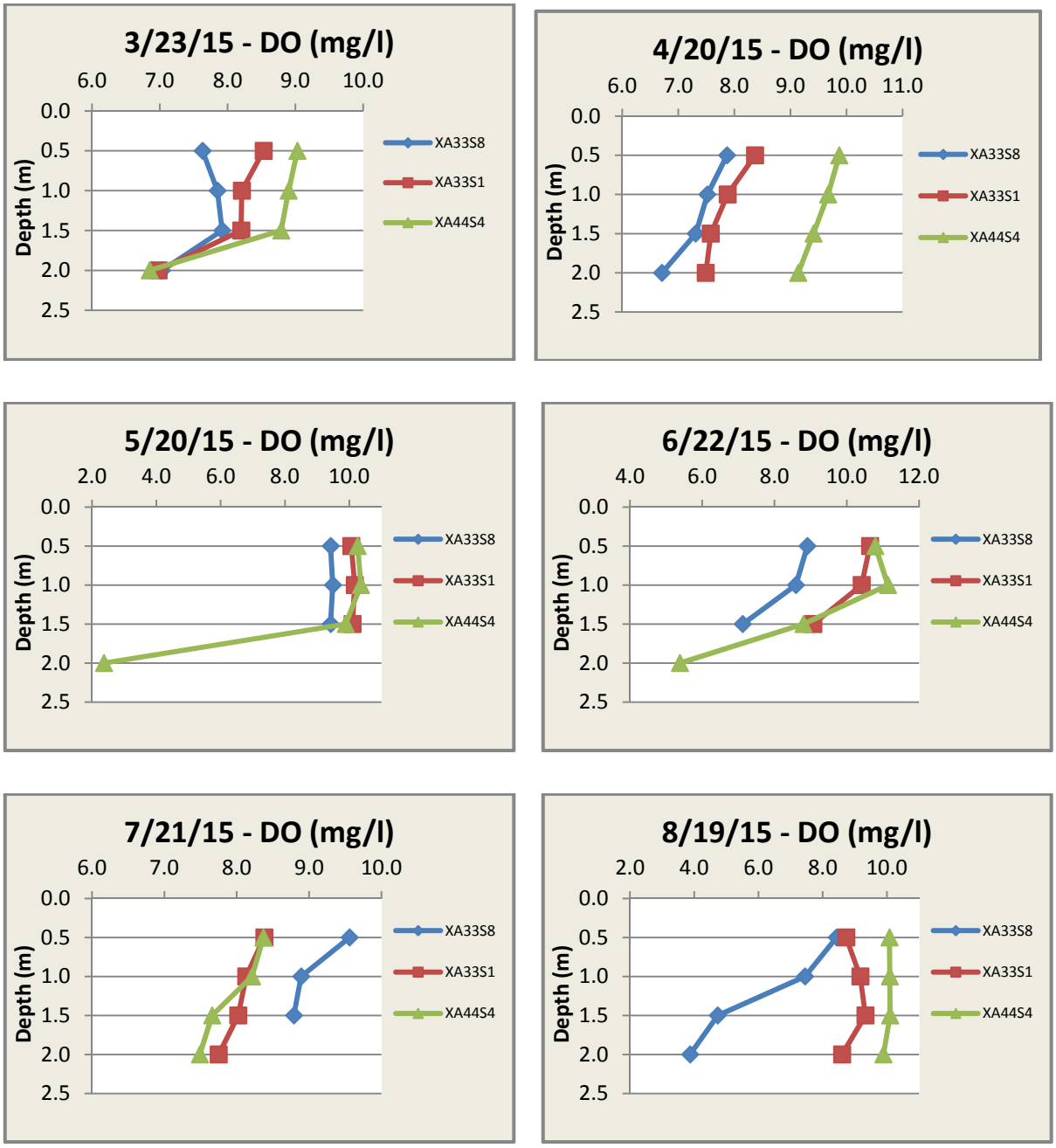
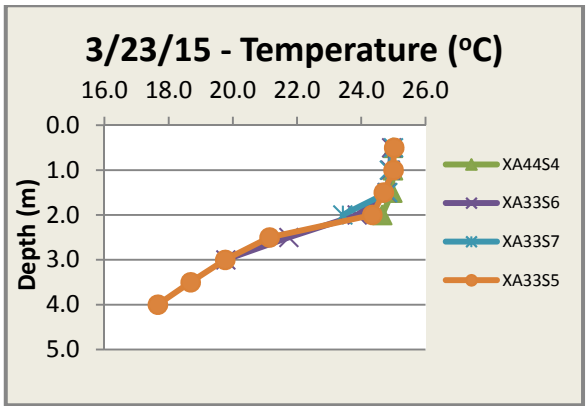


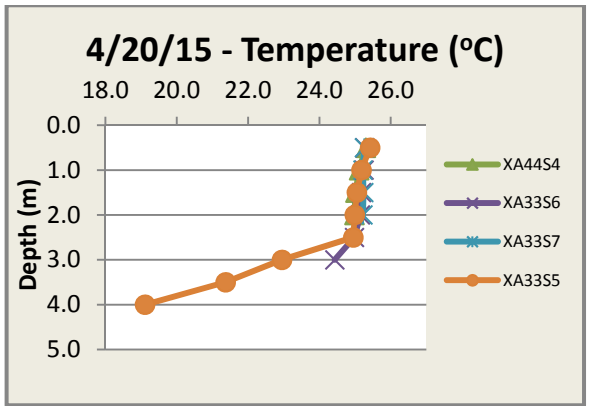
Figure 2-4. Vertical Field Profiles of Dissolved Oxygen Measured in the North Lobe at the Edge of the Wetland Tussock from March 2015-August 2015.

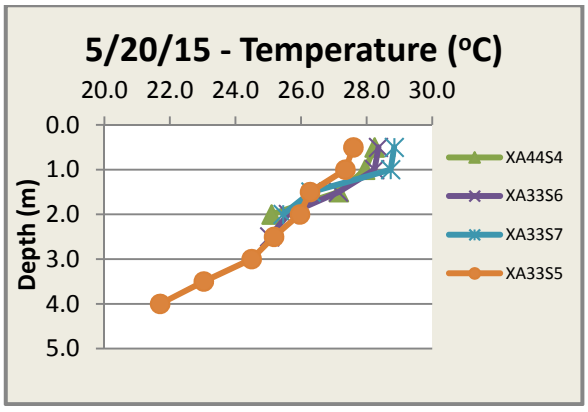
2.2.2 NORTH LOBE: EDGE OF WETLAND TUSSOCK TOWARDS CENTRAL, DEEPER AREA OF LAKE ROBERTS

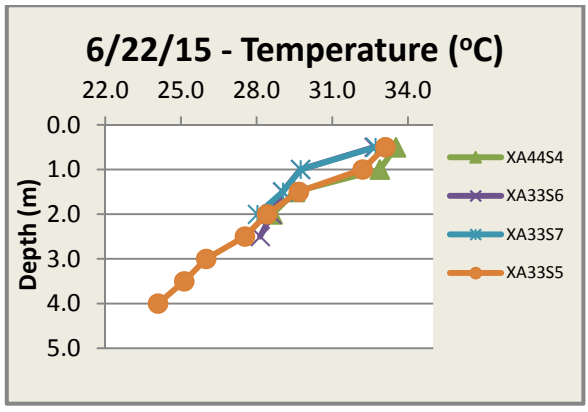
Four monitoring sites were located from the edge of the wetland tussock (XA33S4) through the central portion of the North Lobe (XA33S7 and XA33S6) towards the deepest portion of the North Lobe (XA33S5) to assess the uniformity of flow from the wetland tussock across the lake to the outfall on the northwest side of the North Lobe. The depth of these four sites ranged from 2.0 to 4.0 meters.

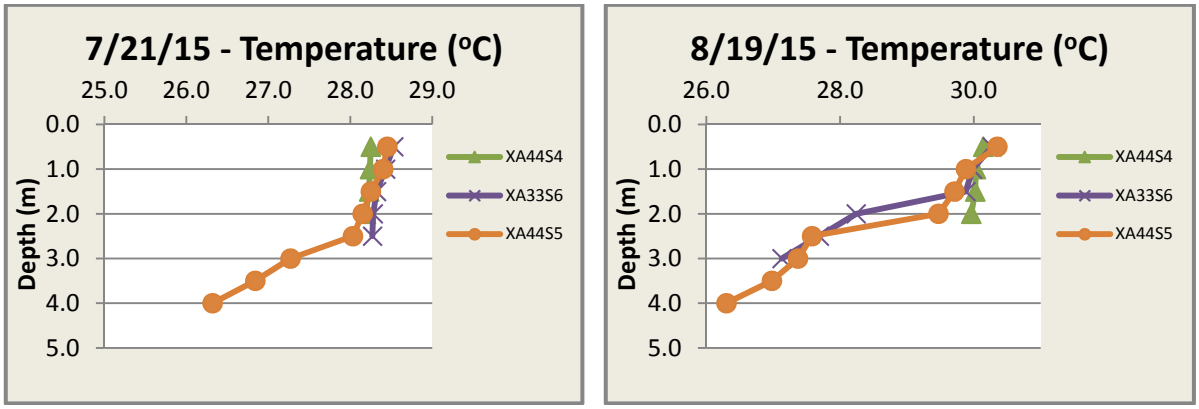
The vertical field profile measurements for temperature, pH and dissolved oxygen collected during monthly monitoring events were graphed to show variations that might occur. Monthly temperature measurements in surface water less than 2 meters were relatively uniform in the 4 sites except during May and June when temperatures decreased with each depth increment. A decrease in temperature is observed in each measurement below 2 meters.







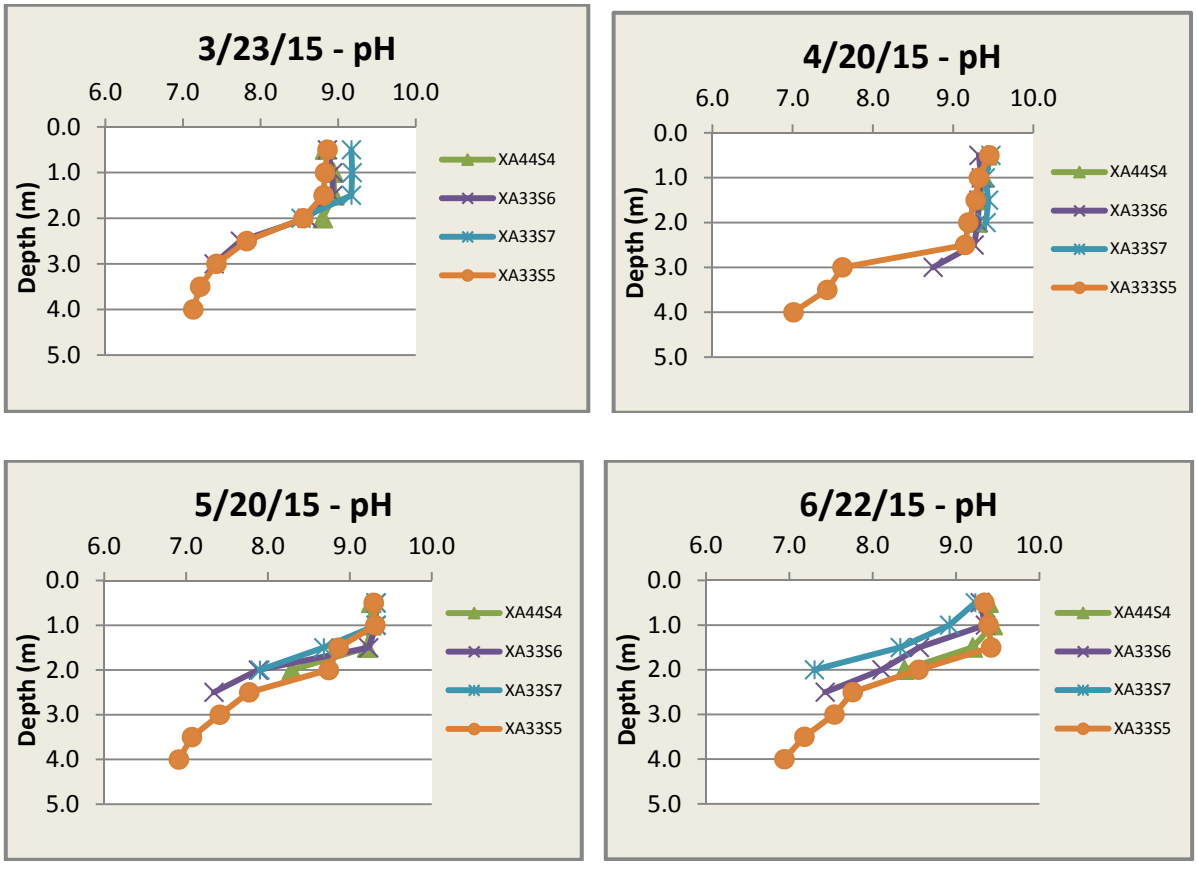


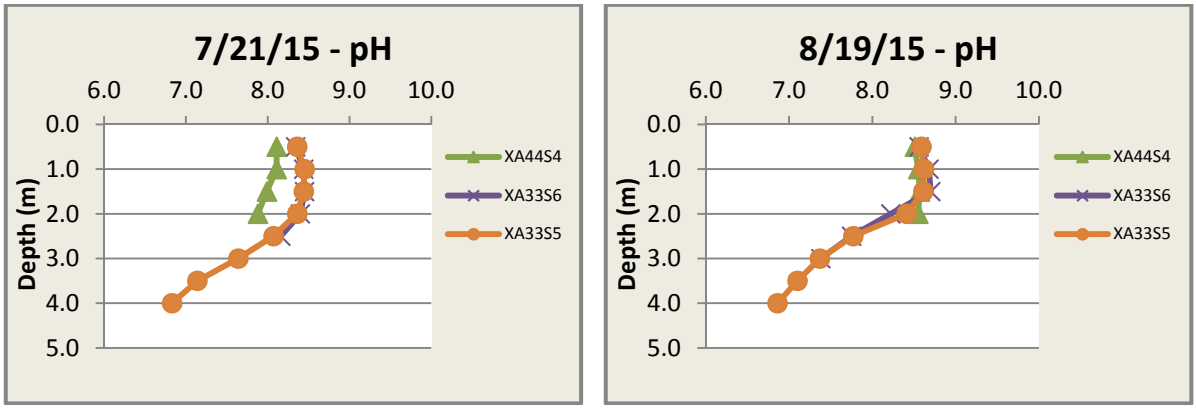


Note: Site XA33S7 was not sampled in July and August

Figure 2-5. Vertical Field Profiles of Temperature Measured from the Edge of the Wetland Tussock across the North Lobe from March 2015-August 2015.

Monthly pH measurements in surface water less than 1.5 meters were relatively uniform in the 4 sites except during May and June. A decrease in pH is observed incrementally below 2 meters.

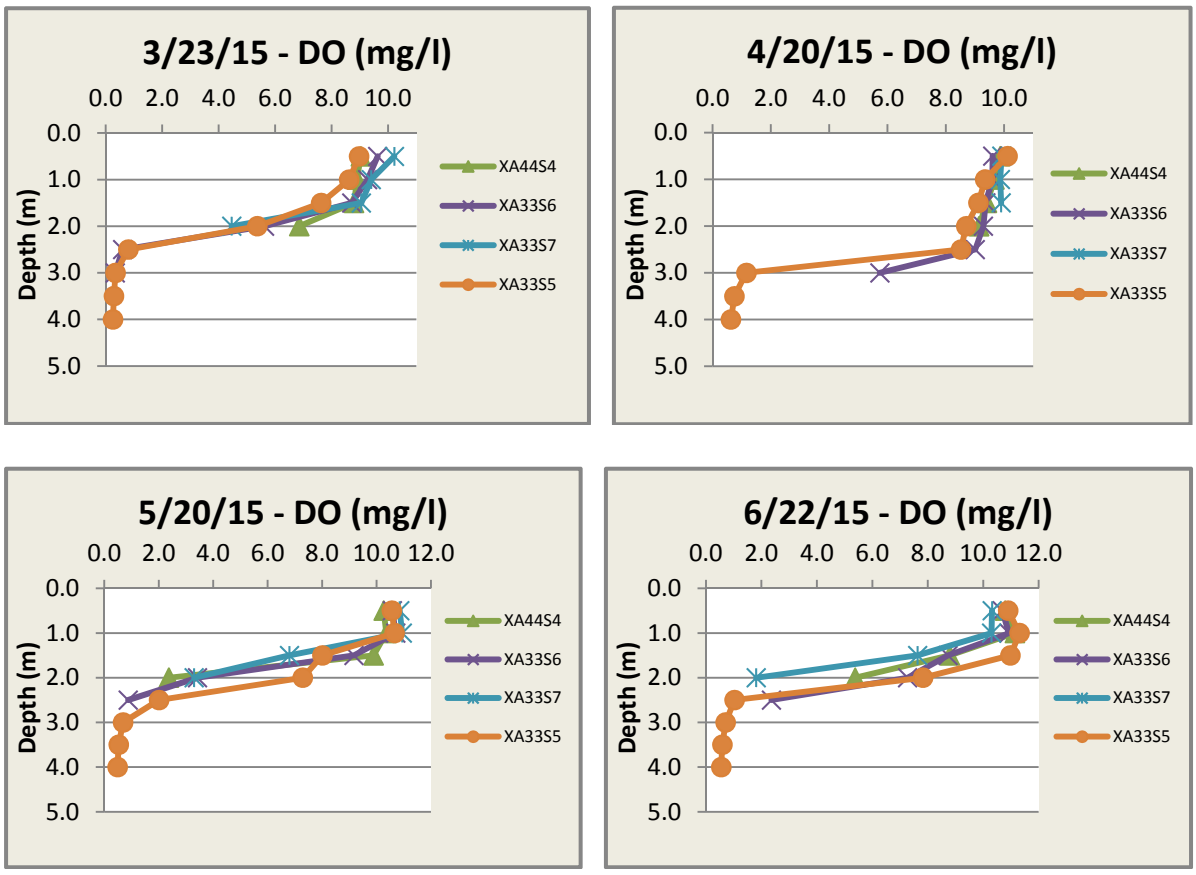


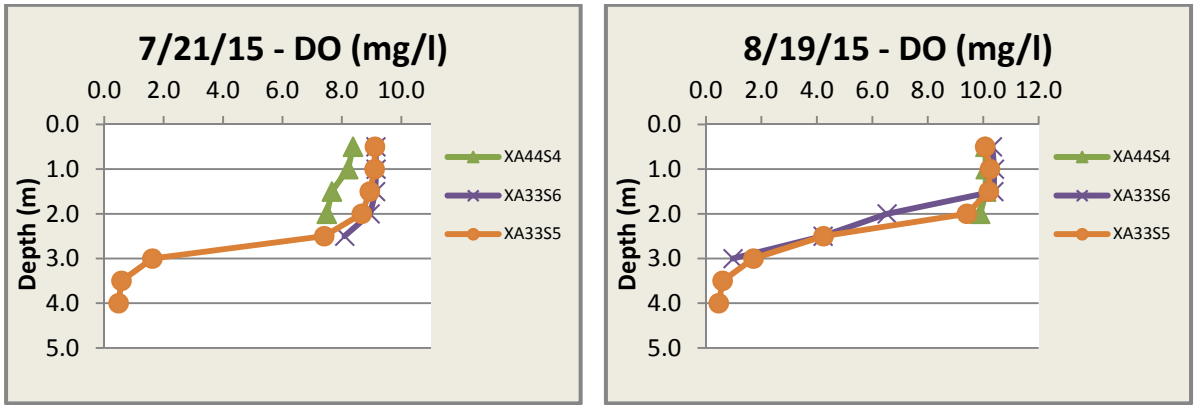


Note: Site XA33S7 was not sampled in July and August

Figure 2-6. Vertical Field Profiles of pH Measured from the Edge of the Wetland Tussock across the North Lobe from March 2015-August 2015.

Dissolved oxygen (DO) measurements within the top 1.5 meters ranged from approximately 8 to 12 mg/l. DO measurements decreased gradually to a depth between 2.0 and 2.5 meters followed by a relatively rapid decrease in dissolved oxygen until reaching the water-sediment interface. Anoxic conditions were observed at lower depths in site XA33S5 during all six monitoring events, in site XA33S6 during May, June and August, and in site XA33S7 during May and June.





Note: Site XA33S7 was not sampled in July and August

Figure 2-7. Vertical Field Profiles of Dissolved Oxygen Measured from the Edge of the Wetland Tussock across the North Lobe from March 2015-August 2015.

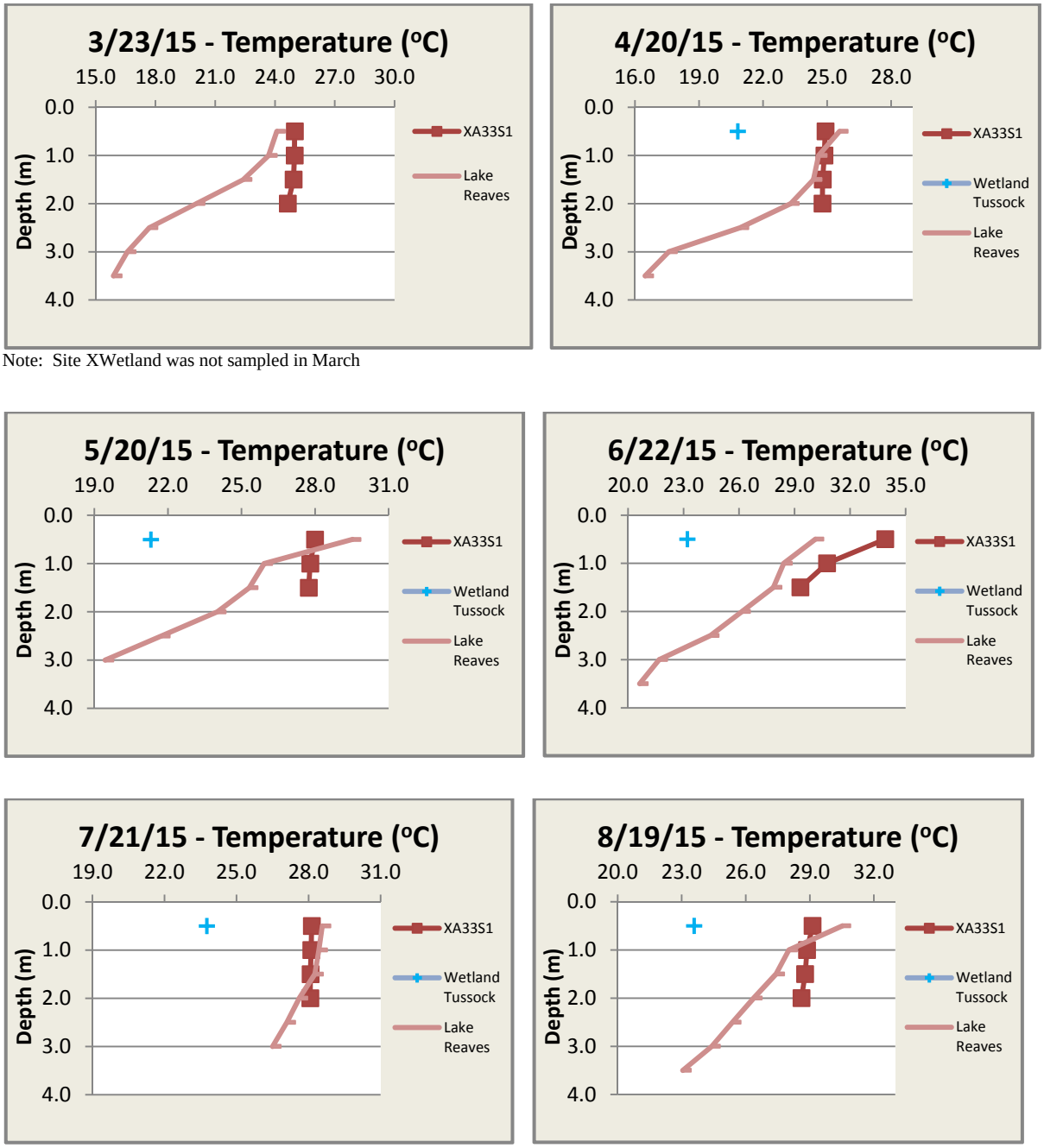
2.2.3 LAKE REAVES, WETLAND TUSSOCK AND NORTH LOBE

Lake Reaves is located northeast of Lake Roberts with a floating wetland tussock separating the two lakes. During the previous field reconnaissance, water levels were discovered to be a depth of approximately one meter under the wetland tussock. Water levels remained at approximately one meter under the wetland tussock during the supplemental sampling period.

The predominant flow of surface water is from Lake Reaves through the wetland tussock into Lake Roberts. During the supplemental sampling period, water hyacinth mats covered approximately two-thirds of the surface water in Lake Reaves. During the six monitoring events of the supplemental sampling, the water hyacinth mat was on the east side of the lake during each sampling event; therefore, the monitoring site in Lake Reaves was located on the west side of the lake near the wetland tussock.

The Lake Reaves, XWetland (Wetland Tussock) and XA33S4 (North Lobe) sites were graphed to evaluate the differences in the vertical field profile measurements for temperature, pH and dissolved oxygen across the different, but connected, surface water system.

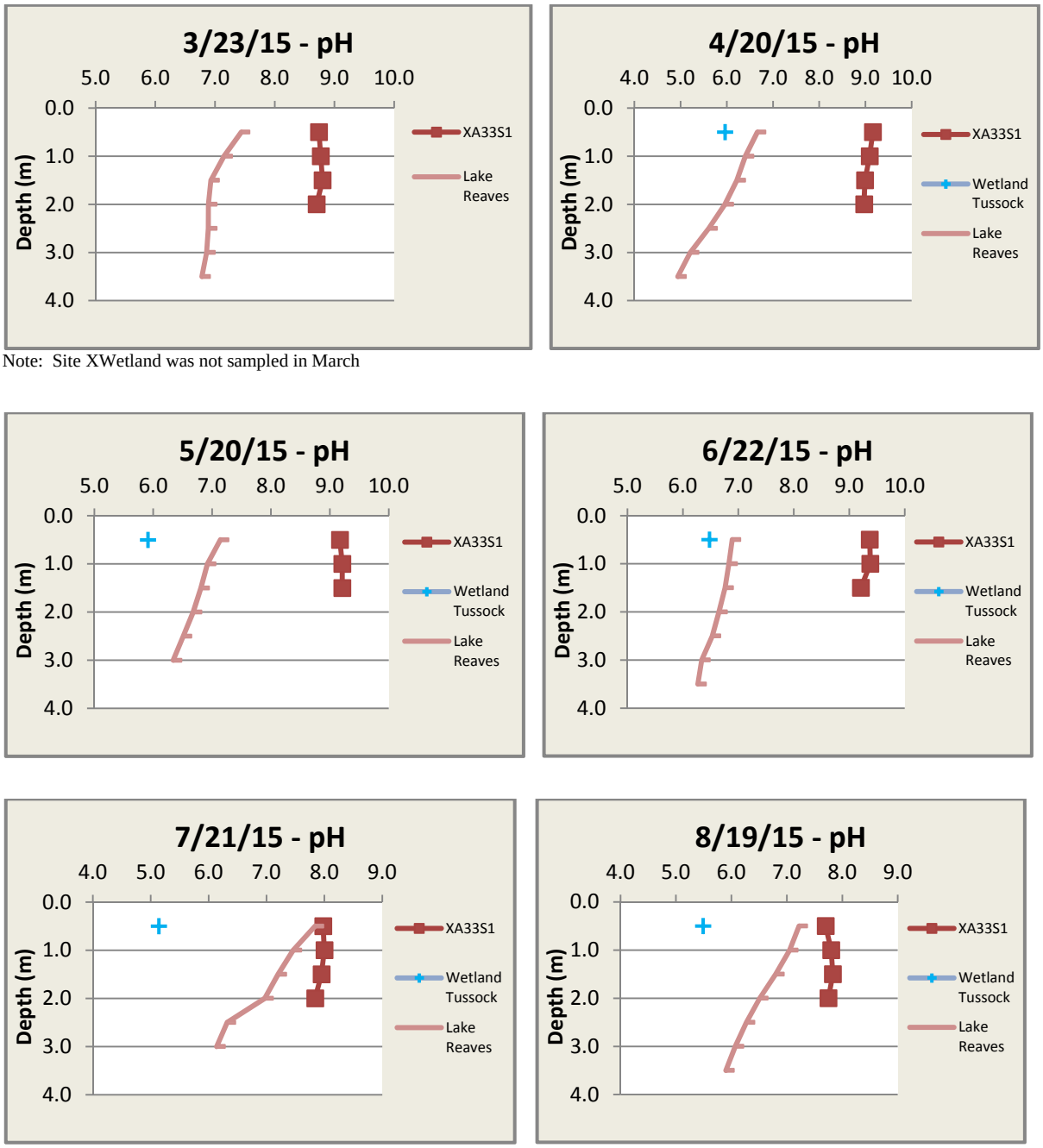
Surface temperatures observed in Lake Reaves were similar to those observed in the North Lobe of Lake Roberts; however, temperature below 1 meter in depth in Lake Reaves was lower than those in Lake Roberts. Temperatures within the wetland tussock are significantly lower than both lakes.



Note: Site XWetland was not sampled in March

Figure 2-8. Vertical Field Profiles of Temperature Measured from Lake Reaves, the Wetland Tussock and XA33S1 in the North Lobe from March to August 2015.

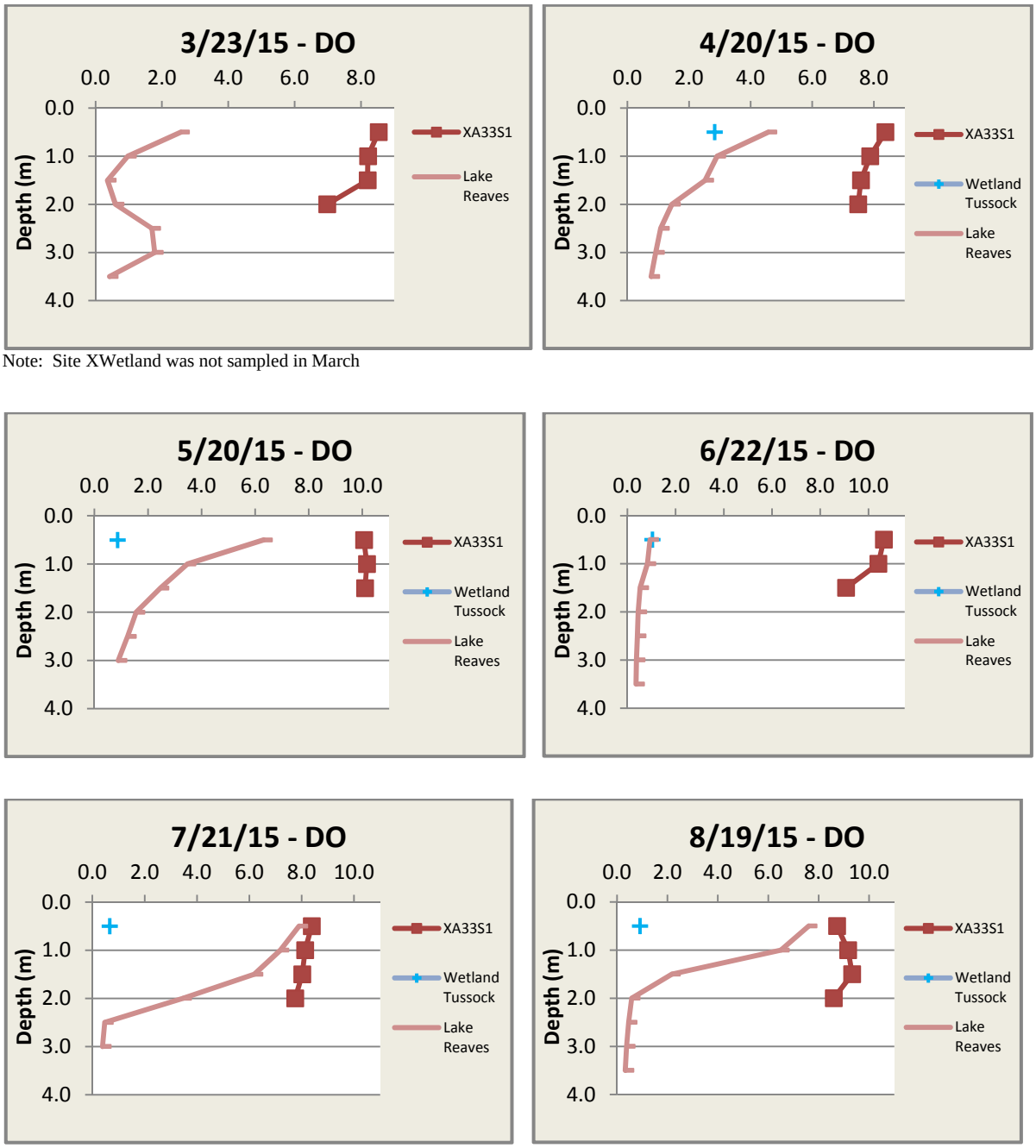
Measured pH values were significantly less in Lake Reaves than in Lake Roberts during the monitoring events, except the surface value during the July sampling event. The pH values in the wetland tussock are lower than Lake Reaves. The pH in Lake Reaves generally decreased with increasing water depth. The pH levels were relatively uniform with increasing water depths along the edge of the wetland tussock.



Note: Site XWetland was not sampled in March

Figure 2-9. Vertical Field Profiles of pH Measured from Lake Reaves, the Wetland Tussock and XA33S1 in the North Lobe from March to August 2015.

Dissolved oxygen measurements in Lake Reaves are significantly lower than those observed in Lake Roberts. Dissolved oxygen measurements in the wetland tussock are significantly lower than in the two lakes. Dissolved oxygen measurements in the two lakes generally decreased within the water column. Anoxic conditions were observed during four of the five monitoring events in the wetland tussock (the April event was slightly above 2 mg/l DO) and in each of the 6 monitoring events within Lake Reaves.



Note: Site XWetland was not sampled in March

Figure 2-10. Vertical Field Profiles of Dissolved Oxygen Measured from Lake Reaves, the Wetland Tussock and XA33S1 in the North Lobe from March to August 2015.

2.2.4 SECCHI DISK MEASUREMENTS

A Secchi disk depth measurement was collected at each of the monitoring sites during most monitoring events. Secchi disk depths in the North Lobe of Lake Roberts were less transparent than Lake Reaves during March through June. During July and August, the transparency in both lakes was similar. Substantially lower Secchi disk measurements were observed in the wetland tussock during the monitoring events. Visual observations of the North Lobe indicated earlier algae bloom that observed the previous year, possibly due to warmer than average temperatures during the winter and early spring months of 2015.

2.3 WATER QUALITY CHARACTERISTICS

Surface water samples were collected on a monthly basis during the 6-month supplemental monitoring program at each of the eight monitoring sites (except at Site XA33S7 during July and August 2015, and XWetland during March 2015). Two separate water samples were collected at the six North Lobe monitoring sites in Lake Roberts; one at approximately 0.5 meters below the water surface (top sample) and another at approximately 0.5 meters above the water-sediment interface (bottom" sample). Only top samples were collected from the monitoring sites in the wetland tussock and in Lake Reaves. A complete listing of water quality characteristics measured at each of the monitoring sites between March 2015 and August 2015 is presented in Appendix B.

Three separate evaluations of the analytical data were performed: (1) data from the three North Lobe monitoring sites located along the edge of the wetland tussock were compared to assess the uniformity of nutrients flowing from the wetland tussock into Lake Roberts; (2) data from four monitoring sites located from the edge of the wetland tussock through the central portion of the North Lobe towards the deepest portion of the North Lobe were compared to assess the variations of nutrient flow from the wetland tussock to the outfall on the northwest side of the North Lobe, and (3) data from Lake Reaves, the wetland tussock and the North Lobe were compared to assess the impacts of Lake Reaves and the wetland tussock may have on Lake Roberts.

2.3.1 NORTH LOBE - ALONG WETLAND TUSSOCK EDGE

The mean water quality characteristics for the three monitoring sites located in the North Lobe of Lake Roberts along the edge of the wetland tussock between March and August 2015 is presented in Table 2. Surface and bottom samples were collected at the three sites. Separate mean values for the surface and bottom samples are provided in the table.

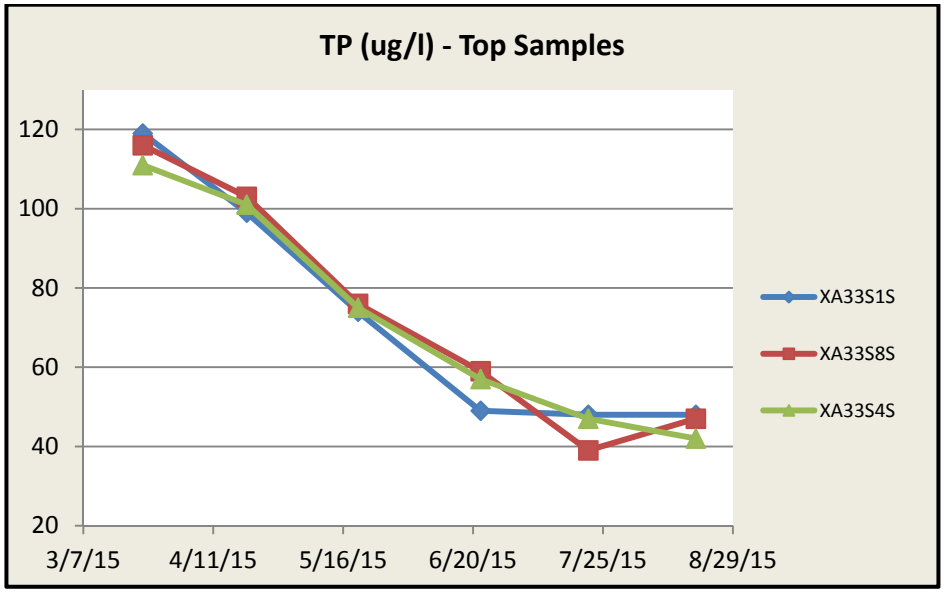
Table 2
Summary of Mean Water Quality Characteristics
3 North Lobe Sites Along the Edge of the Wetland Tussock
March 2015 to August 2015

Parameter	Units	North Lobe (XA33S8)		North Lobe (XA33S1)		North Lobe (XA33S4)	
		Surface	Bottom	Surface	Bottom	Surface	Bottom
pH	s.u.	8.6	8.4	8.7	8.6	8.9	8.6
Alkalinity	mg/l	37.0	36.5	36.2	35.2	35.7	35.7
Conductivity	µmho/cm	232	231	243	230	233	230
NH_3	µg/l	28	28	25	25	25	25
NO_X	µg/l	6	6	7	7	7	7
Diss. Organic N	µg/l	898	888	956	938	970	890
Particulate N	µg/l	733	807	701	721	881	899
Total N	µg/l	1,827	1,817	1,862	1,830	1,858	1,693
SRP	µg/l	3	3	3	3	3	3
Diss. Organic P	µg/l	13	11	12	12	12	18
Particulate P	µg/l	57	59	58	60	61	61
Total P	µg/l	73	74	73	75	72	65
Turbidity	NTU	12	11	12	12	12	12
Color	PCU	42	42	42	38	41	41
TSS	mg/l	13	11	12	9.	12	12
Chlorophyll-a	mg/m^3	67	--	65	--	68	--

The mean value of each parameter analyzed from the three surface samples was compared. Very little variation in the mean values is observed in the surface samples. Similarly, the mean value of each parameter analyzed for the three bottom samples were compared with little variation between the values.

Based on the results of field parameters and analytical data collected during this six month supplemental study, it appears that the discharge from the wetland tussock to the North Lobe of Lake Roberts is fairly uniform across the wetland/surface water interface.

A graphical comparison in the measured surface concentrations of total nitrogen and total phosphorus at the three monitoring sites along the edge of the wetland tussock was prepared to visualize the similarities in the analytical data at each site.



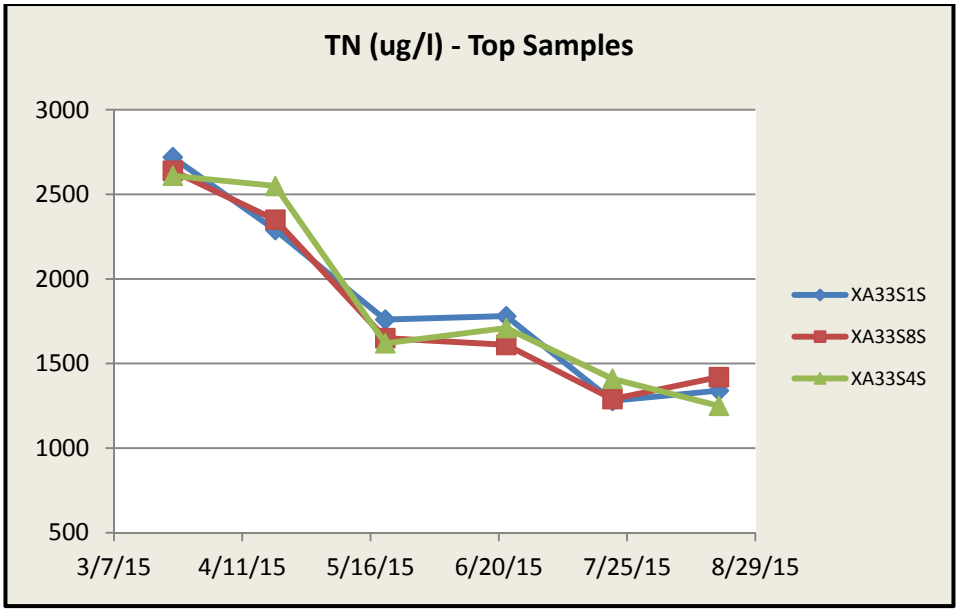


Figure 2-11. Similarities in Measured Surface Concentrations of TP and TN in the North Lobe at the Edge of the Wetland Tussock from March 2015-August 2015

2.3.2 NORTH LOBE - EDGE OF WETLAND TUSSOCK TOWARDS CENTRAL, DEEPER AREA OF LAKE

Surface and bottom samples were collected from four monitoring sites located at the edge of the wetland tussock (XA33S4) through the central portion of the North Lobe (XA33S7 and XA33S6) towards the deepest portion of the North Lobe (XA33S5). A summary of mean water quality characteristics at each of these four monitoring sites between March 2015 and August 2015 is presented in Table 3 below. Separate mean values are provided for the surface and bottom samples at the four sites.

Table 3
Summary of Mean Water Quality Characteristics in the North Lobe
Shallow Edge of the Wetland Tussock towards the Deeper Area
March 2015 to August 2015

Parameter	Units	North Lobe (XA33S4)		North Lobe (XA33S7)		North Lobe (XA33S6)		North Lobe (XA33S5)	
		Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom
pH	s.u.	8.9	8.6	9.3	8.3	9.0	7.8	9.0	6.9
Alkalinity	mg/l	35.7	35.7	36.5	34.5	36.0	35.3	36.5	51.2
Conductivity	µmho/cm	233	230	229	222	232	225	232	256
NH_3	µg/l	25	25	23	25	25	38	25	952
NO_x	µg/l	7	7	6	6	7	7	7	8
Diss. Organic N	µg/l	970	890	940	887	944	1,158	912	940
Particulate N	µg/l	881	899	857	1,044	603	929	697	456
Total N	µg/l	1,858	1,693	2,070	1,960	1,773	1,717	1,808	2,295
SRP	µg/l	3	3	3	3	3	3	3	23
Diss. Organic P	µg/l	12	18	13	13	12	13	11	36
Particulate P	µg/l	61	61	71	71	58	56	60	55
Total P	µg/l	72	65	87	86	73	72	74	98
Turbidity	NTU	12	12	16	14	12	9	12	7
Color	PCU	41	41	47	44	42	40	41	48
TSS	mg/l	12	12	17	16	11	12	12	7
Chlorophyll-a	mg/m^3	68	--	95	--	74	--	72	--

Note: Site XA33S7 was not sampled in July and August

The mean value of each parameter analyzed from the four surface samples across Lake Roberts was compared. Little variation in the mean values was observed in the surface samples except for Dissolved Organic Nitrogen and Particulate Nitrogen which decrease from the edge of the wetland tussock (Note that the phosphorus levels are slightly higher in Site 7; however, phosphorus levels were lower in July and August which were not factored into the mean value for Site 7).

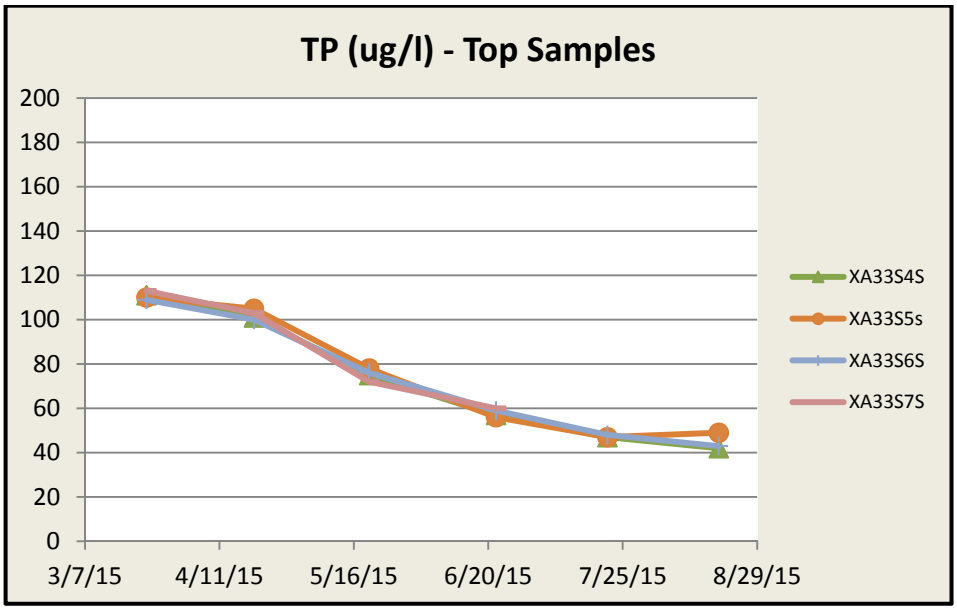
The mean value of each parameter analyzed from the four bottom samples across Lake Roberts was compared. The overall depth of Sites 4 and 7 were approximately two meters, Site 6 was three meters and Site 5 was four meters. Mean pH and alkalinity values decreased in depths below 2 meters. Conductivity increased in the deepest site, but is still within the acceptable range for Central Florida lakes.

An elevated concentration of ammonia was observed in the deepest bottom sample while the particulate nitrogen was lower. The mean dissolved organic nitrogen and total nitrogen concentrations increased at the sites with water levels deeper than 2 to 2.5 meters.

The only concentration of SRP (soluble reactive phosphorus) above mean detection limit was in the deepest bottom sample. Dissolved organic phosphorus was significantly higher in the deepest bottom sample. The dominant phosphorus species was particulate phosphorus with higher concentrations measured in the deepest bottom sample. The total mean phosphorus concentrations appeared to increase in concentration with depth.

The measured total phosphorus concentrations in the wetland tussock are significantly higher than Lake Roberts or Lake Reaves. The contribution of phosphorus to Lake Roberts from the wetland tussock could mask seasonal variations.

A graphical comparison in the measured surface concentrations of total nitrogen and total phosphorus at the four monitoring sites from the edge of the wetland tussock across the North Lobe of Lake Roberts was prepared to visualize the similarities in the analytical data at each site.



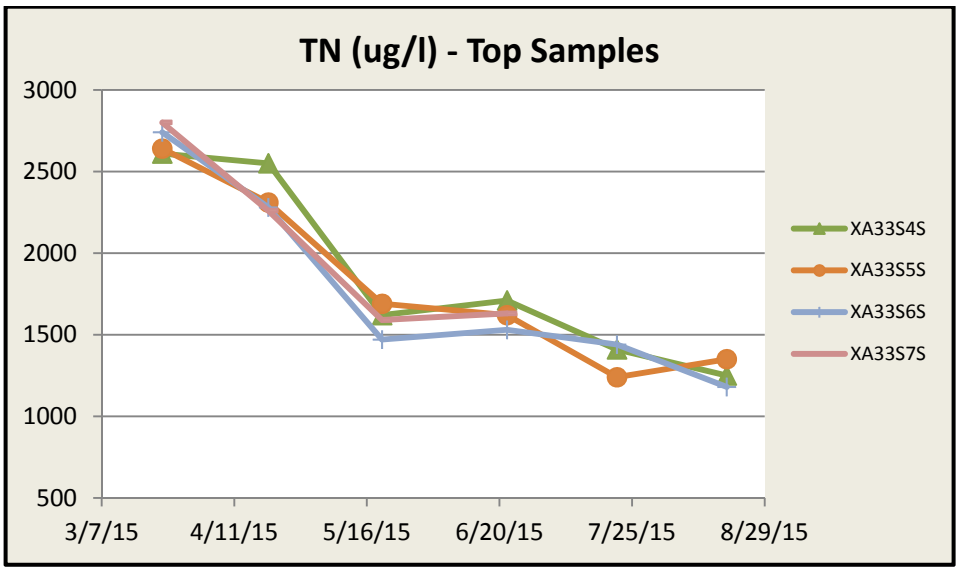


Figure 2-12. Similarities in Measured Surface Concentrations of TP and TN in the North Lobe from the Edge of the Wetland Tussock towards the Deeper Area, March 2015-August 2015

2.3.3 LAKE REAVES, WETLAND TUSSOCK AND NORTH LOBE

A summary of mean water quality characteristics at each of three monitoring sites along the edge of the wetland tussock in the North Lobe of Lake Roberts between March 2015 and August 2015 is presented in Table 4 below. Separate mean values are provided for the surface and bottom samples at the three sites.

Table 4
Summary of Mean Water Quality Characteristics in Lake Reaves, Wetland Tussock and the North Lobe near the edge of the Wetland Tussock, March 2015 to August 2015

Parameter	Units	Lake Reaves (XA33S1)	Wetland Tussock	North Lobe (XA33S1)
		Surface	Surface	Surface
pH	s.u.	7.2	5.8	8.7
Alkalinity	mg/l	39.0	24.2	36.2
Conductivity	µmho/cm	220	182	243
NH_3	µg/l	25	1141	25
NO_X	µg/l	8	9	7
Diss. Organic N	µg/l	856	1,268	956
Particulate N	µg/l	187	1,483	701
Total N	µg/l	1,003	2,874	1,862
SRP	µg/l	3	26	3
Diss. Organic P	µg/l	11	44	12
Particulate P	µg/l	21	76	58

Parameter	Units	Lake Reaves (XA33S1)	Wetland Tussock	North Lobe (XA33S1)
		Surface	Surface	Surface
Total P	µg/l	36	147	73
Turbidity	NTU	1	438	12
Color	PCU	123	196	42
TSS	mg/l	2	63	12
Chlorophyll-a	mg/m^3	22	31	65

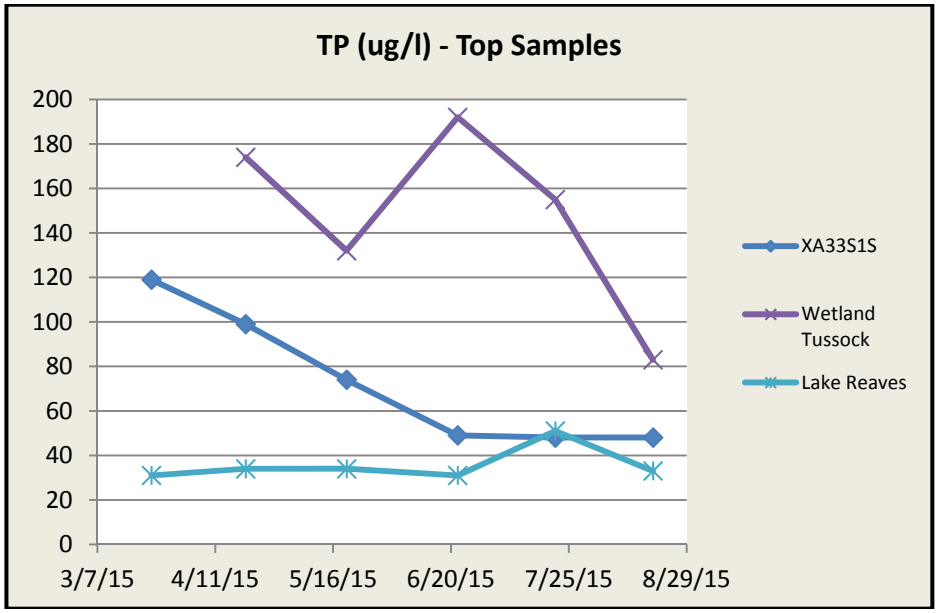
Mean pH values at the wetland tussock monitoring site is a magnitude of 10 lower than the Lake Reaves monitoring site. Mean pH values at the Lake Reaves monitoring site is a magnitude of 10 lower that the Lake Roberts monitoring site near the edge of the wetland tussock. Measured alkalinity values at all three sites is less 45 mg/l, reflecting relatively poorly buffered water characteristics. Mean surface conductivity values ranged are considered typical of values commonly measured in Central Florida lakes.

The mean value of ammonia observed in the wetland tussock is elevated and may be indicative of decaying vegetation within the water column under the floating vegetation. The dominant nitrogen species at the two lake monitoring sites is dissolved organic nitrogen while the dominant nitrogen species in the wetland tussock is particulate nitrogen. The mean total nitrogen concentration in Lake Roberts is higher than in Lake Reaves while mean total nitrogen concentrations the wetland tussock were significantly higher than in either lake.

Mean levels of phosphorus species in the wetland tussock are nearly four times higher than in those observed in Lake Reaves. The levels in Lake Roberts are nearly twice as high as in Lake Reaves.

Mean chlorophyll-a concentrations were low in Lake Reaves and the wetland tussock, probably due the floating vegetation mats reducing the amount of sunlight reaching the water. The mean chlorophyll-a concentration in the Lake Roberts site was 2 times higher than the wetland tussock. Elevated concentrations of chlorophyll-a can indicate the presence of algae blooms.

A graphical comparison in the measured surface concentrations of total nitrogen and total phosphorus at the three monitoring sites in Lake Reaves, wetland tussock and the North Lobe edge of wetland tussock was prepared to visualize the variability in the analytical data at each site.



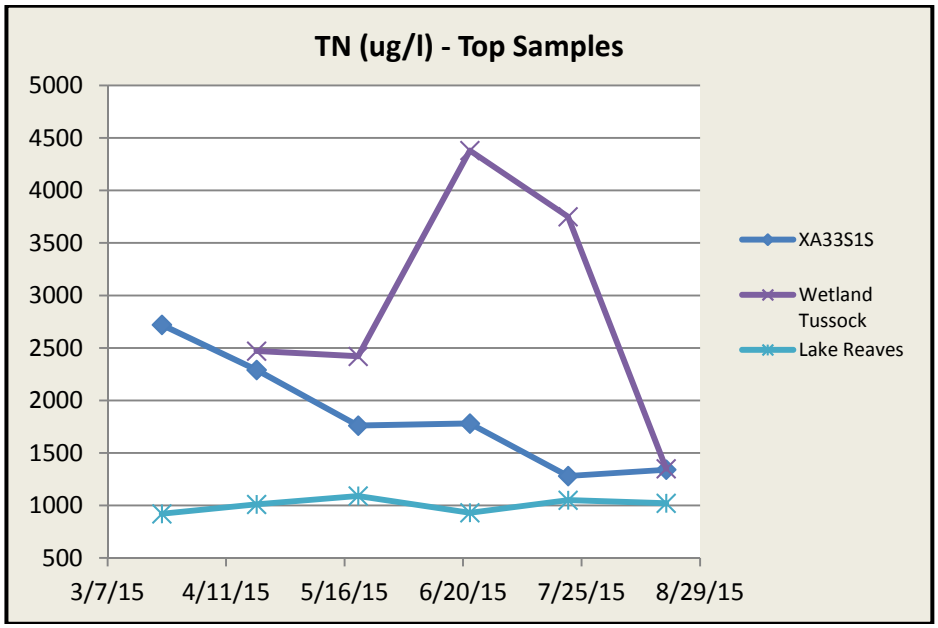


Figure 2-13. Variations in Measured Surface Concentrations of TP and TN in Lake Reaves, Wetland Tussock and the North Lobe near the Edge of the Wetland, March 2015-August 2015

3.0 SUMMARY

The supplemental water quality monitoring conducted by CPWG from March to August 2015 provides a snapshot look at the following three scenarios:

- Variations in water quality parameters from Lake Reaves through the wetland tussock into Lake Roberts;
- Variations in water quality parameters along the wetland tussock interface with Lake Roberts; and
- Variations in water quality parameters as surface water moves across the North Lobe from the wetland tussock to the outfall.

The mean TN, TP and chlorophyll-a concentrations in Lake Reaves are almost half the concentrations observed in Lake Roberts. However, the surface concentrations of TN, TP and chlorophyll-a are significantly higher in the wetland tussock than Lake Roberts. Analytical results from the supplemental sampling events support the assumption that the wetland tussock is contributing to the chlorophyll-a and nutrient levels in Lake Roberts.

Water quality characteristics are similar within the three monitoring sites in the North Lobe of Lake Roberts, indicating that the influence from the wetland tussock is uniformly distributed across the interface with Lake Roberts.

The mean TN, TP and chlorophyll-a concentrations in surface samples across the North Lobe of Lake Roberts are relatively similar, although dissolved organic and particulate nitrogen decreased with distance from the wetland tussock. The mean TN and TP concentrations in bottom samples across the North Lobe of Lake Roberts increase in depths greater than 2 to 2.5 meters. Similar characteristics were observed during the original study in the deeper depths of the Center Area and South Lobe of Lake Roberts.

4.0 REVIEW OF WATER QUALITY IMPROVEMENT OPTIONS BASED ON SUPPLEMENTAL SAMPLE RESULTS

Water quality improvement options presented in the original Lake Roberts report were reviewed. Reconsideration of some of the options is presented in this supplemental report.

4.1 SEDIMENT INACTIVATION

Sediment phosphorus inactivation is one of the lake restoration techniques recommended for Lake Roberts. The available phosphorus from the lake sediments was calculated and the overall amount of alum required for sediment inactivation was determined. Review of the chemical characteristics

of the Lake Roberts North Lobe indicates that water quality degradation begins in depths lower than 2 to 2.5 meters indicating that sediment phosphorus may not have significant impact on lake water in the shallower regions. The overall size of Lake Roberts is 108 acres. The area of the lake with water depths greater than 2.5 meters is approximately 65 acres (based on the water depth contour map in the original report). If alum application is focused on the deeper regions of the lake where sediment is thicker and appears to have the greatest impact on water quality, the amount of alum required and overall cost could be reduced.

4.2 SANITARY SEWER INSTALLATION

Sanitary Sewer installation to eliminate septic tank discharge to the lake was a restoration technique recommended for Lake Roberts, and was the most costly alternative. During a recent public meeting for Lake Roberts, many residents indicated that water levels in Lake Roberts seem to be higher in recent years than when they first moved into the subdivision surrounding the lake. Review of water levels in Lake Roberts during the original and supplemental studies indicate that lake levels ranged between 109 and 110 feet, NAVD. Review of historical water levels from the 1990s indicates that water levels ranged between 107 and 112 feet (datum not reported). Review of available historical aerials of the area before subdivisions became the dominant land use indicates that the wetland tussock was possibly a forested wetland. An overall increase in water levels in the lake could have resulted in the death of the wetland trees and the creation of the wetland tussock. Most of the cypress trees surrounding the lakes edge are standing in two to three feet of water.

The downstream receiving water body for Lake Roberts is Lake Tilden. During recent sampling on Lake Tilden, water elevations were determined to be 95 to 96 feet, which appear to be significantly lower than Lake Roberts. The outfall structure for Lake Roberts is an open pipe with no visible means of staging water levels in the lake. It is possible that the stormwater culverts in the downstream subdivisions may have been installed at a higher elevation than the natural discharge elevations for the undeveloped land. A detailed survey of the downstream drainage system to the outfall at Lake Tilden is recommended to evaluate if certain pipes could be lowered by one to two feet to reduce the overall water level in Lake Roberts

Decreasing the water levels in Lake Roberts would lower groundwater elevations, increasing the ability of septic tank drain fields to remove nutrients before reaching the lake. Increased operation of the septic tanks around the lake, along with septic tank maintenance, could reduce the need for sanitary sewer installation in the area. Additionally, lowering the water levels in Lake Roberts would reduce water levels in the wetland tussock, possibly reducing the pollutant load to the lake.

4.3 BAFFLE BOXES

Baffle boxes was another pollutant removal alternative in the recommended tool box. Baffle boxes work best when fallen leaves and sediment deposition can be captured above the groundwater/lake level. From January 2014 to March 2015 the elevation of Lake Roberts ranged from 109 to 110-ft. Based on geotechnical information obtained as part of the Windermere Country Club project the groundwater water level varies between 2 and 10-ft below ground surface. Based on presumed water elevations and available topographic information, baffle boxes remain a viable alternative for capturing pollutants in the drainage basin prior to reaching the lake.

5.0 NUTRIENT INPUTS

Section 5 of the September 2015 Lake Roberts report discusses nutrient inputs and losses in detail. The supplemental information presented herein adds greater detail to the previous analysis and investigates the effects of land use changes on two areas that are currently being discussed for development or redevelopment.

5.1 STORMWATER RUNOFF

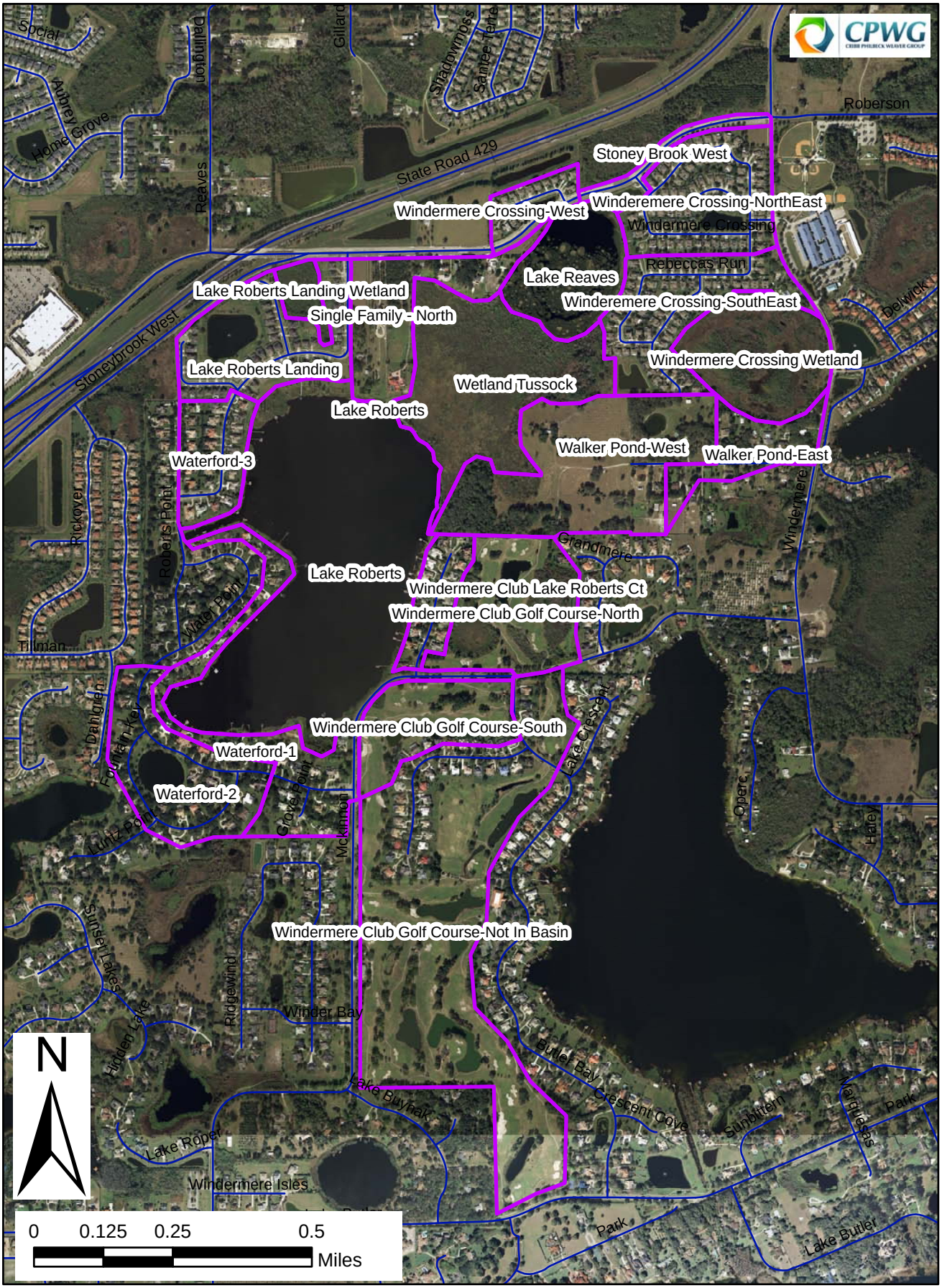
Existing Condition

The Lake Roberts watershed was subdivided into twenty sub-basins to gain a better understanding of the source of the stormwater related nutrients entering Lake Roberts. The sub-basins are illustrated in Figure 5-1. The resulting loads from each sub-basin are presented in Table 5. The detailed calculations are presented in Appendix C.

From the September 2015 Report the "Walker Pond-West" sub-basin, on the east side of the lake, was enlarged to match the proposed development plans for the site.

A sub-basin "Windermere Club Golf Course-Not In Basin" was added to allow a discussion of changing the golf course land use to a medium density residential land use. This sub-basin currently flows to Crescent Lake via the existing drainage patterns.

Figure 5-2 shows the "hot-spots" based on kg/acre/yr or TP. The loading range from 0.05 kg/acre/yr of TP at Windermere Club Golf Course-South to 0.53 kg/acre/yr of TP at Stoney Brook West.



Lake Roberts Sub-Basins

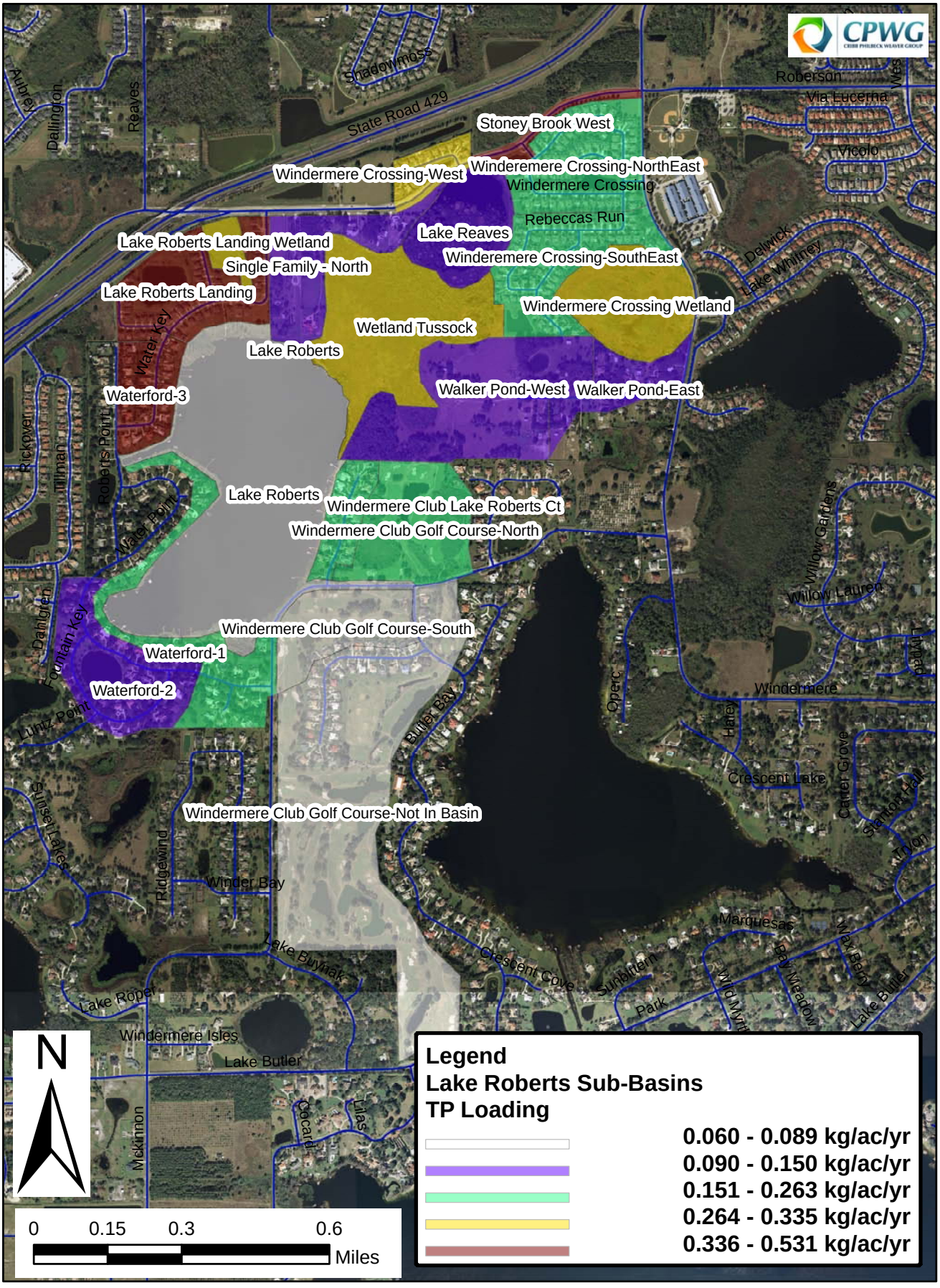
Figure 5-1

Table 5
Stormwater Runoff Pollutant Load – Existing Condition

Basin	Area (acres)	Generated Runoff Volume (ac-ft)	Delivered Runoff Volume (ac-ft)	TP (kg/yr)	TN (kg/yr)	TSS (kg/yr)	TP (kg/acre/yr)	TN (kg/acre/yr)	TSS (kg/acre/yr)
Lake Reaves	24.3	62.3	62.3	2.8	55.8	1,198.0	0.1	2.3	49.4
Lake Roberts	127.5	313.7	313.7	11.3	242.7	6,534.4	0.1	1.9	51.2
Lake Roberts Landing	33.5	56.3	45.8	14.6	113.3	1,697.6	0.4	3.4	50.6
Lake Roberts Landing Wetland	5.4	10.2	10.2	1.6	20.2	124.2	0.3	3.8	23.1
Single Family - North	26.5	16.7	16.7	3.3	37.9	390.2	0.1	1.4	14.7
Stoney Brook West	6.8	15.8	12.8	3.6	27.3	567.4	0.5	4.0	83.1
Walker Pond-East	15.8	9.1	9.1	2.4	21.3	263.6	0.2	1.3	16.7
Walker Pond-West	57.7	46.2	46.2	6.8	85.8	689.0	0.1	1.5	11.9
Waterford-1	31.4	22.1	22.1	8.3	62.0	889.3	0.3	2.0	28.3
Waterford-2	33.8	23.3	19.4	4.4	36.9	633.8	0.1	1.1	18.8
Waterford-3	17.0	22.0	22.0	8.2	61.9	887.5	0.5	3.6	52.2
Wetland Tussock	53.9	108.7	108.7	15.2	207.6	1,062.3	0.3	3.9	19.7
Windermere Crossing-NorthEast	33.2	28.1	22.6	8.5	63.3	922.8	0.3	1.9	27.8
Windermere Crossing-SouthEast	32.5	29.8	25.2	8.3	65.4	895.2	0.3	2.0	27.5
Windermere Club Golf Course-North	33.3	39.3	39.3	6.8	74.0	691.1	0.2	2.2	20.8
Windermere Club Golf Course-Not In Basin	121.4	54.0	43.2	8.6	71.4	1,326.9	0.1	0.6	10.9
Windermere Club Golf Course-South	23.6	7.5	6.0	1.4	11.1	199.2	0.1	0.5	8.4
Windermere Club Lake Roberts	11.6	7.6	7.6	2.8	21.2	301.1	0.2	1.8	26.0

Basin	Area (acres)	Generated Runoff Volume (ac-ft)	Delivered Runoff Volume (ac-ft)	TP (kg/yr)	TN (kg/yr)	TSS (kg/yr)	TP (kg/acre/yr)	TN (kg/acre/yr)	TSS (kg/acre/yr)
Ct									
Windermere Crossing Wetland	30.4	58.7	58.6	8.8	114.5	692.6	0.3	3.8	22.8
Windermere Crossing-West	9.09	11.95	9.66	3.04	22.81	419.65	0.3	2.5	46.1
Grand Total	**729**	**944**	**901**	**131**	**1,416**	**20,386**	**0.3***	**2.4***	**32.6***

*Average



Sub-Basin "Hot Spots"

Figure 5-2

Proposed Condition

Future pollutant loading rates were estimated by converting some existing undeveloped land uses to medium density residential land uses.

The entire "Walker Pond-West" sub-basin was converted to medium density residential land use. There is discussion that a developer is looking to develop this existing open land/low density residential to medium density residential.

There has also been some discussion the Windermere Club Golf Course may be converted to medium density residential. To simulate this land use conversion, the land use in sub-basins Windermere Club Golf Course-North, Windermere Club Golf Course-South, and Windermere Club Golf Course-Not In Basin were changed to medium density residential. The loading changes resulting from this land use conversion are summarized in Table 6 and presented in greater detail in Table 7. The detailed calculations are presented in Appendix D.

The overall TP loading resulting from land use changes increases by 26 kg/yr, TN loading increases by 130 kg/yr and TSS increases by 2,460 kg/yr.

Table 6
Stormwater Runoff Pollutant Load – Proposed Condition Summary

Sub-Basin	TP (kg/yr)	TN (kg/yr)	TSS (kg/yr)
Walker Pond West – Existing	6.8	85.8	689.0
Walker Pod West - Proposed	15.1	112.8	1,625.8
Difference	**8.3**	**27**	**936.8**
Windermere Club Golf Course-North – Existing	6.8	74.0	691.1
Windermere Club Golf Course-Not In Basin – Existing	8.6	71.4	1,326.9
Windermere Club Golf Course-South - Existing	1.4	11.1	199.2
Existing Sub Total	**16.8**	**156.5**	**2,217.2**
Windermere Club Golf Course-North – Proposed	9.5	70.9	1,021.8
Windermere Club Golf Course-Not In Basin – Proposed	20.8	155.9	2,246.9
Windermere Club Golf Course-South - Proposed	4.4	32.7	471.8
Proposed Sub Total	**34.7**	**259.5**	**3740.5**
Difference	**17.9**	**103.0**	**1,523.3**
Total Difference	**26.2**	**130**	**2,460.1**

Table 7
Stormwater Runoff Pollutant Load – Proposed Condition

Basin	Area (acres)	Generated Runoff Volume (ac-ft)	Delivered Runoff Volume (ac-ft)	TP (kg/yr)	TN (kg/yr)	TSS (kg/yr)	TP (kg/acre/yr)	TN (kg/acre/yr)	TSS (kg/acre/yr)
Lake Reaves	24.3	62.3	62.3	2.8	55.8	1,198.0	0.1	2.3	49.4
Lake Roberts	127.5	313.7	313.7	11.3	242.7	6,534.4	0.1	1.9	51.2
Lake Roberts Landing	33.5	56.3	45.8	14.6	113.3	1,697.6	0.4	3.4	50.6
Lake Roberts Landing Wetland	5.4	10.2	10.2	1.6	20.2	124.2	0.3	3.8	23.1
Single Family - North	26.5	16.7	16.7	3.3	37.9	390.2	0.1	1.4	14.7
Stoney Brook West	6.8	15.8	12.8	3.6	27.3	567.4	0.5	4.0	83.1
Walker Pond-East	15.8	9.1	9.1	2.4	21.3	263.6	0.2	1.3	16.7
Walker Pond-West	57.7	49.9	39.9	15.1	112.8	1,625.8	0.3	2.0	28.2
Waterford-1	31.4	22.1	22.1	8.3	62.0	889.3	0.3	2.0	28.3
Waterford-2	33.8	23.3	19.4	4.4	36.9	633.8	0.1	1.1	18.8
Waterford-3	17.0	22.0	22.0	8.2	61.9	887.5	0.5	3.6	52.2
Wetland Tussock	53.9	108.7	108.7	15.2	207.6	1,062.3	0.3	3.9	19.7
Windermere Crossing-NorthEast	33.2	28.1	22.6	8.5	63.3	922.8	0.3	1.9	27.8
Windermere Crossing-SouthEast	32.5	29.8	25.2	8.3	65.4	895.2	0.3	2.0	27.5
Windermere Club Golf Course-North	33.3	31.4	25.1	9.5	70.9	1,021.8	0.3	2.1	30.7
Windermere Club Golf Course-Not In Basin	121.4	69.0	55.2	20.8	155.9	2,246.9	0.2	1.3	18.5
Windermere Club Golf Course-South	23.6	14.5	11.6	4.4	32.7	471.8	0.2	1.4	20.0
Windermere Club Lake Roberts	11.6	7.6	7.6	2.8	21.2	301.1	0.2	1.8	26.0

Basin	Area (acres)	Generated Runoff Volume (ac-ft)	Delivered Runoff Volume (ac-ft)	TP (kg/yr)	TN (kg/yr)	TSS (kg/yr)	TP (kg/acre/yr)	TN (kg/acre/yr)	TSS (kg/acre/yr)
Ct									
Windermere Crossing Wetland	30.4	58.7	58.6	8.8	114.5	692.6	0.3	3.8	22.8
Windermere Crossing-West	9.09	11.95	9.66	3.04	22.81	419.65	0.3	2.5	46.1
Grand Total	**729**	**961**	**898**	**157**	**1,547**	**22,846**	**0.3***	**2.5***	**33.5***

*Average

5.2 SEPTIC TANKS AT WALKER POND

There are a variety of septic tank systems and sizes that might be installed in the new subdivision, with varying pollutant removal efficiencies. Even the best septic system will contribute some nutrient pollutant load. Likewise, poorly installed and/or poorly maintained septic systems can contribute significant amounts of pollutants to the receiving waterbody. These impacts are increased as the location of the drainfield nears the lakes edge.

The September 2015 Lake Robert discussed septic tanks in some detail and presented loading rates from septic systems. A development is being proposed near Walker Pond that may include 95 houses using septic tanks as their wastewater disposal mechanism. Table 8 presents an estimated pollutant load to Lake Roberts that these houses may contribute.

Table 8
Nutrient Loadings from Septic Tanks at Walker Pond

Description	Amount
TP Loading	2.7 grams/capita/day
TN Loading	11.2 grams/capita/day
Number of Septic Tanks	95 houses
Capita per Septic Tank	2.74 people/house
TP Removal Rate	90%
TN Removal Rate	30%
TP Loading to Septic Tank	257 Kg/year
TP Removed	231.3 Kg/Year
TP Loading to Lake Roberts	25.7 Kg/year (56.7 lbs/Year)
TN Loading to Septic Tank	1,064 Kg/Year
TN Removed	319 Kg/Year
TN Loading to Lake Roberts	745 Kg/Year (1,642 lbs/Year)

Notes:

1. Loading Rates and Removal Rates from University of Florida IFAS Extension report *"Onsite Sewage Treatment and Disposal Systems: Nitrogen" (June 2011) and "Onsite Sewage Treatment and Disposal Systems: Phosphorus" (July 2011)*
2. *2.74 people/house based on Orange County census average for data between 2008 and 2012*

5.3 EMC VALUES FROM WETLAND TUSSOCK TO LAKE ROBERTS

In the original study, the nutrient load from the wetland tussock to Lake Roberts was based on land use EMC values. An alternate method for calculating nutrient load was explored using the mean analytical data collected in the wetland tussock during the 12 month study. Comparing two methods for calculating pollutant load revealed that there was not a significant difference in the two values.

The alternate method for calculating nutrient load from the wetland tussock using the mean analytical data was reviewed to include the additional six months of analytical data collected during the supplemental study. The pollutant load from Lake Reaves through the wetland tussock based on this new data is summarized in Table 9. The percent change between the 12-month and 18-month averages are 8.8% and 30.6% for TP and TN, respectively. Based on the additional data from the supplemental sampling event, the calculated load from the Lake Reaves/Wetland Sub-Basin did not significantly increase for TP. However, TN did have a significant increase.

Table 9
Pollutant Load from Lake Reaves Using Measured EMC Values

Study Period	TP (mg/l)	TN (mg/l)	TP (kg/yr)	TN (kg/yr)
12-Month Study	0.113	1.545	45	614
6-Month Study	0.147	2.874	58	1,142
18-Month Study	0.125	2.020	49	802

APPENDIX A

Vertical Field Profiles Collected in Lake Roberts, Wetland Tussock and Lake Reaves, March 2015 through August 2015

Vertical Field Profiles collected in Lake Roberts, wetland and Lake Reaves
March 2015 through August 2015
North Lobe

Location	Site	Date	Depth (meter)	Temp (^{o}C)	SpCond (umho/cm)	pH Units	DO (mg/l)	DO (%)	ORP (mV)	Turbidity (NTU)	Secchi (meter)
S Wetland Edge	XA33S8	3/23/2015	0.5	25.0	237	8.5	7.6	92.3	81.9	21.3	0.48
	XA33S8	3/23/2015	1.0	24.8	236	8.6	7.9	94.7	76.5	19.8	
	XA33S8	3/23/2015	1.5	24.7	236	8.6	7.9	95.3	75.6	20.1	
	XA33S8	3/23/2015	2.0	24.6	235	8.6	7.0	84.3	76.2	18.2	
C Wetland Edge	XA33S1	3/23/2015	0.5	25.0	299	8.7	8.5	103.2	137.6	22.0	0.52
	XA33S1	3/23/2015	1.0	25.0	227	8.8	8.2	99.4	134.1	21.7	
	XA33S1	3/23/2015	1.5	24.9	227	8.8	8.2	99.1	131.5	21.0	
	XA33S1	3/23/2015	2.0	24.6	224	8.7	7.0	84.1	131.8	18.0	
N Wetland Edge	XA33S4	3/23/2015	0.5	25.0	227	8.8	9.0	109.3	145.8	22.0	0.53
	XA33S4	3/23/2015	1.0	25.0	226	8.9	8.9	108.3	135.1	22.1	
	XA33S4	3/23/2015	1.5	25.0	225	9.0	8.8	106.4	132.4	22.0	
	XA33S4	3/23/2015	2.0	24.7	223	8.8	6.9	83.2	132.6	17.6	
West of XA33S8	XA33S7	3/23/2015	0.5	25.0	223	9.2	10.2	123.7	43.7	23.3	0.51
	XA33S7	3/23/2015	1.0	24.9	221	9.2	9.4	114.0	43.0	21.6	
	XA33S7	3/23/2015	1.5	24.8	220	9.2	9.1	109.2	41.2	21.6	
	XA33S7	3/23/2015	2.0	23.4	217	8.5	4.5	52.0	57.7	9.4	
West of XA33S7	XA33S6	3/23/2015	0.5	24.9	223	8.9	9.6	116.4	67.3	22.2	0.46
	XA33S6	3/23/2015	1.0	24.9	222	8.9	9.3	112.1	63.7	21.9	
	XA33S6	3/23/2015	1.5	24.8	221	8.9	8.7	105.3	63.1	20.9	
	XA33S6	3/23/2015	2.0	23.9	218	8.6	5.6	67.0	71.7	11.9	
	XA33S6	3/23/2015	2.5	21.7	217	7.7	0.6	6.6	93.8	1.6	
	XA33S6	3/23/2015	3.0	19.8	220	7.4	0.3	3.8	-31.6	1.0	

Vertical Field Profiles collected in Lake Roberts, wetland and Lake Reaves
March 2015 through August 2015
North Lobe

Location	Site	Date	Depth (meter)	Temp (^{o}C)	SpCond (umho/cm)	pH Units	DO (mg/l)	DO (%)	ORP (mV)	Turbidity (NTU)	Secchi (meter)
Deep Muck in N Lobe	XA33S5	3/23/2015	0.5	25.0	224	8.9	9.0	108.7	147.9	22.0	0.43
(West of XA33S6)	XA33S5	3/23/2015	1.0	25.0	223	8.8	8.6	104.0	146.2	22.5	
	XA33S5	3/23/2015	1.5	24.7	222	8.8	7.6	92.0	141.4	18.0	
	XA33S5	3/23/2015	2.0	24.3	220	8.6	5.4	64.4	144.6	11.8	
	XA33S5	3/23/2015	2.5	21.1	219	7.8	0.8	9.3	145.2	1.6	
	XA33S5	3/23/2015	3.0	19.8	223	7.4	0.4	3.9	-8.7	1.0	
	XA33S5	3/23/2015	3.5	18.7	226	7.2	0.3	3.1	-76.8	1.2	
	XA33S5	3/23/2015	4.0	17.7	228	7.1	0.3	2.7	-93.0	1.3	
Lake Reaves	XA32S5	3/23/2015	0.5	24.1	201	7.4	2.6	30.8	74.6	-1.3	0.90
	XA32S5	3/23/2015	1.0	23.7	203	7.2	1.0	11.8	77.8	-1.0	
	XA32S5	3/23/2015	1.5	22.4	204	6.9	0.4	4.0	-64.7	-0.7	
	XA32S5	3/23/2015	2.0	20.1	198	6.9	0.6	6.6	-28.4	-1.8	
	XA32S5	3/23/2015	2.5	17.7	193	6.9	1.7	17.6	-4.2	-1.8	
	XA32S5	3/23/2015	3.0	16.6	192	6.9	1.8	18.3	-13.7	-1.8	
	XA32S5	3/23/2015	3.5	15.9	195	6.8	0.4	4.4	-83.1	0.2	

Vertical Field Profiles collected in Lake Roberts, wetland and Lake Reaves
March 2015 through August 2015
North Lobe

Location	Site	Date	Depth (meter)	Temp (^{o}C)	SpCond (umho/cm)	pH Units	DO (mg/l)	DO (%)	ORP (mV)	Turbidity (NTU)	Secchi (meter)
S Wetland Edge	XA33S8	4/20/2015	0.5	24.9	217	9.0	7.9	95.0	117.2	19.7	0.50
	XA33S8	4/20/2015	1.0	24.8	217	8.9	7.5	90.8	117.0	19.7	
	XA33S8	4/20/2015	1.5	24.8	217	8.9	7.3	88.6	117.8	20.8	
	XA33S8	4/20/2015	2.0	24.8	217	8.7	6.7	81.2	120.6	19.5	
C Wetland Edge	XA33S1	4/20/2015	0.5	24.9	218	9.2	8.4	101.2	95.9	19.6	0.46
	XA33S1	4/20/2015	1.0	24.9	218	9.1	7.9	95.2	96.5	19.1	
	XA33S1	4/20/2015	1.5	24.8	217	9.0	7.6	91.5	97.5	19.0	
	XA33S1	4/20/2015	2.0	24.8	217	9.0	7.5	90.4	98.0	20.1	
N Wetland Edge	XA33S4	4/20/2015	0.5	25.3	221	9.4	9.9	120.2	150.0	20.8	0.47
	XA33S4	4/20/2015	1.0	25.1	220	9.4	9.7	117.2	146.1	20.8	
	XA33S4	4/20/2015	1.5	25.0	219	9.3	9.4	113.9	145.2	21.1	
	XA33S4	4/20/2015	2.0	25.0	218	9.3	9.1	110.6	145.0	21.3	
West of XA33S8	XA33S7	4/20/2015	0.5	25.3	220	9.5	9.9	120.7	53.1	20.5	0.44
	XA33S7	4/20/2015	1.0	25.2	219	9.4	9.9	120.0	55.2	21.7	
	XA33S7	4/20/2015	1.5	25.2	220	9.4	9.9	120.2	55.3	21.0	
	XA33S7	4/20/2015	2.0	25.2	218	9.4	9.9	120.0	59.6	23.2	
West of XA33S7	XA33S6	4/20/2015	0.5	25.3	220	9.3	9.6	116.9	55.1	21.2	0.47
	XA33S6	4/20/2015	1.0	25.3	219	9.4	9.6	116.8	55.5	21.7	
	XA33S6	4/20/2015	1.5	25.2	219	9.3	9.4	114.8	56.3	21.0	
	XA33S6	4/20/2015	2.0	25.2	219	9.3	9.3	112.7	57.2	22.6	
	XA33S6	4/20/2015	2.5	25.0	219	9.3	9.0	109.2	60.6	22.1	
	XA33S6	4/20/2015	3.0	24.4	218	8.8	5.7	71.0	63.3	14.5	

Vertical Field Profiles collected in Lake Roberts, wetland and Lake Reaves
March 2015 through August 2015
North Lobe

Location	Site	Date	Depth (meter)	Temp (^{o}C)	SpCond (umho/cm)	pH Units	DO (mg/l)	DO (%)	ORP (mV)	Turbidity (NTU)	Secchi (meter)
Deep Muck in N Lobe	XA33S5	4/20/2015	0.5	25.4	222	9.5	10.1	123.5	134.8	21.3	0.46
(West of XA33S6)	XA33S5	4/20/2015	1.0	25.2	221	9.3	9.4	113.7	135.2	21.3	
	XA33S5	4/20/2015	1.5	25.1	220	9.3	9.1	110.6	135.6	21.2	
	XA33S5	4/20/2015	2.0	25.0	219	9.2	8.7	105.3	137.2	21.2	
	XA33S5	4/20/2015	2.5	25.0	219	9.2	8.5	103.0	137.7	21.4	
	XA33S5	4/20/2015	3.0	23.0	224	7.6	1.2	13.5	69.0	-1.0	
	XA33S5	4/20/2015	3.5	21.4	250	7.4	0.8	8.5	7.4	-4.4	
	XA33S5	4/20/2015	4.0	19.1	242	7.0	0.6	6.8	-62.4	-6.4	
Lake Reaves	XA32S5	4/20/2015	0.5	25.6	209	6.7	4.6	56.1	163.7	-10.7	0.95
	XA32S5	4/20/2015	1.0	24.6	209	6.4	2.9	35.6	166.1	-10.9	
	XA32S5	4/20/2015	1.5	24.4	209	6.2	2.5	30.4	168.6	-10.8	
	XA32S5	4/20/2015	2.0	23.3	212	6.0	1.4	17.3	75.7	-7.6	
	XA32S5	4/20/2015	2.5	20.9	214	5.6	1.1	12.2	31.2	-6.8	
	XA32S5	4/20/2015	3.0	17.6	207	5.2	0.9	9.7	-61.2	-8.2	
	XA32S5	4/20/2015	3.5	16.5	210	4.9	0.8	7.9	-71.7	6.8	
Wetland	X-Wetland	4/20/2015	0.5	20.8	174	6.0	2.8	32.5	-107.1	5.7	0.36

Vertical Field Profiles collected in Lake Roberts, wetland and Lake Reaves
March 2015 through August 2015
North Lobe

Location	Site	Date	Depth (meter)	Temp (^{o}C)	SpCond (umho/cm)	pH Units	DO (mg/l)	DO (%)	ORP (mV)	Turbidity (NTU)	Secchi (meter)
S Wetland Edge	XA33S8	5/20/2015	0.5	27.0	232	9.1	9.4	118.2	100.2	9.8	0.60
	XA33S8	5/20/2015	1.0	26.9	232	9.1	9.5	119.0	94.8	10.7	
	XA33S8	5/20/2015	1.5	26.8	231	9.1	9.4	117.8	93.6	11.1	
C Wetland Edge	XA33S1	5/20/2015	0.5	28.0	233	9.2	10.1	128.4	40.4	10.2	0.62
	XA33S1	5/20/2015	1.0	27.8	233	9.2	10.2	129.4	41.1	10.1	
	XA33S1	5/20/2015	1.5	27.7	232	9.2	10.1	128.6	43.1	10.6	
N Wetland Edge	XA33S4	5/20/2015	0.5	28.2	233	9.3	10.3	131.8	59.2	9.9	0.65
	XA33S4	5/20/2015	1.0	28.0	233	9.3	10.4	132.5	60.8	10.5	
	XA33S4	5/20/2015	1.5	27.2	232	9.2	9.9	124.7	64.1	11.2	
	XA33S4	5/20/2015	2.0	25.1	220	8.3	2.4	30.3	86.5	14.8	
West of XA33S8	XA33S7	5/20/2015	0.5	28.8	234	9.3	10.9	140.9	68.7	9.7	0.65
	XA33S7	5/20/2015	1.0	28.7	234	9.3	10.9	141.5	71.7	10.0	
	XA33S7	5/20/2015	1.5	26.3	231	8.7	6.8	85.0	88.2	12.6	
	XA33S7	5/20/2015	2.0	25.5	227	7.9	3.3	40.2	111.6	12.9	
West of XA33S7	XA33S6	5/20/2015	0.5	28.4	234	9.3	10.6	136.1	44.0	10.1	0.60
	XA33S6	5/20/2015	1.0	28.2	234	9.3	10.7	136.1	46.8	10.4	
	XA33S6	5/20/2015	1.5	27.1	233	9.2	9.2	117.0	51.3	11.3	
	XA33S6	5/20/2015	2.0	25.6	227	7.9	3.4	42.7	86.2	12.5	
	XA33S6	5/20/2015	2.5	25.0	217	7.3	0.9	11.0	99.5	14.9	

Vertical Field Profiles collected in Lake Roberts, wetland and Lake Reaves
March 2015 through August 2015
North Lobe

Location	Site	Date	Depth (meter)	Temp (^{o}C)	SpCond (umho/cm)	pH Units	DO (mg/l)	DO (%)	ORP (mV)	Turbidity (NTU)	Secchi (meter)
Deep Muck in N Lobe	XA33S5	5/20/2015	0.5	27.6	232	9.3	10.6	133.9	80.2	10.3	0.61
(West of XA33S6)	XA33S5	5/20/2015	1.0	27.4	232	9.3	10.7	134.4	86.0	10.4	
	XA33S5	5/20/2015	1.5	26.3	228	8.9	8.0	100.0	88.7	11.4	
	XA33S5	5/20/2015	2.0	26.0	227	8.7	7.3	90.3	92.4	12.5	
	XA33S5	5/20/2015	2.5	25.2	223	7.8	2.0	24.2	113.4	13.0	
	XA33S5	5/20/2015	3.0	24.5	230	7.4	0.7	8.5	-94.7	14.2	
	XA33S5	5/20/2015	3.5	23.0	251	7.1	0.5	6.3	-169.4	10.1	
	XA33S5	5/20/2015	4.0	21.7	258	6.9	0.5	5.6	-185.1	8.8	
Lake Reaves	XA32S5	5/20/2015	0.5	29.5	225	7.1	6.3	83.0	117.1	0.9	1.05
	XA32S5	5/20/2015	1.0	25.9	225	6.9	3.5	43.7	122.8	1.1	
	XA32S5	5/20/2015	1.5	25.3	224	6.8	2.5	31.4	126.3	0.9	
	XA32S5	5/20/2015	2.0	24.0	224	6.7	1.6	19.0	79.3	4.7	
	XA32S5	5/20/2015	2.5	21.7	221	6.5	1.2	14.2	-74.8	4.2	
	XA32S5	5/20/2015	3.0	19.4	220	6.3	0.9	9.7	-134.7	4.7	
Wetland	X-Wetland	5/20/2015	0.5	21.3	178	5.9	0.9	9.9	-117.5	5.6	0.56

Vertical Field Profiles collected in Lake Roberts, wetland and Lake Reaves
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North Lobe

Location	Site	Date	Depth (meter)	Temp (^{o}C)	SpCond (umho/cm)	pH Units	DO (mg/l)	DO (%)	ORP (mV)	Turbidity (NTU)	Secchi (meter)
S Wetland Edge	XA33S8	6/22/2015	0.5	29.8	233	9.1	8.9	117.6	143.4	10.4	0.60
	XA33S8	6/22/2015	1.0	29.5	233	9.0	8.6	112.5	145.4	10.9	
	XA33S8	6/22/2015	1.5	29.3	232	8.8	7.1	92.9	151.2	9.1	
C Wetland Edge	XA33S1	6/22/2015	0.5	33.9	233	9.4	10.6	150.3	80.5	9.4	0.66
	XA33S1	6/22/2015	1.0	30.8	230	9.4	10.4	140.4	87.7	10.1	
	XA33S1	6/22/2015	1.5	29.3	229	9.2	9.1	118.6	95.8	11.2	
N Wetland Edge	XA33S4	6/22/2015	0.5	33.5	236	9.4	10.8	151.5	37.7	10.1	0.61
	XA33S4	6/22/2015	1.0	32.9	234	9.4	11.1	154.7	44.8	10.6	
	XA33S4	6/22/2015	1.5	29.5	232	9.2	8.8	116.2	59.3	11.2	
	XA33S4	6/22/2015	2.0	28.6	227	8.4	5.4	69.1	86.1	9.7	
West of XA33S8	XA33S7	6/22/2015	0.5	32.7	238	9.2	10.3	143.0	115.3	9.3	0.63
	XA33S7	6/22/2015	1.0	29.7	237	8.9	10.3	141.4	158.0	12.1	
	XA33S7	6/22/2015	1.5	29.0	233	8.3	7.6	99.4	160.2	11.2	
	XA33S7	6/22/2015	2.0	28.0	227	7.3	1.8	23.3	210.8	9.2	
West of XA33S7	XA33S6	6/22/2015	0.5	32.7	237	9.3	10.7	147.7	132.6	9.2	0.60
	XA33S6	6/22/2015	1.0	29.7	236	9.4	10.9	144.4	150.6	10.7	
	XA33S6	6/22/2015	1.5	29.0	232	8.6	8.7	114.0	190.1	11.4	
	XA33S6	6/22/2015	2.0	28.6	230	8.1	7.3	93.9	206.1	9.8	
	XA33S6	6/22/2015	2.5	28.1	223	7.4	2.4	32.8	228.3	9.6	

Vertical Field Profiles collected in Lake Roberts, wetland and Lake Reaves
March 2015 through August 2015
North Lobe

Location	Site	Date	Depth (meter)	Temp (^{o}C)	SpCond (umho/cm)	pH Units	DO (mg/l)	DO (%)	ORP (mV)	Turbidity (NTU)	Secchi (meter)
Deep Muck in N Lobe	XA33S5	6/22/2015	0.5	33.1	238	9.3	10.9	152.1	97.6	9.2	0.65
(West of XA33S6)	XA33S5	6/22/2015	1.0	32.2	238	9.4	11.3	156.6	114.4	9.7	
	XA33S5	6/22/2015	1.5	29.7	236	9.4	11.0	144.7	126.6	11.6	
	XA33S5	6/22/2015	2.0	28.4	228	8.6	7.8	100.9	157.3	10.7	
	XA33S5	6/22/2015	2.5	27.5	231	7.8	1.0	13.5	116.2	14.2	
	XA33S5	6/22/2015	3.0	26.0	265	7.5	0.7	8.8	-101.9	10.5	
	XA33S5	6/22/2015	3.5	25.1	272	7.2	0.6	7.1	-129.7	9.7	
	XA33S5	6/22/2015	4.0	24.1	287	6.9	0.6	6.6	-133.7	10.8	
Lake Reaves	XA32S5	6/22/2015	0.5	30.1	226	6.9	0.9	12.4	126.7	1.5	0.90
	XA32S5	6/22/2015	1.0	28.4	226	6.8	0.8	10.8	124.5	1.7	
	XA32S5	6/22/2015	1.5	27.9	226	6.8	0.5	6.8	71.3	4.3	
	XA32S5	6/22/2015	2.0	26.2	229	6.7	0.5	5.6	69.5	7.0	
	XA32S5	6/22/2015	2.5	24.5	229	6.5	0.4	5.0	15.6	11.1	
	XA32S5	6/22/2015	3.0	21.7	229	6.3	0.4	4.3	-96.2	8.8	
	XA32S5	6/22/2015	3.5	20.6	228	6.3	0.4	4.0	-108.6	680.0	
Wetland	X-Wetland	6/22/2015	0.5	23.2	193	6.5	1.0	12.8	-63.1	278.6	0.20

Vertical Field Profiles collected in Lake Roberts, wetland and Lake Reaves
March 2015 through August 2015
North Lobe

Location	Site	Date	Depth (meter)	Temp (^{o}C)	SpCond (umho/cm)	pH Units	DO (mg/l)	DO (%)	ORP (mV)	Turbidity (NTU)	Secchi (meter)
S Wetland Edge	XA33S8	7/21/2015	0.5	29.2	237	8.6	9.6	124.7	82.1	5.2	0.84
	XA33S8	7/21/2015	1.0	28.9	237	8.5	8.9	115.6	88.3	6.3	
	XA33S8	7/21/2015	1.5	28.8	236	8.5	8.8	113.9	90.9	6.4	
C Wetland Edge	XA33S1	7/21/2015	0.5	28.1	240	8.0	8.4	107.3	205.3	5.4	0.90
	XA33S1	7/21/2015	1.0	28.1	240	8.0	8.1	104.1	206.4	5.4	
	XA33S1	7/21/2015	1.5	28.1	240	8.0	8.0	102.7	207.8	5.4	
	XA33S1	7/21/2015	2.0	28.1	240	7.8	7.8	98.8	209.8	5.7	
N Wetland Edge	XA33S4	7/21/2015	0.5	28.3	240	8.1	8.4	107.4	166.0	5.0	0.86
	XA33S4	7/21/2015	1.0	28.2	240	8.1	8.2	105.2	169.6	5.2	
	XA33S4	7/21/2015	1.5	28.2	239	8.0	7.7	98.9	179.7	4.8	
	XA33S4	7/21/2015	2.0	28.2	239	7.9	7.5	95.0	183.9	5.5	
West of XA33S8	XA33S7	7/21/2015	No Sample Collected								
West of XA33S7	XA33S6	7/21/2015	0.5	28.5	237	8.3	9.1	118.3	100.5	5.2	0.94
	XA33S6	7/21/2015	1.0	28.4	236	8.4	9.2	118.2	100.9	5.5	
	XA33S6	7/21/2015	1.5	28.3	236	8.5	9.1	117.9	103.0	5.5	
	XA33S6	7/21/2015	2.0	28.3	236	8.4	9.0	114.8	114.8	5.5	
	XA33S6	7/21/2015	2.5	28.3	236	8.2	8.1	103.6	126.1	5.6	

Vertical Field Profiles collected in Lake Roberts, wetland and Lake Reaves
March 2015 through August 2015
North Lobe

Location	Site	Date	Depth (meter)	Temp (^{o}C)	SpCond (umho/cm)	pH Units	DO (mg/l)	DO (%)	ORP (mV)	Turbidity (NTU)	Secchi (meter)
Deep Muck in N Lobe	XA33S5	7/21/2015	0.5	28.5	240	8.4	9.1	117.3	151.1	5.1	0.90
(West of XA33S6)	XA33S5	7/21/2015	1.0	28.4	240	8.5	9.1	117.1	151.3	5.4	
	XA33S5	7/21/2015	1.5	28.3	240	8.4	8.9	114.8	154.1	5.4	
	XA33S5	7/21/2015	2.0	28.2	240	8.4	8.7	111.1	158.5	5.3	
	XA33S5	7/21/2015	2.5	28.0	239	8.1	7.4	94.9	171.3	5.2	
	XA33S5	7/21/2015	3.0	27.3	239	7.6	1.6	21.4	189.0	5.9	
	XA33S5	7/21/2015	3.5	26.8	247	7.1	0.6	7.4	19.8	9.3	
	XA33S5	7/21/2015	4.0	26.3	267	6.8	0.5	6.0	-109.4	10.8	
Lake Reaves	XA32S5	7/21/2015	0.5	28.6	226	7.8	7.9	102.0	100.4	1.0	0.83
	XA32S5	7/21/2015	1.0	28.4	226	7.5	7.2	92.1	114.4	1.2	
	XA32S5	7/21/2015	1.5	28.3	227	7.2	6.2	79.0	127.2	1.1	
	XA32S5	7/21/2015	2.0	27.6	227	7.0	3.5	47.2	137.8	1.0	
	XA32S5	7/21/2015	2.5	27.1	230	6.3	0.5	6.0	11.7	3.6	
	XA32S5	7/21/2015	3.0	26.5	227	6.1	0.4	4.8	-94.2	4.2	
Wetland	X-Wetland	7/21/2015	0.5	23.8	185	5.1	0.7	8.0	-55.7	1896.0	0.25

Vertical Field Profiles collected in Lake Roberts, wetland and Lake Reaves
March 2015 through August 2015
North Lobe

Location	Site	Date	Depth (meter)	Temp (^{o}C)	SpCond (umho/cm)	pH Units	DO (mg/l)	DO (%)	ORP (mV)	Turbidity (NTU)	Secchi (meter)
S Wetland Edge	XA33S8	8/19/2015	0.5	28.6	238	7.3	8.4	108.9	136.4	4.1	0.99
	XA33S8	8/19/2015	1.0	28.4	237	7.3	7.5	96.0	134.8	4.1	
	XA33S8	8/19/2015	1.5	28.0	232	7.0	4.7	60.8	142.9	4.1	
	XA33S8	8/19/2015	2.0	27.8	236	6.9	3.9	49.4	142.0	4.2	
C Wetland Edge	XA33S1	8/19/2015	0.5	29.1	237	7.7	8.7	113.7	121.1	3.5	1.10
	XA33S1	8/19/2015	1.0	28.9	239	7.8	9.2	118.9	113.6	3.7	
	XA33S1	8/19/2015	1.5	28.8	239	7.8	9.3	120.0	110.9	3.9	
	XA33S1	8/19/2015	2.0	28.6	239	7.8	8.6	111.1	120.7	3.6	
N Wetland Edge	XA33S4	8/19/2015	0.5	30.1	242	8.5	10.1	133.8	92.5	3.4	1.10
	XA33S4	8/19/2015	1.0	30.0	242	8.6	10.1	133.9	93.1	3.8	
	XA33S4	8/19/2015	1.5	30.0	242	8.6	10.1	134.4	95.4	3.6	
	XA33S4	8/19/2015	2.0	30.0	241	8.6	9.9	103.5	99.9	4.3	
West of XA33S8	XA33S7	8/19/2015	No Sample Collected								
West of XA33S7	XA33S6	8/19/2015	0.5	30.3	241	8.6	10.3	136.7	51.8	3.7	1.05
	XA33S6	8/19/2015	1.0	30.0	240	8.7	10.4	137.9	54.0	4.4	
	XA33S6	8/19/2015	1.5	29.9	239	8.7	10.4	137.1	57.1	3.5	
	XA33S6	8/19/2015	2.0	28.2	236	8.2	6.5	84.7	84.8	3.9	
	XA33S6	8/19/2015	2.5	27.7	237	7.8	4.2	53.7	93.5	3.8	
	XA33S6	8/19/2015	3.0	27.1	234	7.4	1.0	12.6	101.5	6.3	

Vertical Field Profiles collected in Lake Roberts, wetland and Lake Reaves
March 2015 through August 2015
North Lobe

Location	Site	Date	Depth (meter)	Temp (^{o}C)	SpCond (umho/cm)	pH Units	DO (mg/l)	DO (%)	ORP (mV)	Turbidity (NTU)	Secchi (meter)
Deep Muck in N Lobe	XA33S5	8/19/2015	0.5	30.4	238	8.6	10.1	134.0	86.7	3.9	1.10
(West of XA33S6)	XA33S5	8/19/2015	1.0	29.9	237	8.6	10.2	135.3	88.1	4.0	
	XA33S5	8/19/2015	1.5	29.7	236	8.6	10.2	135.1	90.7	3.8	
	XA33S5	8/19/2015	2.0	29.5	235	8.4	9.4	123.7	98.2	3.9	
	XA33S5	8/19/2015	2.5	27.6	235	7.8	4.2	53.7	125.5	4.0	
	XA33S5	8/19/2015	3.0	27.4	234	7.4	1.7	21.9	132.4	4.5	
	XA33S5	8/19/2015	3.5	27.0	234	7.1	0.6	7.8	133.2	7.0	
	XA33S5	8/19/2015	4.0	26.3	253	6.9	0.5	5.7	-145.7	7.7	
Lake Reaves	XA32S5	8/19/2015	0.5	30.5	230	7.2	7.6	101.1	142.6	0.0	1.12
	XA32S5	8/19/2015	1.0	28.0	228	7.1	6.5	31.6	140.3	9.3	
	XA32S5	8/19/2015	1.5	27.4	228	6.8	2.2	28.2	144.0	1.8	
	XA32S5	8/19/2015	2.0	26.4	230	6.5	0.6	7.4	-28.3	6.3	
	XA32S5	8/19/2015	2.5	25.4	236	6.3	0.5	5.6	-124.5	5.4	
	XA32S5	8/19/2015	3.0	24.4	238	6.1	0.4	4.6	-216.6	5.0	
	XA32S5	8/19/2015	3.5	23.1	243	5.9	0.3	3.9	-220.7	5.4	
Wetland	X-Wetland	8/19/2015	0.5	23.6	182	5.5	0.9	11.1	-115.7	1.4	0.33

APPENDIX B

Characteristics of Water Samples Collected in Lake Roberts, Wetland Tussock and Lake Reaves, March 2015 through August 2015

Characteristics of Water Samples Collected from Lake Roberts during 2015 Supplemental Sampling

Sample ID	Sample Description	Site	Date Collected	pH (s.u.)	Alkalinity (mg/L)	Conductivity (µmho/cm)	Ammonia (µg/L)	NOX (µg/L)	Diss. Org. N (µg/L)	Part. N (µg/L)	Total N (µg/L)	SRP (µg/L)	Diss. Org. P (µg/L)	Part. P (µg/L)	Total P (µg/L)	Chyl- a (mg/m^3)	TSS (mg/L)	Turbidity (NTU)	Color (PCU)	TKN
				field measurement		field measurement			(pass through 0.45 micron filter)				(pass through 0.45 micron filter)					field measurement		
AC05180	Lake Roberts	XA33 S1S	3/23/15	8.7	34	299	20	6	**	**	2720	3	15	101	119	163.7	16	22.0	65	2720
ACO5378	Lake Roberts	XA33 S1S	4/20/15	9.2	34	218	20	6	1010	1254	2290	3	15	81	99	107.8	20	19.6	50	2290
AC05573	Lake Roberts	XA33 S1S	5/20/15	9.2	35	233	20	6	780	954	1760	3	12	59	74	31.5	12	10.2	39	1760
AC05756	Lake Roberts	XA33 S1S	6/22/15	9.4	38	233	30	7	1080	663	1780	3	11	35	49	31.1	11	9.4	33	1780
AC05964	Lake Roberts	XA33 S1S	7/21/15	8.0	37	240	30	7	990	253	1280	3	11	34	48	31.8	8	5.4	28	1280
AC06154	Lake Roberts	XA33 S1S	8/19/15	7.7	39	237	30	7	920	383	1340	3	9	36	48	26.7	5	3.5	34	1340
MEAN				8.7	36.2	243.3	25.0	6.5	956.0	701.4	1861.7	3.0	12.2	57.7	72.8	65.4	12.0	11.7	41.5	1861.7
AC05179	Lake Roberts	XA33 S1B	3/23/15	8.7	34	224	20	6	**	**	2520	3	13	86	102	**	2	18.0	65	2520
AC05377	Lake Roberts	XA33 S1B	4/20/15	9.0	34	217	20	6	980	1264	2270	3	15	84	102	**	19	20.1	55	2270
AC05572	Lake Roberts	XA33 S1B	5/20/15	9.2	34	232	20	6	800	1094	1920	3	13	73	89	**	10	10.6	38	1920
AC05755	Lake Roberts	XA33 S1B	6/22/15	9.2	34	229	30	7	990	673	1700	3	12	46	61	**	9	11.2	2	1700
AC05963	Lake Roberts	XA33 S1B	7/21/15	7.8	36	240	30	7	980	213	1230	3	9	38	50	**	6	5.7	31	1230
AC06155	Lake Roberts	XA33 S1B	8/19/15	7.8	39	239	30	7	940	363	1340	3	8	33	44	**	5	3.6	35	1340
MEAN				8.6	35.2	230.2	25.0	6.5	938.0	721.4	1830.0	3.0	11.7	60.0	74.7		8.5	11.5	37.7	1830.0
AC05182	Lake Roberts	XA33 S4S	3/23/15	8.8	34	227	20	6	**	**	2610	3	14	111	111	169.0	17	22.0	65	2610
AC05380	Lake Roberts	XA33 S4S	4/20/15	9.4	34	221	20	6	850	1674	2550	3	14	84	101	119.6	22	20.8	50	2550
AC05575	Lake Roberts	XA33 S4S	5/20/15	9.3	35	233	20	6	820	774	1620	3	12	60	75	37.6	12	9.9	39	1620
AC05758	Lake Roberts	XA33 S4S	6/22/15	9.4	36	236	30	7	1060	613	1710	3	13	41	57	33.0	10	10.1	33	1710
AC05966	Lake Roberts	XA33 S4S	7/21/15	8.1	36	240	30	7	910	463	1410	3	8	36	47	29.3	7	5.0	27	1410
AC06158	Lake Roberts	XA33 S4S	8/19/15	8.5	39	242	30	7	1210	3	1250	3	8	31	42	21.8	4	3.4	35	1250
MEAN				8.9	35.7	233.2	25.0	6.5	970.0	881.0	1858.3	3.0	11.5	60.5	72.2	68.4	12.0	11.9	41.5	1858.3
Note: Particulate N during August sampling event considered outlier - value not used in Mean calculation																				
AC05181	Lake Roberts	XA33 S4B	3/23/15	8.8	35	223	20	6	**	**	2220	3	11	80	94	**	11	17.6	65	2220
AC05379	Lake Roberts	XA33 S4B	4/20/15	9.3	34	218	20	6	940	1414	2380	3	15	80	98	**	21	21.3	49	2380
AC05574	Lake Roberts	XA33 S4B	5/20/15	8.3	32	230	20	6	830	954	1810	3	16	77	96	**	14	14.8	36	1810
AC05757	Lake Roberts	XA33 S4B	6/22/15	8.4	37	227	30	7	980	883	1900	3	13	41	57	**	12	9.7	33	1890
AC05965	Lake Roberts	XA33 S4B	7/21/15	7.9	37	239	30	7	850	#	620	3	45	#	6	**	6	5.5	30	620
AC06157	Lake Roberts	XA33 S4B	8/19/15	8.6	39	241	30	7	850	343	1230	3	9	29	41	**	5	4.3	34	1230
MEAN				8.6	35.7	229.7	25.0	6.5	890.0	898.5	1693.3	3.0	18.2	61.4	65.3		11.5	12.2	41.2	1691.7
AC05184	Lake Roberts	XA33 S5S	3/23/15	8.9	35	224	20	6	**	**	2640	3	15	92	110	162.1		22.0	65	2640
AC05382	Lake Roberts	XA33 S5S	4/20/15	9.5	36	222	20	6	850	1434	2310	3	12	90	105	125.1	22	21.3	50	2310
AC05577	Lake Roberts	XA33 S5S	5/20/15	9.3	35	232	20	6	790	874	1690	3	11	64	78	43.2	13	10.3	38	1690
AC05760	Lake Roberts	XA33 S5S	6/22/15	9.3	37	238	30	7	1070	513	1620	3	11	42	56	34.4	11	9.2	32	1620
AC05968	Lake Roberts	XA33 S5S	7/21/15	8.4	37	240	30	7	900	303	1240	3	8	36	47	39.6	9	5.1	25	1240
AC06160	Lake Roberts	XA33 S5S	8/19/15	8.6	39	238	30	7	950	363	1350	3	8	38	49	28.2	4	3.9	33	1350
MEAN				9.0	36.5	232.3	25.0	6.5	912.0	697.4	1808.3	3.0	10.8	60.3	74.2	72.1	11.8	12.0	40.5	1808.3
AC05183	Lake Roberts	XA33 S5B	3/23/15	7.1	39	228	340	6	**	**	1380	77	101	#	134	**	5	1.3	65	1380
AC05381	Lake Roberts	XA33 S5B	4/20/15	7.0	48	242	840	6	760	494	2100	48	70	7	125	**	6	0.1	65	2100
AC05576	Lake Roberts	XA33 S5B	5/20/15	6.9	50	258	850	7	1000	573	2430	3	12	88	103	**	12	8.8	45	2430
AC05759	Lake Roberts	XA33 S5B	6/22/15	6.9	72	287	2270	12	1070	418	3770	3	16	82	101	**	6	10.8	50	3760
AC05967	Lake Roberts	XA33 S5B	7/21/15	6.8	50	267	1050	7	1010	323	2390	3	10	56	69	**	7	10.8	30	2390
AC06159	Lake Roberts	XA33 S5B	8/19/15	6.9	48	253	360	7	860	473	1700	3	9	42	54	**	4	7.7	33	1700
MEAN				6.9	51.2	255.8	951.7	7.5	940.0	456.2	2295.0	22.8	36.3	55.0	97.7		6.7	6.6	48.0	2293.3

Characteristics of Water Samples Collected from Lake Roberts during 2015 Supplemental Sampling

Sample ID	Sample Description	Site	Date Collected	pH (s.u.)	Alkalinity (mg/L)	Conductivity (µmho/cm)	Ammonia (µg/L)	NOX (µg/L)	Diss. Org. N (µg/L)	Part. N (µg/L)	Total N (µg/L)	SRP (µg/L)	Diss. Org. P (µg/L)	Part. P (µg/L)	Total P (µg/L)	Chyl- a (mg/m^3)	TSS (mg/L)	Turbidity (NTU)	Color (PCU)	TKN
				field measurement		field measurement			(pass through 0.45 micron filter)				(pass through 0.45 micron filter)					field measurement		
AC05186	Lake Roberts	XA33 S6S	3/23/15	8.9	35	223	20	6	**	**	2740	3	15	61	109	181.8	16	22.2	65	2740
AC05384	Lake Roberts	XA33 S6S	4/20/15	9.3	33	220	20	6	870	1384	2280	3	14	45	100	120.8	21	21.2	49	2280
AC05579	Lake Roberts	XA33 S6S	5/20/15	9.3	35	234	20	6	830	614	1470	3	12	36	76	43.6	10	10.1	39	1470
AC05762	Lake Roberts	XA33 S6S	6/22/15	9.3	37	237	30	7	1180	313	1530	3	11	32	59	37.6	11	9.2	32	1530
AC05970	Lake Roberts	XA33 S6S	7/21/15	8.3	37	237	30	7	940	463	1440	3	9	36	48	34.9	5	5.2	28	1440
AC06162	Lake Roberts	XA33 S6S	8/19/15	8.6	39	241	30	7	900	243	1180	3	8	0	43	22.5	1	3.7	38	1180
MEAN				9.0	36.0	232.0	25.0	6.5	944.0	603.4	1773.3	3.0	11.5	58.0	72.5	73.5	10.7	11.9	41.8	1773.3
AC05185	Lake Roberts	XA33 S6B	3/23/15	7.4	35	220	70	6	**	**	1690	3	16	85	65	**	9	1.0	60	1690
AC05383	Lake Roberts	XA33 S6B	4/20/15	8.8	34	218	20	6	970	1204	2200	3	15	48	99	**	21	14.5	50	2200
AC05578	Lake Roberts	XA33 S6B	5/20/15	7.3	32	217	20	6	510	1374	1910	3	17	35	105	**	17	14.9	38	1900
AC05761	Lake Roberts	XA33 S6B	6/22/15	7.4	36	223	60	7	1010	663	1740	3	11	43	62	**	11	9.6	32	1740
AC05969	Lake Roberts	XA33 S6B	7/21/15	8.2	38	236	30	7	2460	#	1410	3	8	35	46	**	8	5.6	28	1410
AC06161	Lake Roberts	XA33 S6B	8/19/15	7.4	37	234	30	7	840	473	1350	3	8	0	54	**	4	6.3	33	1350
MEAN				7.8	35.3	224.7	38.3	6.5	1158.0	928.5	1716.7	3.0	12.5	56.3	71.8		11.7	8.7	40.2	1715.0
AC05188	Lake Roberts	XA33 S7S	3/23/15	9.2	37	223	20	6	**	**	2800	3	14	96	113	183.0	20	23.3	65	2800
AC05386	Lake Roberts	XA33 S7S	4/20/15	9.5	34	220	20	6	880	1354	2260	3	14	86	103	121.9	20	20.5	49	2260
AC05581	Lake Roberts	XA33 S7S	5/20/15	9.3	35	234	20	6	820	744	1590	3	13	56	72	38.5	16	9.7	38	1590
AC05764	Lake Roberts	XA33 S7S	6/22/15	9.2	40	238	30	7	1120	473	1630	3	10	47	60	37.2	13	9.3	34	1630
*	Lake Roberts	XA33 S7S	7/21/15	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
*	Lake Roberts	XA33 S7S	8/19/15	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
MEAN				9.3	36.5	228.8	22.5	6.3	940.0	857.0	2070.0	3.0	12.8	71.3	87.0	95.2	17.3	15.7	46.5	2070.0
AC05187	Lake Roberts	XA33 S7B	3/23/15	8.5	37	217	30	6	**	**	1960	3	13	68	84	**	12	9.4	60	1960
AC05385	Lake Roberts	XA33 S7B	4/20/15	9.4	33	218	20	6	870	1294	2190	3	14	84	101	**	19	23.2	49	2190
AC05580	Lake Roberts	XA33 S7B	5/20/15	7.9	34	227	20	6	810	984	1820	3	13	77	93	**	17	12.9	37	1820
AC05763	Lake Roberts	XA33 S7B	6/22/15	7.3	34	227	30	7	980	853	1870	3	10	53	66	**	14	9.2	30	1870
*	Lake Roberts	XA33 S7B	7/21/15	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
*	Lake Roberts	XA33 S7B	8/19/15	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
MEAN				8.3	34.5	222.3	25.0	6.3	886.7	1043.7	1960.0	3.0	12.5	70.5	86.0		15.5	13.7	44.0	1960.0
AC05191	Lake Roberts	XA33 S8S	3/23/15	8.5	38	237	40	6	**	**	2640	4	16	61	116	160.6	17	21.3	65	2640
AC05389	Lake Roberts	XA33 S8S	4/20/15	9.0	34	217	20	6	980	1344	2350	4	20	46	103	116.7	19	19.7	50	2350
AC05584	Lake Roberts	XA33 S8S	5/20/15	9.1	34	232	20	6	650	974	1650	3	12	25	76	41.7	12	9.8	38	1650
AC05766	Lake Roberts	XA33 S8S	6/22/15	9.1	37	233	30	7	1020	553	1610	3	10	33	59	35.3	11	10.4	32	1610
AC05972	Lake Roberts	XA33 S8S	7/21/15	8.6	37	237	30	7	960	293	1290	3	11	25	39	24.5	9	5.2	29	1290
AC06164	Lake Roberts	XA33 S8S	8/19/15	7.3	42	238	30	7	880	503	1420	3	11	0	47	22.4	10	4.1	35	1420
MEAN				8.6	37.0	232.3	28.3	6.5	898.0	733.4	1826.7	3.3	13.3	56.7	73.3	66.9	13.0	11.8	41.5	1826.7
AC05189	Lake Roberts	XA33 S8B	3/23/15	8.6	38	235	40	6	**	**	2260	3	15	60	98	**	10	18.2	65	2260
AC05387	Lake Roberts	XA33 S8B	4/20/15	8.7	33	217	20	6	930	1254	2210	3	15	52	101	**	19	19.5	50	2210
AC05583	Lake Roberts	XA33 S8B	5/20/15	9.1	35	231	20	6	630	1124	1780	3	12	44	75	**	13	11.1	40	1780
AC05765	Lake Roberts	XA33 S8B	6/22/15	8.8	37	232	30	7	1060	653	1750	3	10	37	65	**	8	9.1	32	1750
AC05971	Lake Roberts	XA33 S8B	7/21/15	8.5	37	236	30	9	990	571	1600	3	8	44	55	**	16	6.4	28	1590
AC06163	Lake Roberts	XA33 S8B	8/19/15	6.9	39	236	30	7	830	433	1300	3	8	0	48	**	2	4.2	35	1300
MEAN				8.4	36.5	231.2	28.3	6.8	888.0	807.0	1816.7	3.0	11.3	59.3	73.7		11.3	11.4	41.7	1815.0

Characteristics of Water Samples Collected from Lake Roberts during 2015 Supplemental Sampling

Sample ID	Sample Description	Site	Date Collected	pH (s.u.) field measurement	Alkalinity (mg/L)	Conductivity (µmho/cm) field measurement	Ammonia (µg/L)	NOX (µg/L)	Diss. Org. N (µg/L) (pass through 0.45 micron filter)	Part. N (µg/L)	Total N (µg/L)	SRP (µg/L)	Diss. Org. P (µg/L) (pass through 0.45 micron filter)	Part. P (µg/L)	Total P (µg/L)	Chyl- a (mg/m^3)	TSS (mg/L)	Turbidity (NTU) field measurement	Color (PCU)	TKN
AC05178	Lake Reaves	XA32 S5S	3/23/15	7.4	34	201	20	6	**	**	920	3	9	18	31	7.8	1	0.1	140	920
AC05376	Lake Reaves	XA32 S5S	4/20/15	6.7	35	209	20	6	1080	#	1010	3	11	14	34	13.8	2	0.1	130	1010
AC05571	Lake Reaves	XA32 S5S	5/20/15	7.1	38	225	20	6	760	304	1090	3	13	38	34	27.3	2	0.9	120	1090
AC05754	Lake Reaves	XA32 S5S	6/22/15	6.9	48	226	30	11	820	69	930	3	14	19	31	4.7	5	1.5	130	920
AC05962	Lake Reaves	XA32 S5S	7/21/15	7.8	39	226	30	10	850	160	1050	3	10	38	51	57.6	3	1.0	110	1040
AC06154	Lake Reaves	XA32 S5S	8/19/15	7.2	40	230	30	7	770	213	1020	3	11	#VALUE!	33	18.5	1	0.0	110	1020
MEAN				7.2	39.0	219.5	25.0	7.7	856.0	186.5	1003.3	3.0	11.3	21.3	35.7	21.6	2.3	0.6	123.3	1000.0
*	Lake Roberts	X Wetland	3/23/15	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
AC05404	Lake Roberts	X Wetland	4/20/15	6.0	23	170	90	6	1000	1374	2470	30	47	97	174	21.3	45	5.7	170	2470
AC05599	Lake Roberts	X Wetland	5/20/15	5.9	25	178	70	6	1640	704	2420	15	33	84	132	36.8	28	5.6	170	2420
AC05767	Lake Roberts	X Wetland	6/22/15	6.50	29	193	310	14	1270	2786	4380	48	63	81	192	58.00	107	279.0	180	4370
AC05973	Lake Roberts	X Wetland	7/21/15	5.10	21	185	60	12	1280	2398	3750	27	49	79	155	12.70	91	1896.0	180	3740
	Lake Roberts	X Wetland	8/19/15	5.50	23	182	40	7	1150	153	1350	12	30	41	83	27.60	45	1.4	280	1350
MEAN				5.8	24.2	181.6	114.0	9.0	1268.0	1483.0	2874.0	26.4	44.4	76.4	147.2	31.3	63.2	437.5	196.0	2870.0

* Samples not collected
** Samples not analyzed
\# Mathmatical equation appears to be less than 0.0
Turbidity MDL = 0.1
Ammonia MDL = 20 ug/l
NOx MDL = 6 ug/l
SRP MDL = 3 ug/l

APPENDIX C

Watershed Hydrologic and Nutrient Model for Lake Roberts Sub-Basins (Existing Condition)

Basin	Land Use	Stormwater Treatment	Area (acres)	DCIA (%)	Non-DCIA CN Value	Runoff C Value	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Delivered Runoff Volume (ac-ft)	TP EMC (mg/l)	TN EMC (mg/l)	TSS EMC (mg/l)	TP (kg/yr)	TN (kg/yr)	TSS (kg/yr)
Lake Reaves	Roads	No	0.03	90	98	0.6665	0.07	0	0.07	0.22	1.64	37.3	0.02	0.14	3.25
Lake Reaves	Medium Density	No	0.17	15	98	0.6665	0.44	0	0.44	0.306	2.29	33.0	0.17	1.25	18.00
Lake Reaves	Medium Density	No	0.13	15	53	0.1077	0.05	0	0.05	0.306	2.29	33.0	0.02	0.15	2.17
Lake Reaves	Medium Density	No	0.03	15	84	0.2356	0.03	0	0.03	0.306	2.29	33.0	0.01	0.08	1.10
Lake Reaves	Medium Density	No	0.18	15	84	0.2356	0.17	0	0.17	0.306	2.29	33.0	0.06	0.48	6.96
Lake Reaves	Lakes	No	18.36	85	98	0.6665	48.40	0	48.40	0.013	0.49	17.3	0.78	29.25	1,032.73
Lake Reaves	Lakes	No	0.03	85	98	0.6665	0.08	0	0.08	0.013	0.49	17.3	0.00	0.05	1.71
Lake Reaves	Lakes	No	0.18	85	98	0.6665	0.48	0	0.48	0.013	0.49	17.3	0.01	0.29	10.16
Lake Reaves	Lakes	No	0.00	85	98	0.6665	0.01	0	0.01	0.013	0.49	17.3	0.00	0.00	0.17
Lake Reaves	Low Density	No	0.03	5	82	0.1625	0.02	0	0.02	0.177	1.77	20.4	0.00	0.05	0.56
Lake Reaves	Wetland	No	3.12	75	98	0.6665	8.22	0	8.22	0.113	1.55	7.8	1.15	15.71	79.06
Lake Reaves	Wetland	No	0.29	75	39	0.5000	0.57	0	0.57	0.113	1.55	7.8	0.08	1.09	5.50
Lake Reaves	Wetland	No	0.88	75	80	0.5288	1.84	0	1.84	0.113	1.55	7.8	0.26	3.52	17.69
Lake Reaves	Wetland	No	0.13	75	80	0.5288	0.27	0	0.27	0.113	1.55	7.8	0.04	0.52	2.64
Lake Reaves	Wetland	No	0.46	75	98	0.6665	1.22	0	1.22	0.113	1.55	7.8	0.17	2.34	11.78
Lake Reaves	Wetland	No	0.23	75	80	0.5288	0.47	0	0.47	0.113	1.55	7.8	0.07	0.90	4.54
Lake Reaves	Wetland	No	0.00	75	80	0.5288	0.00	0	0.00	0.113	1.55	7.8	0.00	0.00	0.00
Lake Roberts	Wetland	No	2.29	75	98	0.6665	6.03	0	6.03	0.113	1.55	7.8	0.84	11.53	58.01
Lake Roberts	Wetland	No	4.41	75	80	0.5288	9.21	0	9.21	0.113	1.55	7.8	1.28	17.62	88.65
Lake Roberts	Wetland	No	0.28	75	80	0.5288	0.58	0	0.58	0.113	1.55	7.8	0.08	1.11	5.58
Lake Roberts	Wetland	No	0.05	75	80	0.5288	0.09	0	0.09	0.113	1.55	7.8	0.01	0.18	0.91
Lake Roberts	Wetland	No	0.02	75	80	0.5288	0.04	0	0.04	0.113	1.55	7.8	0.01	0.09	0.43
Lake Roberts	Medium Density	No	0.05	15	98	0.6665	0.13	0	0.13	0.306	2.29	33.0	0.05	0.36	5.18
Lake Roberts	Medium Density	No	0.18	15	53	0.1077	0.08	0	0.08	0.306	2.29	33.0	0.03	0.21	3.09
Lake Roberts	Medium Density	No	0.62	15	84	0.2356	0.58	0	0.58	0.306	2.29	33.0	0.22	1.63	23.53
Lake Roberts	Wetland	No	1.87	75	98	0.6665	4.92	0	4.92	0.113	1.55	7.8	0.69	9.41	47.37
Lake Roberts	Wetland	No	0.02	75	80	0.5288	0.04	0	0.04	0.113	1.55	7.8	0.01	0.08	0.39
Lake Roberts	Wetland	No	2.20	75	80	0.5288	4.61	0	4.61	0.113	1.55	7.8	0.64	8.81	44.35
Lake Roberts	Wetland	No	0.01	75	80	0.5288	0.02	0	0.02	0.113	1.55	7.8	0.00	0.04	0.21
Lake Roberts	Wetland	No	0.72	75	80	0.5288	1.50	0	1.50	0.113	1.55	7.8	0.21	2.87	14.44
Lake Roberts	Lakes	No	103.77	85	98	0.6665	273.49	0	273.49	0.013	0.49	17.3	4.39	165.30	5,836.19
Lake Roberts	Lakes	No	0.78	85	98	0.6665	2.05	0	2.05	0.013	0.49	17.3	0.03	1.24	43.66
Lake Roberts	Lakes	No	0.12	85	98	0.6665	0.33	0	0.33	0.013	0.49	17.3	0.01	0.20	7.01
Lake Roberts	Lakes	No	0.00	85	98	0.6665	0.00	0	0.00	0.013	0.49	17.3	0.00	0.00	0.03
Lake Roberts	Lakes	No	0.13	85	98	0.6665	0.35	0	0.35	0.013	0.49	17.3	0.01	0.21	7.54
Lake Roberts	Lakes	No	0.10	85	98	0.6665	0.26	0	0.26	0.013	0.49	17.3	0.00	0.16	5.49
Lake Roberts	Lakes	No	0.18	85	98	0.6665	0.48	0	0.48	0.013	0.49	17.3	0.01	0.29	10.30
Lake Roberts	Lakes	No	0.13	85	98	0.6665	0.34	0	0.34	0.013	0.49	17.3	0.01	0.20	7.23
Lake Roberts	Lakes	No	0.44	85	98	0.6665	1.15	0	1.15	0.013	0.49	17.3	0.02	0.70	24.62
Lake Roberts	Medium Density	No	0.66	15	98	0.6665	1.74	0	1.74	0.306	2.29	33.0	0.65	4.90	70.63
Lake Roberts	Medium Density	No	0.86	15	84	0.2356	0.80	0	0.80	0.306	2.29	33.0	0.30	2.27	32.71
Lake Roberts	Medium Density	No	0.73	15	84	0.2356	0.68	0	0.68	0.306	2.29	33.0	0.26	1.93	27.83
Lake Roberts	Medium Density	No	0.27	15	84	0.2356	0.26	0	0.26	0.306	2.29	33.0	0.10	0.72	10.41
Lake Roberts	Medium Density	No	1.42	15	84	0.2356	1.32	0	1.32	0.306	2.29	33.0	0.50	3.73	53.71
Lake Roberts	Medium Density	No	0.00	15	84	0.2356	0.00	0	0.00	0.306	2.29	33.0	0.00	0.00	0.01
Lake Roberts	Medium Density	No	0.85	15	84	0.2356	0.79	0	0.79	0.306	2.29	33.0	0.30	2.23	32.14
Lake Roberts	Medium Density	No	0.01	15	84	0.2356	0.01	0	0.01	0.306	2.29	33.0	0.00	0.03	0.38
Lake Roberts	Medium Density	No	0.24	15	53	0.1077	0.10	0	0.10	0.306	2.29	33.0	0.04	0.29	4.19
Lake Roberts	Medium Density	No	0.01	15	84	0.2356	0.01	0	0.01	0.306	2.29	33.0	0.00	0.02	0.29
Lake Roberts	Medium Density	No	0.01	15	80	0.1984	0.00	0	0.00	0.306	2.29	33.0	0.00	0.01	0.18
Lake Roberts	Golf Course	No	1.32	1	74	0.0768	0.40	0	0.40	0.306	2	33.0	0.15	0.99	16.27
Lake Roberts	Golf Course	No	0.83	1	40	0.0074	0.02	0	0.02	0.306	2	33.0	0.01	0.06	0.99
Lake Roberts	Golf Course	No	0.96	1	80	0.1212	0.46	0	0.46	0.306	2	33.0	0.17	1.13	18.69

Basin	Land Use	Stormwater Treatment	Area (acres)	DCIA (%)	Non-DCIA CN Value	Runoff C Value	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Delivered Runoff Volume (ac-ft)	TP EMC (mg/l)	TN EMC (mg/l)	TSS EMC (mg/l)	TP (kg/yr)	TN (kg/yr)	TSS (kg/yr)
Lake Roberts	Medium Density	No	0.22	15	84	0.2356	0.21	0	0.21	0.306	2.29	33.0	0.08	0.59	8.53
Lake Roberts	Medium Density	No	0.51	15	84	0.2356	0.48	0	0.48	0.306	2.29	33.0	0.18	1.35	19.40
Lake Roberts	Medium Density	No	0.04	15	84	0.2356	0.04	0	0.04	0.306	2.29	33.0	0.01	0.11	1.60
Lake Roberts	Wetland	No	0.00	75	80	0.5288	0.00	0	0.00	0.113	1.55	7.8	0.00	0.00	0.00
Lake Roberts	Golf Course	Wet Detention	0.22	1	74	0.0768	0.07	20	0.05	0.306	2	33.0	0.02	0.13	2.14
Lake Roberts	Golf Course	Wet Detention	0.01	1	40	0.0074	0.00	20	0.00	0.306	2	33.0	0.00	0.00	0.01
Lake Roberts	Golf Course	Wet Detention	0.00	1	80	0.1212	0.00	20	0.00	0.306	2	33.0	0.00	0.00	0.05
Lake Roberts Landing	Wetland	No	0.06	75	80	0.5288	0.13	0	0.13	0.113	1.55	7.8	0.02	0.24	1.23
Lake Roberts Landing	Wetland	No	0.01	75	80	0.5288	0.01	0	0.01	0.113	1.55	7.8	0.00	0.02	0.11
Lake Roberts Landing	Medium Density	No	0.14	15	84	0.2356	0.13	0	0.13	0.306	2.29	33.0	0.05	0.36	5.26
Lake Roberts Landing	Medium Density	No	0.06	15	84	0.2356	0.06	0	0.06	0.306	2.29	33.0	0.02	0.17	2.42
Lake Roberts Landing	Medium Density	No	0.16	15	84	0.2356	0.15	0	0.15	0.306	2.29	33.0	0.06	0.43	6.23
Lake Roberts Landing	Medium Density	No	0.07	15	80	0.1984	0.05	0	0.05	0.306	2.29	33.0	0.02	0.15	2.12
Lake Roberts Landing	Medium Density	No	0.02	15	84	0.2356	0.02	0	0.02	0.306	2.29	33.0	0.01	0.05	0.78
Lake Roberts Landing	Wetland	No	0.37	75	80	0.5288	0.77	0	0.77	0.113	1.55	7.8	0.11	1.47	7.41
Lake Roberts Landing	Medium Density	No	0.00	15	84	0.2356	0.00	0	0.00	0.306	2.29	33.0	0.00	0.01	0.18
Lake Roberts Landing	Medium Density	No	0.02	15	84	0.2356	0.01	0	0.01	0.306	2.29	33.0	0.01	0.04	0.59
Lake Roberts Landing	Medium Density	No	0.13	15	98	0.6665	0.34	0	0.34	0.306	2.29	33.0	0.13	0.97	14.04
Lake Roberts Landing	Medium Density	No	0.52	15	84	0.2356	0.48	0	0.48	0.306	2.29	33.0	0.18	1.36	19.67
Lake Roberts Landing	Medium Density	No	1.42	15	84	0.2356	1.32	0	1.32	0.306	2.29	33.0	0.50	3.74	53.85
Lake Roberts Landing	Medium Density	No	0.32	15	84	0.2356	0.29	0	0.29	0.306	2.29	33.0	0.11	0.83	11.97
Lake Roberts Landing	Medium Density	No	0.33	15	80	0.1984	0.26	0	0.26	0.306	2.29	33.0	0.10	0.73	10.47
Lake Roberts Landing	Medium Density	No	0.05	15	98	0.6665	0.14	0	0.14	0.306	2.29	33.0	0.05	0.40	5.74
Lake Roberts Landing	Roads	Wet Detention	0.04	90	98	0.6665	0.11	20	0.09	0.22	1.64	37.3	0.02	0.19	4.22
Lake Roberts Landing	Open Space	Wet Detention	0.08	1	98	0.6665	0.20	20	0.16	0.074	1.15	7.8	0.01	0.23	1.55
Lake Roberts Landing	Ponds	Wet Detention	3.18	85	98	0.6665	8.39	20	6.71	0.013	0.49	17.3	0.11	4.06	143.27
Lake Roberts Landing	Wetland	Wet Detention	0.07	75	80	0.5288	0.14	20	0.11	0.113	1.55	7.8	0.02	0.21	1.06
Lake Roberts Landing	Wetland	Wet Detention	0.05	75	80	0.5288	0.10	20	0.08	0.113	1.55	7.8	0.01	0.15	0.75
Lake Roberts Landing	Medium Density	Wet Detention	0.01	15	84	0.2356	0.01	20	0.00	0.306	2.29	33.0	0.00	0.01	0.18
Lake Roberts Landing	Medium Density	Wet Detention	0.00	15	98	0.6665	0.00	20	0.00	0.306	2.29	33.0	0.00	0.00	0.04
Lake Roberts Landing	Medium Density	Wet Detention	7.48	15	84	0.2356	6.96	20	5.57	0.306	2.29	33.0	2.10	15.74	226.79
Lake Roberts Landing	Medium Density	Wet Detention	0.00	15	84	0.2356	0.00	20	0.00	0.306	2.29	33.0	0.00	0.01	0.11
Lake Roberts Landing	Medium Density	Wet Detention	0.34	15	84	0.2356	0.31	20	0.25	0.306	2.29	33.0	0.09	0.71	10.23
Lake Roberts Landing	Medium Density	Wet Detention	0.31	15	84	0.2356	0.29	20	0.23	0.306	2.29	33.0	0.09	0.66	9.55
Lake Roberts Landing	Medium Density	Wet Detention	1.83	15	84	0.2356	1.71	20	1.36	0.306	2.29	33.0	0.52	3.86	55.56
Lake Roberts Landing	Medium Density	Wet Detention	3.69	15	80	0.1984	2.89	20	2.31	0.306	2.29	33.0	0.87	6.54	94.22
Lake Roberts Landing	Medium Density	Wet Detention	0.82	15	84	0.2356	0.77	20	0.61	0.306	2.29	33.0	0.23	1.73	24.93
Lake Roberts Landing	Medium Density	Wet Detention	0.75	15	80	0.1984	0.59	20	0.47	0.306	2.29	33.0	0.18	1.32	19.07
Lake Roberts Landing	Medium Density	Wet Detention	11.23	15	98	0.6665	29.60	20	23.68	0.306	2.29	33.0	8.94	66.89	963.99
Lake Roberts Landing Wetland	Roads	No	0.01	90	98	0.6665	0.03	0	0.03	0.22	1.64	37.3	0.01	0.05	1.17
Lake Roberts Landing Wetland	Wetland	No	0.02	75	80	0.5288	0.05	0	0.05	0.113	1.55	7.8	0.01	0.10	0.49
Lake Roberts Landing Wetland	Wetland	No	0.64	75	80	0.5288	1.34	0	1.34	0.113	1.55	7.8	0.19	2.56	12.90
Lake Roberts Landing Wetland	Wetland	No	3.77	75	80	0.5288	7.88	0	7.88	0.113	1.55	7.8	1.10	15.07	75.85
Lake Roberts Landing Wetland	Wetland	No	0.02	75	80	0.5288	0.05	0	0.05	0.113	1.55	7.8	0.01	0.10	0.49
Lake Roberts Landing Wetland	Medium Density	No	0.22	15	84	0.2356	0.21	0	0.21	0.306	2.29	33.0	0.08	0.58	8.42
Lake Roberts Landing Wetland	Medium Density	No	0.24	15	84	0.2356	0.23	0	0.23	0.306	2.29	33.0	0.09	0.64	9.17
Lake Roberts Landing Wetland	Medium Density	No	0.33	15	84	0.2356	0.31	0	0.31	0.306	2.29	33.0	0.12	0.88	12.70
Lake Roberts Landing Wetland	Medium Density	No	0.02	15	80	0.1984	0.02	0	0.02	0.306	2.29	33.0	0.01	0.05	0.76
Lake Roberts Landing Wetland	Medium Density	No	0.00	15	84	0.2356	0.00	0	0.00	0.306	2.29	33.0	0.00	0.01	0.10
Lake Roberts Landing Wetland	Wetland	Wet Detention	0.00	75	80	0.5288	0.00	20	0.00	0.113	1.55	7.8	0.00	0.00	0.00
Lake Roberts Landing Wetland	Wetland	Wet Detention	0.00	75	80	0.5288	0.01	20	0.01	0.113	1.55	7.8	0.00	0.01	0.05
Lake Roberts Landing Wetland	Medium Density	Wet Detention	0.01	15	84	0.2356	0.01	20	0.01	0.306	2.29	33.0	0.00	0.03	0.41
Lake Roberts Landing Wetland	Medium Density	Wet Detention	0.01	15	84	0.2356	0.01	20	0.01	0.306	2.29	33.0	0.00	0.02	0.31

Basin	Land Use	Stormwater Treatment	Area (acres)	DCIA (%)	Non-DCIA CN Value	Runoff C Value	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Delivered Runoff Volume (ac-ft)	TP EMC (mg/l)	TN EMC (mg/l)	TSS EMC (mg/l)	TP (kg/yr)	TN (kg/yr)	TSS (kg/yr)
Lake Roberts Landing Wetland	Medium Density	Wet Detention	0.04	15	84	0.2356	0.04	20	0.03	0.306	2.29	33.0	0.01	0.09	1.36
Lake Roberts Landing Wetland	Medium Density	Wet Detention	0.00	15	80	0.1984	0.00	20	0.00	0.306	2.29	33.0	0.00	0.00	0.03
Single Family - North	Roads	No	0.35	90	98	0.6665	0.91	0	0.91	0.22	1.64	37.3	0.25	1.85	42.02
Single Family - North	Roads	No	0.57	90	98	0.6665	1.50	0	1.50	0.22	1.64	37.3	0.41	3.04	69.22
Single Family - North	Groves	No	1.25	1	80	0.1212	0.60	0	0.60	0.14	2.05	15.5	0.10	1.52	11.48
Single Family - North	Groves	No	4.15	1	80	0.1212	1.99	0	1.99	0.14	2.05	15.5	0.34	5.03	37.99
Single Family - North	Groves	No	7.27	1	74	0.0768	2.21	0	2.21	0.14	2.05	15.5	0.38	5.59	42.24
Single Family - North	Groves	No	4.61	1	80	0.1212	2.21	0	2.21	0.14	2.05	15.5	0.38	5.59	42.28
Single Family - North	Wetland	No	1.19	75	80	0.5288	2.49	0	2.49	0.113	1.55	7.8	0.35	4.76	23.95
Single Family - North	Lakes	No	0.00	85	98	0.6665	0.00	0	0.00	0.013	0.49	17.3	0.00	0.00	0.01
Single Family - North	Low Density	No	3.50	5	82	0.1625	2.25	0	2.25	0.177	1.77	20.4	0.49	4.91	56.54
Single Family - North	Low Density	No	0.24	5	77	0.1194	0.11	0	0.11	0.177	1.77	20.4	0.02	0.25	2.86
Single Family - North	Low Density	No	2.90	5	82	0.1625	1.86	0	1.86	0.177	1.77	20.4	0.41	4.07	46.91
Single Family - North	Lakes	No	0.02	85	98	0.6665	0.06	0	0.06	0.013	0.49	17.3	0.00	0.03	1.23
Single Family - North	Wetland	No	0.09	75	80	0.5288	0.19	0	0.19	0.113	1.55	7.8	0.03	0.37	1.84
Single Family - North	Wetland	No	0.02	75	80	0.5288	0.05	0	0.05	0.113	1.55	7.8	0.01	0.09	0.46
Single Family - North	Medium Density	No	0.04	15	84	0.2356	0.04	0	0.04	0.306	2.29	33.0	0.02	0.12	1.70
Single Family - North	Medium Density	No	0.28	15	80	0.1984	0.22	0	0.22	0.306	2.29	33.0	0.08	0.61	8.84
Single Family - North	Medium Density	No	0.01	15	84	0.2356	0.01	0	0.01	0.306	2.29	33.0	0.00	0.02	0.24
Single Family - North	Medium Density	Wet Detention	0.00	15	80	0.1984	0.00	20	0.00	0.306	2.29	33.0	0.00	0.01	0.09
Single Family - North	Roads	Wet Detention	0.00	90	98	0.6665	0.01	20	0.01	0.22	1.64	37.3	0.00	0.01	0.32
Stoney Brook West	Medium Density	No	0.33	15	84	0.2356	0.30	0	0.30	0.306	2.29	33.0	0.11	0.86	12.35
Stoney Brook West	Wetland	No	0.10	75	80	0.5288	0.21	0	0.21	0.113	1.55	7.8	0.03	0.40	2.01
Stoney Brook West	Roads	Wet Detention	0.06	90	98	0.6665	0.15	20	0.12	0.22	1.64	37.3	0.03	0.25	5.64
Stoney Brook West	Roads	Wet Detention	0.71	90	98	0.6665	1.86	20	1.49	0.22	1.64	37.3	0.40	3.01	68.57
Stoney Brook West	Roads	Wet Detention	1.76	90	98	0.6665	4.63	20	3.70	0.22	1.64	37.3	1.01	7.49	170.41
Stoney Brook West	Roads	Wet Detention	2.50	90	98	0.6665	6.60	20	5.28	0.22	1.64	37.3	1.43	10.68	242.97
Stoney Brook West	Medium Density	Wet Detention	0.32	15	53	0.1077	0.14	20	0.11	0.306	2.29	33.0	0.04	0.31	4.43
Stoney Brook West	Medium Density	Wet Detention	0.35	15	84	0.2356	0.32	20	0.26	0.306	2.29	33.0	0.10	0.73	10.52
Stoney Brook West	Medium Density	Wet Detention	0.54	15	98	0.6665	1.42	20	1.14	0.306	2.29	33.0	0.43	3.22	46.34
Stoney Brook West	Medium Density	Wet Detention	0.15	15	80	0.1984	0.11	20	0.09	0.306	2.29	33.0	0.03	0.26	3.71
Stoney Brook West	Wetland	Wet Detention	0.03	75	80	0.5288	0.06	20	0.05	0.113	1.55	7.8	0.01	0.09	0.44
Walker Pond-East	Medium Density	No	0.12	15	84	0.2356	0.11	0	0.11	0.306	2.29	33.0	0.04	0.32	4.63
Walker Pond-East	Medium Density	No	0.71	15	84	0.2356	0.66	0	0.66	0.306	2.29	33.0	0.25	1.87	26.90
Walker Pond-East	Medium Density	No	2.94	15	80	0.1984	2.31	0	2.31	0.306	2.29	33.0	0.87	6.52	93.94
Walker Pond-East	Low Density	No	0.67	5	82	0.1625	0.43	0	0.43	0.177	1.77	20.4	0.09	0.94	10.79
Walker Pond-East	Low Density	No	1.14	5	82	0.1625	0.73	0	0.73	0.177	1.77	20.4	0.16	1.60	18.42
Walker Pond-East	Low Density	No	0.61	5	82	0.1625	0.39	0	0.39	0.177	1.77	20.4	0.08	0.85	9.80
Walker Pond-East	Low Density	No	0.20	5	82	0.1625	0.13	0	0.13	0.177	1.77	20.4	0.03	0.27	3.16
Walker Pond-East	Low Density	No	7.32	5	77	0.1194	3.46	0	3.46	0.177	1.77	20.4	0.75	7.55	87.00
Walker Pond-East	Open Space	No	0.02	1	81	0.1309	0.01	0	0.01	0.074	1.15	7.8	0.00	0.01	0.08
Walker Pond-East	Wetland	No	0.05	75	80	0.5288	0.11	0	0.11	0.113	1.55	7.8	0.02	0.22	1.10
Walker Pond-East	Open Space	No	0.72	1	81	0.1309	0.37	0	0.37	0.074	1.15	7.8	0.03	0.53	3.59
Walker Pond-East	Open Space	No	0.08	1	81	0.1309	0.04	0	0.04	0.074	1.15	7.8	0.00	0.06	0.41
Walker Pond-East	Open Space	No	1.20	1	75	0.0828	0.39	0	0.39	0.074	1.15	7.8	0.04	0.56	3.79
Walker Pond-West	Groves	No	5.04	1	74	0.0768	1.53	0	1.53	0.14	2.05	15.5	0.26	3.87	29.27
Walker Pond-West	Wetland	No	0.21	75	80	0.5288	0.43	0	0.43	0.113	1.55	7.8	0.06	0.82	4.15
Walker Pond-West	Wetland	No	0.25	75	80	0.5288	0.52	0	0.52	0.113	1.55	7.8	0.07	0.99	4.99
Walker Pond-West	Pasture Land	No	0.42	1	80	0.1212	0.20	0	0.20	0.387	2.48	94.3	0.10	0.61	23.37
Walker Pond-West	Pasture Land	No	0.03	1	80	0.1212	0.01	0	0.01	0.387	2.48	94.3	0.01	0.04	1.67
Walker Pond-West	Pasture Land	No	3.96	1	74	0.0768	1.20	0	1.20	0.387	2.48	94.3	0.57	3.68	139.77
Walker Pond-West	Wetland	No	1.33	75	80	0.5288	2.79	0	2.79	0.113	1.55	7.8	0.39	5.33	26.83
Walker Pond-West	Wetland	No	0.62	75	80	0.5288	1.29	0	1.29	0.113	1.55	7.8	0.18	2.46	12.40

Basin	Land Use	Stormwater Treatment	Area (acres)	DCIA (%)	Non-DCIA CN Value	Runoff C Value	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Delivered Runoff Volume (ac-ft)	TP EMC (mg/l)	TN EMC (mg/l)	TSS EMC (mg/l)	TP (kg/yr)	TN (kg/yr)	TSS (kg/yr)
Walker Pond-West	Wetland	No	0.48	75	74	0.5176	0.97	0	0.97	0.113	1.55	7.8	0.14	1.86	9.36
Walker Pond-West	Wetland	No	0.70	75	39	0.5000	1.39	0	1.39	0.113	1.55	7.8	0.19	2.65	13.34
Walker Pond-West	Wetland	No	0.38	75	80	0.5288	0.79	0	0.79	0.113	1.55	7.8	0.11	1.51	7.60
Walker Pond-West	Wetland	No	3.39	75	80	0.5288	7.09	0	7.09	0.113	1.55	7.8	0.99	13.55	68.17
Walker Pond-West	Wetland	No	4.99	75	74	0.5176	10.21	0	10.21	0.113	1.55	7.8	1.42	19.52	98.23
Walker Pond-West	Low Density	No	0.10	5	82	0.1625	0.07	0	0.07	0.177	1.77	20.4	0.01	0.15	1.69
Walker Pond-West	Low Density	No	1.76	5	82	0.1625	1.13	0	1.13	0.177	1.77	20.4	0.25	2.47	28.47
Walker Pond-West	Low Density	No	1.12	5	82	0.1625	0.72	0	0.72	0.177	1.77	20.4	0.16	1.58	18.18
Walker Pond-West	Low Density	No	1.02	5	82	0.1625	0.66	0	0.66	0.177	1.77	20.4	0.14	1.43	16.48
Walker Pond-West	Low Density	No	3.30	5	77	0.1194	1.56	0	1.56	0.177	1.77	20.4	0.34	3.40	39.20
Walker Pond-West	Medium Density	No	0.00	15	53	0.1077	0.00	0	0.00	0.306	2.29	33.0	0.00	0.00	0.00
Walker Pond-West	Open Space	No	0.95	1	81	0.1309	0.49	0	0.49	0.074	1.15	7.8	0.04	0.70	4.74
Walker Pond-West	Open Space	No	3.13	1	81	0.1309	1.62	0	1.62	0.074	1.15	7.8	0.15	2.30	15.60
Walker Pond-West	Open Space	No	0.24	1	75	0.0828	0.08	0	0.08	0.074	1.15	7.8	0.01	0.11	0.75
Walker Pond-West	Wetland	No	0.00	75	80	0.5288	0.01	0	0.01	0.113	1.55	7.8	0.00	0.02	0.09
Walker Pond-West	Golf Course	No	0.59	1	80	0.1212	0.28	0	0.28	0.306	2	33.0	0.11	0.69	11.42
Walker Pond-West	Golf Course	No	0.24	1	74	0.0768	0.07	0	0.07	0.306	2	33.0	0.03	0.18	2.94
Walker Pond-West	Open Space	No	2.32	1	75	0.0828	0.76	0	0.76	0.074	1.15	7.8	0.07	1.08	7.31
Walker Pond-West	Open Space	No	1.50	1	81	0.1309	0.77	0	0.77	0.074	1.15	7.8	0.07	1.10	7.45
Walker Pond-West	Open Space	No	15.22	1	81	0.1309	7.88	0	7.88	0.074	1.15	7.8	0.72	11.18	75.81
Walker Pond-West	Open Space	No	0.26	1	75	0.0828	0.08	0	0.08	0.074	1.15	7.8	0.01	0.12	0.81
Walker Pond-West	Open Space	No	1.13	1	81	0.1309	0.59	0	0.59	0.074	1.15	7.8	0.05	0.83	5.64
Walker Pond-West	Open Space	No	2.95	1	75	0.0828	0.97	0	0.97	0.074	1.15	7.8	0.09	1.37	9.30
Walker Pond-West	Medium Density	No	0.00	15	80	0.1984	0.00	0	0.00	0.306	2.29	33.0	0.00	0.01	0.08
Walker Pond-West	Medium Density	No	0.08	15	84	0.2356	0.07	0	0.07	0.306	2.29	33.0	0.03	0.20	2.92
Walker Pond-West	Groves	Wet Detention	0.00	1	74	0.0768	0.00	20	0.00	0.14	2.05	15.5	0.00	0.00	0.01
Walker Pond-West	Pasture Land	Wet Detention	0.03	1	74	0.0768	0.01	20	0.01	0.387	2.48	94.3	0.00	0.03	0.97
Waterford-1	Wetland	No	0.01	75	80	0.5288	0.01	0	0.01	0.113	1.55	7.8	0.00	0.02	0.11
Waterford-1	Wetland	No	0.07	75	80	0.5288	0.15	0	0.15	0.113	1.55	7.8	0.02	0.28	1.41
Waterford-1	Wetland	No	0.01	75	80	0.5288	0.02	0	0.02	0.113	1.55	7.8	0.00	0.05	0.23
Waterford-1	Wetland	No	0.05	75	80	0.5288	0.11	0	0.11	0.113	1.55	7.8	0.01	0.20	1.02
Waterford-1	Lakes	No	0.00	85	98	0.6665	0.00	0	0.00	0.013	0.49	17.3	0.00	0.00	0.03
Waterford-1	Medium Density	No	0.00	15	98	0.6665	0.01	0	0.01	0.306	2.29	33.0	0.00	0.02	0.29
Waterford-1	Medium Density	No	4.74	15	84	0.2356	4.42	0	4.42	0.306	2.29	33.0	1.67	12.48	179.84
Waterford-1	Medium Density	No	0.42	15	84	0.2356	0.39	0	0.39	0.306	2.29	33.0	0.15	1.09	15.77
Waterford-1	Medium Density	No	2.41	15	84	0.2356	2.24	0	2.24	0.306	2.29	33.0	0.85	6.34	91.31
Waterford-1	Medium Density	No	2.17	15	84	0.2356	2.02	0	2.02	0.306	2.29	33.0	0.76	5.70	82.17
Waterford-1	Medium Density	No	0.73	15	84	0.2356	0.68	0	0.68	0.306	2.29	33.0	0.26	1.91	27.59
Waterford-1	Medium Density	No	1.06	15	84	0.2356	0.99	0	0.99	0.306	2.29	33.0	0.37	2.80	40.34
Waterford-1	Medium Density	No	0.34	15	84	0.2356	0.32	0	0.32	0.306	2.29	33.0	0.12	0.90	12.91
Waterford-1	Medium Density	No	0.60	15	84	0.2356	0.56	0	0.56	0.306	2.29	33.0	0.21	1.59	22.89
Waterford-1	Medium Density	No	0.73	15	84	0.2356	0.68	0	0.68	0.306	2.29	33.0	0.26	1.92	27.68
Waterford-1	Medium Density	No	3.62	15	84	0.2356	3.37	0	3.37	0.306	2.29	33.0	1.27	9.53	137.38
Waterford-1	Medium Density	No	11.98	15	53	0.1077	5.10	0	5.10	0.306	2.29	33.0	1.93	14.41	207.66
Waterford-1	Medium Density	No	0.58	15	84	0.2356	0.54	0	0.54	0.306	2.29	33.0	0.20	1.53	22.00
Waterford-1	Medium Density	No	0.74	15	53	0.1077	0.31	0	0.31	0.306	2.29	33.0	0.12	0.89	12.80
Waterford-1	Golf Course	No	0.88	1	40	0.0074	0.03	0	0.03	0.306	2	33.0	0.01	0.06	1.06
Waterford-1	Golf Course	No	0.25	1	80	0.1212	0.12	0	0.12	0.306	2	33.0	0.04	0.29	4.79
Waterford-1	Medium Density	No	0.00	15	53	0.1077	0.00	0	0.00	0.306	2.29	33.0	0.00	0.00	0.00
Waterford-1	Golf Course	Wet Detention	0.01	1	40	0.0074	0.00	20	0.00	0.306	2	33.0	0.00	0.00	0.01
Waterford-1	Medium Density	Wet Detention	0.00	15	53	0.1077	0.00	20	0.00	0.306	2.29	33.0	0.00	0.00	0.00
Waterford-2	Groves	No	0.07	1	40	0.0074	0.00	0	0.00	0.14	2.05	15.5	0.00	0.01	0.04
Waterford-2	Medium Density	No	0.35	15	84	0.2356	0.33	0	0.33	0.306	2.29	33.0	0.12	0.92	13.24

Basin	Land Use	Stormwater Treatment	Area (acres)	DCIA (%)	Non-DCIA CN Value	Runoff C Value	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Delivered Runoff Volume (ac-ft)	TP EMC (mg/l)	TN EMC (mg/l)	TSS EMC (mg/l)	TP (kg/yr)	TN (kg/yr)	TSS (kg/yr)
Waterford-2	Medium Density	No	0.22	15	84	0.2356	0.21	0	0.21	0.306	2.29	33.0	0.08	0.58	8.41
Waterford-2	Medium Density	No	6.35	15	53	0.1077	2.70	0	2.70	0.306	2.29	33.0	1.02	7.64	110.03
Waterford-2	Medium Density	No	0.52	15	53	0.1077	0.22	0	0.22	0.306	2.29	33.0	0.08	0.62	9.00
Waterford-2	Pasture Land	No	0.30	1	40	0.0074	0.01	0	0.01	0.387	2.48	94.3	0.00	0.03	1.03
Waterford-2	Medium Density	Wet Detention	0.00	15	84	0.2356	0.00	20	0.00	0.306	2.29	33.0	0.00	0.00	0.02
Waterford-2	Medium Density	Wet Detention	20.87	15	53	0.1077	8.89	20	7.11	0.306	2.29	33.0	2.68	20.08	289.36
Waterford-2	Medium Density	Wet Detention	0.00	15	53	0.1077	0.00	20	0.00	0.306	2.29	33.0	0.00	0.00	0.00
Waterford-2	Medium Density	Wet Detention	0.43	15	53	0.1077	0.18	20	0.15	0.306	2.29	33.0	0.06	0.42	6.01
Waterford-2	Medium Density	Wet Detention	0.00	15	98	0.6665	0.00	20	0.00	0.306	2.29	33.0	0.00	0.01	0.16
Waterford-2	Medium Density	Wet Detention	0.84	15	84	0.2356	0.78	20	0.62	0.306	2.29	33.0	0.24	1.76	25.35
Waterford-2	Ponds	Wet Detention	0.23	85	98	0.6665	0.62	20	0.49	0.013	0.49	17.3	0.01	0.30	10.54
Waterford-2	Ponds	Wet Detention	3.29	85	98	0.6665	8.67	20	6.93	0.013	0.49	17.3	0.11	4.19	147.98
Waterford-2	Ponds	Wet Detention	0.28	85	98	0.6665	0.74	20	0.59	0.013	0.49	17.3	0.01	0.36	12.65
Waterford-3	Wetland	No	0.12	75	80	0.5288	0.24	0	0.24	0.113	1.55	7.8	0.03	0.47	2.35
Waterford-3	Medium Density	No	1.96	15	84	0.2356	1.83	0	1.83	0.306	2.29	33.0	0.69	5.16	74.33
Waterford-3	Medium Density	No	5.58	15	84	0.2356	5.20	0	5.20	0.306	2.29	33.0	1.96	14.69	211.70
Waterford-3	Medium Density	No	5.75	15	84	0.2356	5.35	0	5.35	0.306	2.29	33.0	2.02	15.13	217.96
Waterford-3	Medium Density	No	3.49	15	98	0.6665	9.19	0	9.19	0.306	2.29	33.0	3.47	25.95	373.95
Waterford-3	Medium Density	No	0.01	15	98	0.6665	0.02	0	0.02	0.306	2.29	33.0	0.01	0.07	0.96
Waterford-3	Medium Density	Wet Detention	0.03	15	84	0.2356	0.03	20	0.02	0.306	2.29	33.0	0.01	0.07	0.95
Waterford-3	Medium Density	Wet Detention	0.00	15	98	0.6665	0.01	20	0.01	0.306	2.29	33.0	0.00	0.03	0.39
Waterford-3	Medium Density	Wet Detention	0.01	15	84	0.2356	0.01	20	0.01	0.306	2.29	33.0	0.00	0.02	0.25
Waterford-3	Medium Density	Wet Detention	0.05	15	98	0.6665	0.14	20	0.11	0.306	2.29	33.0	0.04	0.32	4.60
Wetland Tussock	Groves	No	0.03	1	74	0.0768	0.01	0	0.01	0.14	2.05	15.5	0.00	0.02	0.17
Wetland Tussock	Groves	No	0.04	1	80	0.1212	0.02	0	0.02	0.14	2.05	15.5	0.00	0.05	0.39
Wetland Tussock	Wetland	No	0.25	75	98	0.6665	0.65	0	0.65	0.113	1.55	7.8	0.09	1.24	6.23

APPENDIX D

Watershed Hydrologic and Nutrient Model for Lake Roberts Sub-Basins (Proposed Condition)

Basin	Land Use	Stormwater Treatment	Area (acres)	DCIA (%)	Non-DCIA CN Value	Runoff C Value	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Delivered Runoff Volume (ac-ft)	TP EMC (mg/l)	TN EMC (mg/l)	TSS EMC (mg/l)	TP (kg/yr)	TN (kg/yr)	TSS (kg/yr)
Lake Reaves	Roads	No	0.03	90	98	0.6665	0.07	0	0.07	0.22	1.64	37.3	0.02	0.14	3.25
Lake Reaves	Medium Density	No	0.17	15	98	0.6665	0.44	0	0.44	0.306	2.29	33.0	0.17	1.25	18.00
Lake Reaves	Medium Density	No	0.13	15	53	0.1077	0.05	0	0.05	0.306	2.29	33.0	0.02	0.15	2.17
Lake Reaves	Medium Density	No	0.03	15	84	0.2356	0.03	0	0.03	0.306	2.29	33.0	0.01	0.08	1.10
Lake Reaves	Medium Density	No	0.18	15	84	0.2356	0.17	0	0.17	0.306	2.29	33.0	0.06	0.48	6.96
Lake Reaves	Lakes	No	18.36	85	98	0.6665	48.40	0	48.40	0.013	0.49	17.3	0.78	29.25	1,032.73
Lake Reaves	Lakes	No	0.03	85	98	0.6665	0.08	0	0.08	0.013	0.49	17.3	0.00	0.05	1.71
Lake Reaves	Lakes	No	0.18	85	98	0.6665	0.48	0	0.48	0.013	0.49	17.3	0.01	0.29	10.16
Lake Reaves	Lakes	No	0.00	85	98	0.6665	0.01	0	0.01	0.013	0.49	17.3	0.00	0.00	0.17
Lake Reaves	Low Density	No	0.03	5	82	0.1625	0.02	0	0.02	0.177	1.77	20.4	0.00	0.05	0.56
Lake Reaves	Wetland	No	3.12	75	98	0.6665	8.22	0	8.22	0.113	1.55	7.8	1.15	15.71	79.06
Lake Reaves	Wetland	No	0.29	75	39	0.5000	0.57	0	0.57	0.113	1.55	7.8	0.08	1.09	5.50
Lake Reaves	Wetland	No	0.88	75	80	0.5288	1.84	0	1.84	0.113	1.55	7.8	0.26	3.52	17.69
Lake Reaves	Wetland	No	0.13	75	80	0.5288	0.27	0	0.27	0.113	1.55	7.8	0.04	0.52	2.64
Lake Reaves	Wetland	No	0.46	75	98	0.6665	1.22	0	1.22	0.113	1.55	7.8	0.17	2.34	11.78
Lake Reaves	Wetland	No	0.23	75	80	0.5288	0.47	0	0.47	0.113	1.55	7.8	0.07	0.90	4.54
Lake Reaves	Wetland	No	0.00	75	80	0.5288	0.00	0	0.00	0.113	1.55	7.8	0.00	0.00	0.00
Lake Roberts	Wetland	No	2.29	75	98	0.6665	6.03	0	6.03	0.113	1.55	7.8	0.84	11.53	58.01
Lake Roberts	Wetland	No	4.41	75	80	0.5288	9.21	0	9.21	0.113	1.55	7.8	1.28	17.62	88.65
Lake Roberts	Wetland	No	0.28	75	80	0.5288	0.58	0	0.58	0.113	1.55	7.8	0.08	1.11	5.58
Lake Roberts	Wetland	No	0.05	75	80	0.5288	0.09	0	0.09	0.113	1.55	7.8	0.01	0.18	0.91
Lake Roberts	Wetland	No	0.02	75	80	0.5288	0.04	0	0.04	0.113	1.55	7.8	0.01	0.09	0.43
Lake Roberts	Medium Density	No	0.05	15	98	0.6665	0.13	0	0.13	0.306	2.29	33.0	0.05	0.36	5.18
Lake Roberts	Medium Density	No	0.18	15	53	0.1077	0.08	0	0.08	0.306	2.29	33.0	0.03	0.21	3.09
Lake Roberts	Medium Density	No	0.62	15	84	0.2356	0.58	0	0.58	0.306	2.29	33.0	0.22	1.63	23.53
Lake Roberts	Wetland	No	1.87	75	98	0.6665	4.92	0	4.92	0.113	1.55	7.8	0.69	9.41	47.37
Lake Roberts	Wetland	No	0.02	75	80	0.5288	0.04	0	0.04	0.113	1.55	7.8	0.01	0.08	0.39
Lake Roberts	Wetland	No	2.20	75	80	0.5288	4.61	0	4.61	0.113	1.55	7.8	0.64	8.81	44.35
Lake Roberts	Wetland	No	0.01	75	80	0.5288	0.02	0	0.02	0.113	1.55	7.8	0.00	0.04	0.21
Lake Roberts	Wetland	No	0.72	75	80	0.5288	1.50	0	1.50	0.113	1.55	7.8	0.21	2.87	14.44
Lake Roberts	Lakes	No	103.77	85	98	0.6665	273.49	0	273.49	0.013	0.49	17.3	4.39	165.30	5,836.19
Lake Roberts	Lakes	No	0.78	85	98	0.6665	2.05	0	2.05	0.013	0.49	17.3	0.03	1.24	43.66
Lake Roberts	Lakes	No	0.12	85	98	0.6665	0.33	0	0.33	0.013	0.49	17.3	0.01	0.20	7.01
Lake Roberts	Lakes	No	0.00	85	98	0.6665	0.00	0	0.00	0.013	0.49	17.3	0.00	0.00	0.03
Lake Roberts	Lakes	No	0.13	85	98	0.6665	0.35	0	0.35	0.013	0.49	17.3	0.01	0.21	7.54
Lake Roberts	Lakes	No	0.10	85	98	0.6665	0.26	0	0.26	0.013	0.49	17.3	0.00	0.16	5.49
Lake Roberts	Lakes	No	0.18	85	98	0.6665	0.48	0	0.48	0.013	0.49	17.3	0.01	0.29	10.30
Lake Roberts	Lakes	No	0.13	85	98	0.6665	0.34	0	0.34	0.013	0.49	17.3	0.01	0.20	7.23
Lake Roberts	Lakes	No	0.44	85	98	0.6665	1.15	0	1.15	0.013	0.49	17.3	0.02	0.70	24.62
Lake Roberts	Medium Density	No	0.66	15	98	0.6665	1.74	0	1.74	0.306	2.29	33.0	0.65	4.90	70.63
Lake Roberts	Medium Density	No	0.86	15	84	0.2356	0.80	0	0.80	0.306	2.29	33.0	0.30	2.27	32.71
Lake Roberts	Medium Density	No	0.73	15	84	0.2356	0.68	0	0.68	0.306	2.29	33.0	0.26	1.93	27.83
Lake Roberts	Medium Density	No	0.27	15	84	0.2356	0.26	0	0.26	0.306	2.29	33.0	0.10	0.72	10.41
Lake Roberts	Medium Density	No	1.42	15	84	0.2356	1.32	0	1.32	0.306	2.29	33.0	0.50	3.73	53.71
Lake Roberts	Medium Density	No	0.00	15	84	0.2356	0.00	0	0.00	0.306	2.29	33.0	0.00	0.00	0.01
Lake Roberts	Medium Density	No	0.85	15	84	0.2356	0.79	0	0.79	0.306	2.29	33.0	0.30	2.23	32.14
Lake Roberts	Medium Density	No	0.01	15	84	0.2356	0.01	0	0.01	0.306	2.29	33.0	0.00	0.03	0.38
Lake Roberts	Medium Density	No	0.24	15	53	0.1077	0.10	0	0.10	0.306	2.29	33.0	0.04	0.29	4.19
Lake Roberts	Medium Density	No	0.01	15	84	0.2356	0.01	0	0.01	0.306	2.29	33.0	0.00	0.02	0.29
Lake Roberts	Medium Density	No	0.01	15	80	0.1984	0.00	0	0.00	0.306	2.29	33.0	0.00	0.01	0.18
Lake Roberts	Golf Course	No	1.32	1	74	0.0768	0.40	0	0.40	0.306	2	33.0	0.15	0.99	16.27
Lake Roberts	Golf Course	No	0.83	1	40	0.0074	0.02	0	0.02	0.306	2	33.0	0.01	0.06	0.99
Lake Roberts	Golf Course	No	0.96	1	80	0.1212	0.46	0	0.46	0.306	2	33.0	0.17	1.13	18.69

Basin	Land Use	Stormwater Treatment	Area (acres)	DCIA (%)	Non-DCIA CN Value	Runoff C Value	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Delivered Runoff Volume (ac-ft)	TP EMC (mg/l)	TN EMC (mg/l)	TSS EMC (mg/l)	TP (kg/yr)	TN (kg/yr)	TSS (kg/yr)
Lake Roberts	Medium Density	No	0.22	15	84	0.2356	0.21	0	0.21	0.306	2.29	33.0	0.08	0.59	8.53
Lake Roberts	Medium Density	No	0.51	15	84	0.2356	0.48	0	0.48	0.306	2.29	33.0	0.18	1.35	19.40
Lake Roberts	Medium Density	No	0.04	15	84	0.2356	0.04	0	0.04	0.306	2.29	33.0	0.01	0.11	1.60
Lake Roberts	Wetland	No	0.00	75	80	0.5288	0.00	0	0.00	0.113	1.55	7.8	0.00	0.00	0.00
Lake Roberts	Golf Course	Wet Detention	0.22	1	74	0.0768	0.07	20	0.05	0.306	2	33.0	0.02	0.13	2.14
Lake Roberts	Golf Course	Wet Detention	0.01	1	40	0.0074	0.00	20	0.00	0.306	2	33.0	0.00	0.00	0.01
Lake Roberts	Golf Course	Wet Detention	0.00	1	80	0.1212	0.00	20	0.00	0.306	2	33.0	0.00	0.00	0.05
Lake Roberts Landing	Wetland	No	0.06	75	80	0.5288	0.13	0	0.13	0.113	1.55	7.8	0.02	0.24	1.23
Lake Roberts Landing	Wetland	No	0.01	75	80	0.5288	0.01	0	0.01	0.113	1.55	7.8	0.00	0.02	0.11
Lake Roberts Landing	Medium Density	No	0.14	15	84	0.2356	0.13	0	0.13	0.306	2.29	33.0	0.05	0.36	5.26
Lake Roberts Landing	Medium Density	No	0.06	15	84	0.2356	0.06	0	0.06	0.306	2.29	33.0	0.02	0.17	2.42
Lake Roberts Landing	Medium Density	No	0.16	15	84	0.2356	0.15	0	0.15	0.306	2.29	33.0	0.06	0.43	6.23
Lake Roberts Landing	Medium Density	No	0.07	15	80	0.1984	0.05	0	0.05	0.306	2.29	33.0	0.02	0.15	2.12
Lake Roberts Landing	Medium Density	No	0.02	15	84	0.2356	0.02	0	0.02	0.306	2.29	33.0	0.01	0.05	0.78
Lake Roberts Landing	Wetland	No	0.37	75	80	0.5288	0.77	0	0.77	0.113	1.55	7.8	0.11	1.47	7.41
Lake Roberts Landing	Medium Density	No	0.00	15	84	0.2356	0.00	0	0.00	0.306	2.29	33.0	0.00	0.01	0.18
Lake Roberts Landing	Medium Density	No	0.02	15	84	0.2356	0.01	0	0.01	0.306	2.29	33.0	0.01	0.04	0.59
Lake Roberts Landing	Medium Density	No	0.13	15	98	0.6665	0.34	0	0.34	0.306	2.29	33.0	0.13	0.97	14.04
Lake Roberts Landing	Medium Density	No	0.52	15	84	0.2356	0.48	0	0.48	0.306	2.29	33.0	0.18	1.36	19.67
Lake Roberts Landing	Medium Density	No	1.42	15	84	0.2356	1.32	0	1.32	0.306	2.29	33.0	0.50	3.74	53.85
Lake Roberts Landing	Medium Density	No	0.32	15	84	0.2356	0.29	0	0.29	0.306	2.29	33.0	0.11	0.83	11.97
Lake Roberts Landing	Medium Density	No	0.33	15	80	0.1984	0.26	0	0.26	0.306	2.29	33.0	0.10	0.73	10.47
Lake Roberts Landing	Medium Density	No	0.05	15	98	0.6665	0.14	0	0.14	0.306	2.29	33.0	0.05	0.40	5.74
Lake Roberts Landing	Roads	Wet Detention	0.04	90	98	0.6665	0.11	20	0.09	0.22	1.64	37.3	0.02	0.19	4.22
Lake Roberts Landing	Open Space	Wet Detention	0.08	1	98	0.6665	0.20	20	0.16	0.074	1.15	7.8	0.01	0.23	1.55
Lake Roberts Landing	Ponds	Wet Detention	3.18	85	98	0.6665	8.39	20	6.71	0.013	0.49	17.3	0.11	4.06	143.27
Lake Roberts Landing	Wetland	Wet Detention	0.07	75	80	0.5288	0.14	20	0.11	0.113	1.55	7.8	0.02	0.21	1.06
Lake Roberts Landing	Wetland	Wet Detention	0.05	75	80	0.5288	0.10	20	0.08	0.113	1.55	7.8	0.01	0.15	0.75
Lake Roberts Landing	Medium Density	Wet Detention	0.01	15	84	0.2356	0.01	20	0.00	0.306	2.29	33.0	0.00	0.01	0.18
Lake Roberts Landing	Medium Density	Wet Detention	0.00	15	98	0.6665	0.00	20	0.00	0.306	2.29	33.0	0.00	0.00	0.04
Lake Roberts Landing	Medium Density	Wet Detention	7.48	15	84	0.2356	6.96	20	5.57	0.306	2.29	33.0	2.10	15.74	226.79
Lake Roberts Landing	Medium Density	Wet Detention	0.00	15	84	0.2356	0.00	20	0.00	0.306	2.29	33.0	0.00	0.01	0.11
Lake Roberts Landing	Medium Density	Wet Detention	0.34	15	84	0.2356	0.31	20	0.25	0.306	2.29	33.0	0.09	0.71	10.23
Lake Roberts Landing	Medium Density	Wet Detention	0.31	15	84	0.2356	0.29	20	0.23	0.306	2.29	33.0	0.09	0.66	9.55
Lake Roberts Landing	Medium Density	Wet Detention	1.83	15	84	0.2356	1.71	20	1.36	0.306	2.29	33.0	0.52	3.86	55.56
Lake Roberts Landing	Medium Density	Wet Detention	3.69	15	80	0.1984	2.89	20	2.31	0.306	2.29	33.0	0.87	6.54	94.22
Lake Roberts Landing	Medium Density	Wet Detention	0.82	15	84	0.2356	0.77	20	0.61	0.306	2.29	33.0	0.23	1.73	24.93
Lake Roberts Landing	Medium Density	Wet Detention	0.75	15	80	0.1984	0.59	20	0.47	0.306	2.29	33.0	0.18	1.32	19.07
Lake Roberts Landing	Medium Density	Wet Detention	11.23	15	98	0.6665	29.60	20	23.68	0.306	2.29	33.0	8.94	66.89	963.99
Lake Roberts Landing Wetland	Roads	No	0.01	90	98	0.6665	0.03	0	0.03	0.22	1.64	37.3	0.01	0.05	1.17
Lake Roberts Landing Wetland	Wetland	No	0.02	75	80	0.5288	0.05	0	0.05	0.113	1.55	7.8	0.01	0.10	0.49
Lake Roberts Landing Wetland	Wetland	No	0.64	75	80	0.5288	1.34	0	1.34	0.113	1.55	7.8	0.19	2.56	12.90
Lake Roberts Landing Wetland	Wetland	No	3.77	75	80	0.5288	7.88	0	7.88	0.113	1.55	7.8	1.10	15.07	75.85
Lake Roberts Landing Wetland	Wetland	No	0.02	75	80	0.5288	0.05	0	0.05	0.113	1.55	7.8	0.01	0.10	0.49
Lake Roberts Landing Wetland	Medium Density	No	0.22	15	84	0.2356	0.21	0	0.21	0.306	2.29	33.0	0.08	0.58	8.42
Lake Roberts Landing Wetland	Medium Density	No	0.24	15	84	0.2356	0.23	0	0.23	0.306	2.29	33.0	0.09	0.64	9.17
Lake Roberts Landing Wetland	Medium Density	No	0.33	15	84	0.2356	0.31	0	0.31	0.306	2.29	33.0	0.12	0.88	12.70
Lake Roberts Landing Wetland	Medium Density	No	0.02	15	80	0.1984	0.02	0	0.02	0.306	2.29	33.0	0.01	0.05	0.76
Lake Roberts Landing Wetland	Medium Density	No	0.00	15	84	0.2356	0.00	0	0.00	0.306	2.29	33.0	0.00	0.01	0.10
Lake Roberts Landing Wetland	Wetland	Wet Detention	0.00	75	80	0.5288	0.00	20	0.00	0.113	1.55	7.8	0.00	0.00	0.00
Lake Roberts Landing Wetland	Wetland	Wet Detention	0.00	75	80	0.5288	0.01	20	0.01	0.113	1.55	7.8	0.00	0.01	0.05
Lake Roberts Landing Wetland	Medium Density	Wet Detention	0.01	15	84	0.2356	0.01	20	0.01	0.306	2.29	33.0	0.00	0.03	0.41
Lake Roberts Landing Wetland	Medium Density	Wet Detention	0.01	15	84	0.2356	0.01	20	0.01	0.306	2.29	33.0	0.00	0.02	0.31

Basin	Land Use	Stormwater Treatment	Area (acres)	DCIA (%)	Non-DCIA CN Value	Runoff C Value	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Delivered Runoff Volume (ac-ft)	TP EMC (mg/l)	TN EMC (mg/l)	TSS EMC (mg/l)	TP (kg/yr)	TN (kg/yr)	TSS (kg/yr)
Lake Roberts Landing Wetland	Medium Density	Wet Detention	0.04	15	84	0.2356	0.04	20	0.03	0.306	2.29	33.0	0.01	0.09	1.36
Lake Roberts Landing Wetland	Medium Density	Wet Detention	0.00	15	80	0.1984	0.00	20	0.00	0.306	2.29	33.0	0.00	0.00	0.03
Single Family - North	Roads	No	0.35	90	98	0.6665	0.91	0	0.91	0.22	1.64	37.3	0.25	1.85	42.02
Single Family - North	Roads	No	0.57	90	98	0.6665	1.50	0	1.50	0.22	1.64	37.3	0.41	3.04	69.22
Single Family - North	Groves	No	1.25	1	80	0.1212	0.60	0	0.60	0.14	2.05	15.5	0.10	1.52	11.48
Single Family - North	Groves	No	4.15	1	80	0.1212	1.99	0	1.99	0.14	2.05	15.5	0.34	5.03	37.99
Single Family - North	Groves	No	7.27	1	74	0.0768	2.21	0	2.21	0.14	2.05	15.5	0.38	5.59	42.24
Single Family - North	Groves	No	4.61	1	80	0.1212	2.21	0	2.21	0.14	2.05	15.5	0.38	5.59	42.28
Single Family - North	Wetland	No	1.19	75	80	0.5288	2.49	0	2.49	0.113	1.55	7.8	0.35	4.76	23.95
Single Family - North	Lakes	No	0.00	85	98	0.6665	0.00	0	0.00	0.013	0.49	17.3	0.00	0.00	0.01
Single Family - North	Low Density	No	3.50	5	82	0.1625	2.25	0	2.25	0.177	1.77	20.4	0.49	4.91	56.54
Single Family - North	Low Density	No	0.24	5	77	0.1194	0.11	0	0.11	0.177	1.77	20.4	0.02	0.25	2.86
Single Family - North	Low Density	No	2.90	5	82	0.1625	1.86	0	1.86	0.177	1.77	20.4	0.41	4.07	46.91
Single Family - North	Lakes	No	0.02	85	98	0.6665	0.06	0	0.06	0.013	0.49	17.3	0.00	0.03	1.23
Single Family - North	Wetland	No	0.09	75	80	0.5288	0.19	0	0.19	0.113	1.55	7.8	0.03	0.37	1.84
Single Family - North	Wetland	No	0.02	75	80	0.5288	0.05	0	0.05	0.113	1.55	7.8	0.01	0.09	0.46
Single Family - North	Medium Density	No	0.04	15	84	0.2356	0.04	0	0.04	0.306	2.29	33.0	0.02	0.12	1.70
Single Family - North	Medium Density	No	0.28	15	80	0.1984	0.22	0	0.22	0.306	2.29	33.0	0.08	0.61	8.84
Single Family - North	Medium Density	No	0.01	15	84	0.2356	0.01	0	0.01	0.306	2.29	33.0	0.00	0.02	0.24
Single Family - North	Medium Density	Wet Detention	0.00	15	80	0.1984	0.00	20	0.00	0.306	2.29	33.0	0.00	0.01	0.09
Single Family - North	Roads	Wet Detention	0.00	90	98	0.6665	0.01	20	0.01	0.22	1.64	37.3	0.00	0.01	0.32
Stoney Brook West	Medium Density	No	0.33	15	84	0.2356	0.30	0	0.30	0.306	2.29	33.0	0.11	0.86	12.35
Stoney Brook West	Wetland	No	0.10	75	80	0.5288	0.21	0	0.21	0.113	1.55	7.8	0.03	0.40	2.01
Stoney Brook West	Roads	Wet Detention	0.06	90	98	0.6665	0.15	20	0.12	0.22	1.64	37.3	0.03	0.25	5.64
Stoney Brook West	Roads	Wet Detention	0.71	90	98	0.6665	1.86	20	1.49	0.22	1.64	37.3	0.40	3.01	68.57
Stoney Brook West	Roads	Wet Detention	1.76	90	98	0.6665	4.63	20	3.70	0.22	1.64	37.3	1.01	7.49	170.41
Stoney Brook West	Roads	Wet Detention	2.50	90	98	0.6665	6.60	20	5.28	0.22	1.64	37.3	1.43	10.68	242.97
Stoney Brook West	Medium Density	Wet Detention	0.32	15	53	0.1077	0.14	20	0.11	0.306	2.29	33.0	0.04	0.31	4.43
Stoney Brook West	Medium Density	Wet Detention	0.35	15	84	0.2356	0.32	20	0.26	0.306	2.29	33.0	0.10	0.73	10.52
Stoney Brook West	Medium Density	Wet Detention	0.54	15	98	0.6665	1.42	20	1.14	0.306	2.29	33.0	0.43	3.22	46.34
Stoney Brook West	Medium Density	Wet Detention	0.15	15	80	0.1984	0.11	20	0.09	0.306	2.29	33.0	0.03	0.26	3.71
Stoney Brook West	Wetland	Wet Detention	0.03	75	80	0.5288	0.06	20	0.05	0.113	1.55	7.8	0.01	0.09	0.44
Walker Pond-East	Medium Density	No	0.12	15	84	0.2356	0.11	0	0.11	0.306	2.29	33.0	0.04	0.32	4.63
Walker Pond-East	Medium Density	No	0.71	15	84	0.2356	0.66	0	0.66	0.306	2.29	33.0	0.25	1.87	26.90
Walker Pond-East	Medium Density	No	2.94	15	80	0.1984	2.31	0	2.31	0.306	2.29	33.0	0.87	6.52	93.94
Walker Pond-East	Low Density	No	0.67	5	82	0.1625	0.43	0	0.43	0.177	1.77	20.4	0.09	0.94	10.79
Walker Pond-East	Low Density	No	1.14	5	82	0.1625	0.73	0	0.73	0.177	1.77	20.4	0.16	1.60	18.42
Walker Pond-East	Low Density	No	0.61	5	82	0.1625	0.39	0	0.39	0.177	1.77	20.4	0.08	0.85	9.80
Walker Pond-East	Low Density	No	0.20	5	82	0.1625	0.13	0	0.13	0.177	1.77	20.4	0.03	0.27	3.16
Walker Pond-East	Low Density	No	7.32	5	77	0.1194	3.46	0	3.46	0.177	1.77	20.4	0.75	7.55	87.00
Walker Pond-East	Open Space	No	0.02	1	81	0.1309	0.01	0	0.01	0.074	1.15	7.8	0.00	0.01	0.08
Walker Pond-East	Wetland	No	0.05	75	80	0.5288	0.11	0	0.11	0.113	1.55	7.8	0.02	0.22	1.10
Walker Pond-East	Open Space	No	0.72	1	81	0.1309	0.37	0	0.37	0.074	1.15	7.8	0.03	0.53	3.59
Walker Pond-East	Open Space	No	0.08	1	81	0.1309	0.04	0	0.04	0.074	1.15	7.8	0.00	0.06	0.41
Walker Pond-East	Open Space	No	1.20	1	75	0.0828	0.39	0	0.39	0.074	1.15	7.8	0.04	0.56	3.79
Walker Pond-West	Medium Density	Wet Detention	5.04	15	80	0.1984	3.95	20	3.16	0.306	2.29	33.0	1.19	8.93	128.70
Walker Pond-West	Medium Density	Wet Detention	0.21	15	84	0.2356	0.19	20	0.15	0.306	2.29	33.0	0.06	0.43	6.26
Walker Pond-West	Medium Density	Wet Detention	0.25	15	84	0.2356	0.23	20	0.18	0.306	2.29	33.0	0.07	0.52	7.52
Walker Pond-West	Medium Density	Wet Detention	0.42	15	84	0.2356	0.39	20	0.31	0.306	2.29	33.0	0.12	0.88	12.72
Walker Pond-West	Medium Density	Wet Detention	0.03	15	84	0.2356	0.03	20	0.02	0.306	2.29	33.0	0.01	0.06	0.91
Walker Pond-West	Medium Density	Wet Detention	3.96	15	80	0.1984	3.10	20	2.48	0.306	2.29	33.0	0.94	7.01	101.03
Walker Pond-West	Medium Density	Wet Detention	1.33	15	84	0.2356	1.24	20	0.99	0.306	2.29	33.0	0.38	2.81	40.46
Walker Pond-West	Medium Density	Wet Detention	0.62	15	84	0.2356	0.57	20	0.46	0.306	2.29	33.0	0.17	1.30	18.70

Basin	Land Use	Stormwater Treatment	Area (acres)	DCIA (%)	Non-DCIA CN Value	Runoff C Value	Generated Runoff Volume (ac-ft)	Runoff Volume Reduction Factor	Delivered Runoff Volume (ac-ft)	TP EMC (mg/l)	TN EMC (mg/l)	TSS EMC (mg/l)	TP (kg/yr)	TN (kg/yr)	TSS (kg/yr)
Walker Pond-West	Medium Density	Wet Detention	0.48	15	80	0.1984	0.37	20	0.30	0.306	2.29	33.0	0.11	0.84	12.13
Walker Pond-West	Medium Density	Wet Detention	0.70	15	53	0.1077	0.30	20	0.24	0.306	2.29	33.0	0.09	0.67	9.72
Walker Pond-West	Medium Density	Wet Detention	0.38	15	84	0.2356	0.35	20	0.28	0.306	2.29	33.0	0.11	0.80	11.46
Walker Pond-West	Medium Density	Wet Detention	3.39	15	84	0.2356	3.16	20	2.53	0.306	2.29	33.0	0.95	7.13	102.80
Walker Pond-West	Medium Density	Wet Detention	4.99	15	80	0.1984	3.91	20	3.13	0.306	2.29	33.0	1.18	8.84	127.40
Walker Pond-West	Medium Density	Wet Detention	0.10	15	84	0.2356	0.10	20	0.08	0.306	2.29	33.0	0.03	0.22	3.16
Walker Pond-West	Medium Density	Wet Detention	1.76	15	84	0.2356	1.64	20	1.31	0.306	2.29	33.0	0.50	3.71	53.40
Walker Pond-West	Medium Density	Wet Detention	1.12	15	84	0.2356	1.05	20	0.84	0.306	2.29	33.0	0.32	2.37	34.11
Walker Pond-West	Medium Density	Wet Detention	1.02	15	84	0.2356	0.95	20	0.76	0.306	2.29	33.0	0.29	2.15	30.92
Walker Pond-West	Medium Density	Wet Detention	3.30	15	80	0.1984	2.59	20	2.07	0.306	2.29	33.0	0.78	5.85	84.29
Walker Pond-West	Medium Density	Wet Detention	0.00	15	53	0.1077	0.00	20	0.00	0.306	2.29	33.0	0.00	0.00	0.00
Walker Pond-West	Medium Density	Wet Detention	0.95	15	84	0.2356	0.89	20	0.71	0.306	2.29	33.0	0.27	2.00	28.85
Walker Pond-West	Medium Density	Wet Detention	3.13	15	84	0.2356	2.92	20	2.33	0.306	2.29	33.0	0.88	6.60	95.04
Walker Pond-West	Medium Density	Wet Detention	0.24	15	80	0.1984	0.19	20	0.15	0.306	2.29	33.0	0.06	0.42	6.10
Walker Pond-West	Medium Density	Wet Detention	0.00	15	84	0.2356	0.00	20	0.00	0.306	2.29	33.0	0.00	0.01	0.14
Walker Pond-West	Medium Density	Wet Detention	0.59	15	84	0.2356	0.55	20	0.44	0.306	2.29	33.0	0.16	1.23	17.75
Walker Pond-West	Medium Density	Wet Detention	0.24	15	80	0.1984	0.19	20	0.15	0.306	2.29	33.0	0.06	0.42	6.08
Walker Pond-West	Medium Density	Wet Detention	2.32	15	80	0.1984	1.82	20	1.46	0.306	2.29	33.0	0.55	4.11	59.26
Walker Pond-West	Medium Density	Wet Detention	1.50	15	84	0.2356	1.39	20	1.12	0.306	2.29	33.0	0.42	3.15	45.40
Walker Pond-West	Medium Density	Wet Detention	15.22	15	84	0.2356	14.18	20	11.35	0.306	2.29	33.0	4.28	32.05	461.85
Walker Pond-West	Medium Density	Wet Detention	0.26	15	80	0.1984	0.20	20	0.16	0.306	2.29	33.0	0.06	0.46	6.60
Walker Pond-West	Medium Density	Wet Detention	1.13	15	84	0.2356	1.05	20	0.84	0.306	2.29	33.0	0.32	2.38	34.34
Walker Pond-West	Medium Density	Wet Detention	2.95	15	80	0.1984	2.32	20	1.85	0.306	2.29	33.0	0.70	5.23	75.41
Walker Pond-West	Medium Density	Wet Detention	0.00	15	80	0.1984	0.00	20	0.00	0.306	2.29	33.0	0.00	0.00	0.06
Walker Pond-West	Medium Density	Wet Detention	0.08	15	84	0.2356	0.07	20	0.06	0.306	2.29	33.0	0.02	0.16	2.34
Walker Pond-West	Medium Density	Wet Detention	0.00	15	80	0.1984	0.00	20	0.00	0.306	2.29	33.0	0.00	0.00	0.07
Walker Pond-West	Medium Density	Wet Detention	0.03	15	80	0.1984	0.03	20	0.02	0.306	2.29	33.0	0.01	0.06	0.87
Waterford-1	Wetland	No	0.01	75	80	0.5288	0.01	0	0.01	0.113	1.55	7.8	0.00	0.02	0.11
Waterford-1	Wetland	No	0.07	75	80	0.5288	0.15	0	0.15	0.113	1.55	7.8	0.02	0.28	1.41
Waterford-1	Wetland	No	0.01	75	80	0.5288	0.02	0	0.02	0.113	1.55	7.8	0.00	0.05	0.23
Waterford-1	Wetland	No	0.05	75	80	0.5288	0.11	0	0.11	0.113	1.55	7.8	0.01	0.20	1.02
Waterford-1	Lakes	No	0.00	85	98	0.6665	0.00	0	0.00	0.013	0.49	17.3	0.00	0.00	0.03
Waterford-1	Medium Density	No	0.00	15	98	0.6665	0.01	0	0.01	0.306	2.29	33.0	0.00	0.02	0.29
Waterford-1	Medium Density	No	4.74	15	84	0.2356	4.42	0	4.42	0.306	2.29	33.0	1.67	12.48	179.84
Waterford-1	Medium Density	No	0.42	15	84	0.2356	0.39	0	0.39	0.306	2.29	33.0	0.15	1.09	15.77
Waterford-1	Medium Density	No	2.41	15	84	0.2356	2.24	0	2.24	0.306	2.29	33.0	0.85	6.34	91.31
Waterford-1	Medium Density	No	2.17	15	84	0.2356	2.02	0	2.02	0.306	2.29	33.0	0.76	5.70	82.17
Waterford-1	Medium Density	No	0.73	15	84	0.2356	0.68	0	0.68	0.306	2.29	33.0	0.26	1.91	27.59
Waterford-1	Medium Density	No	1.06	15	84	0.2356	0.99	0	0.99	0.306	2.29	33.0	0.37	2.80	40.34
Waterford-1	Medium Density	No	0.34	15	84	0.2356	0.32	0	0.32	0.306	2.29	33.0	0.12	0.90	12.91
Waterford-1	Medium Density	No	0.60	15	84	0.2356	0.56	0	0.56	0.306	2.29	33.0	0.21	1.59	22.89
Waterford-1	Medium Density	No	0.73	15	84	0.2356	0.68	0	0.68	0.306	2.29	33.0	0.26	1.92	27.68
Waterford-1	Medium Density	No	3.62	15	84	0.2356	3.37	0	3.37	0.306	2.29	33.0	1.27	9.53	137.38
Waterford-1	Medium Density	No	11.98	15	53	0.1077	5.10	0	5.10	0.306	2.29	33.0	1.93	14.41	207.66
Waterford-1	Medium Density	No	0.58	15	84	0.2356	0.54	0	0.54	0.306	2.29	33.0	0.20	1.53	22.00
Waterford-1	Medium Density	No	0.74	15	53	0.1077	0.31	0	0.31	0.306	2.29	33.0	0.12	0.89	12.80
Waterford-1	Golf Course	No	0.88	1	40	0.0074	0.03	0	0.03	0.306	2	33.0	0.01	0.06	1.06
Waterford-1	Golf Course	No	0.25	1	80	0.1212	0.12	0	0.12	0.306	2	33.0	0.04	0.29	4.79
Waterford-1	Medium Density	No	0.00	15	53	0.1077	0.00	0	0.00	0.306	2.29	33.0	0.00	0.00	0.00
Waterford-1	Golf Course	Wet Detention	0.01	1	40	0.0074	0.00	20	0.00	0.306	2	33.0	0.00	0.00	0.01
Waterford-1	Medium Density	Wet Detention	0.00	15	53	0.1077	0.00	20	0.00	0.306	2.29	33.0	0.00	0.00	0.00
Waterford-2	Groves	No	0.07	1	40	0.0074	0.00	0	0.00	0.14	2.05	15.5	0.00	0.01	0.04
Waterford-2	Medium Density	No	0.35	15	84	0.2356	0.33	0	0.33	0.306	2.29	33.0	0.12	0.92	13.24

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Waterford-2	Medium Density	No	0.22	15	84	0.2356	0.21	0	0.21	0.306	2.29	33.0	0.08	0.58	8.41
Waterford-2	Medium Density	No	6.35	15	53	0.1077	2.70	0	2.70	0.306	2.29	33.0	1.02	7.64	110.03
Waterford-2	Medium Density	No	0.52	15	53	0.1077	0.22	0	0.22	0.306	2.29	33.0	0.08	0.62	9.00
Waterford-2	Pasture Land	No	0.30	1	40	0.0074	0.01	0	0.01	0.387	2.48	94.3	0.00	0.03	1.03
Waterford-2	Medium Density	Wet Detention	0.00	15	84	0.2356	0.00	20	0.00	0.306	2.29	33.0	0.00	0.00	0.02
Waterford-2	Medium Density	Wet Detention	20.87	15	53	0.1077	8.89	20	7.11	0.306	2.29	33.0	2.68	20.08	289.36
Waterford-2	Medium Density	Wet Detention	0.00	15	53	0.1077	0.00	20	0.00	0.306	2.29	33.0	0.00	0.00	0.00
Waterford-2	Medium Density	Wet Detention	0.43	15	53	0.1077	0.18	20	0.15	0.306	2.29	33.0	0.06	0.42	6.01
Waterford-2	Medium Density	Wet Detention	0.00	15	98	0.6665	0.00	20	0.00	0.306	2.29	33.0	0.00	0.01	0.16
Waterford-2	Medium Density	Wet Detention	0.84	15	84	0.2356	0.78	20	0.62	0.306	2.29	33.0	0.24	1.76	25.35
Waterford-2	Ponds	Wet Detention	0.23	85	98	0.6665	0.62	20	0.49	0.013	0.49	17.3	0.01	0.30	10.54
Waterford-2	Ponds	Wet Detention	3.29	85	98	0.6665	8.67	20	6.93	0.013	0.49	17.3	0.11	4.19	147.98
Waterford-2	Ponds	Wet Detention	0.28	85	98	0.6665	0.74	20	0.59	0.013	0.49	17.3	0.01	0.36	12.65
Waterford-3	Wetland	No	0.12	75	80	0.5288	0.24	0	0.24	0.113	1.55	7.8	0.03	0.47	2.35
Waterford-3	Medium Density	No	1.96	15	84	0.2356	1.83	0	1.83	0.306	2.29	33.0	0.69	5.16	74.33
Waterford-3	Medium Density	No	5.58	15	84	0.2356	5.20	0	5.20	0.306	2.29	33.0	1.96	14.69	211.70
Waterford-3	Medium Density	No	5.75	15	84	0.2356	5.35	0	5.35	0.306	2.29	33.0	2.02	15.13	217.96
Waterford-3	Medium Density	No	3.49	15	98	0.6665	9.19	0	9.19	0.306	2.29	33.0	3.47	25.95	373.95
Waterford-3	Medium Density	No	0.01	15	98	0.6665	0.02	0	0.02	0.306	2.29	33.0	0.01	0.07	0.96
Waterford-3	Medium Density	Wet Detention	0.03	15	84	0.2356	0.03	20	0.02	0.306	2.29	33.0	0.01	0.07	0.95
Waterford-3	Medium Density	Wet Detention	0.00	15	98	0.6665	0.01	20	0.01	0.306	2.29	33.0	0.00	0.03	0.39
Waterford-3	Medium Density	Wet Detention	0.01	15	84	0.2356	0.01	20	0.01	0.306	2.29	33.0	0.00	0.02	0.25
Waterford-3	Medium Density	Wet Detention	0.05	15	98	0.6665	0.14	20	0.11	0.306	2.29	33.0	0.04	0.32	4.60
Wetland Tussock	Groves	No	0.03	1	74	0.0768	0.01	0	0.01	0.14	2.05	15.5	0.00	0.02	0.17
Wetland Tussock	Groves	No	0.04	1	80	0.1212	0.02	0	0.02	0.14	2.05	15.5	0.00	0.05	0.39
Wetland Tussock	Wetland	No	0.25	75	98	0.6665	0.65	0	0.65	0.113	1.55	7.8	0.09	1.24	6.23