Documentation in Support of Category 4e

Waterbody/Watershed Identification

Organization	Orange County
Point of Contact	Julie Bortles 3165 McCrory Place, Suite 200 Orlando, Florida 32803 Julie.Bortles@ocfl.net 407-836-1456
Waterbody(s)	Waterbody Identification (WBID) # 3011A Lake Weston
No. Waterbody / Pollutant Combinations	Based on Impaired Waters Rule (IWR) Run 60, one waterbody segment, 3011A, is Verified Impaired for: • Nutrients (chla) Group 2/Cycle 3, 2016 verified list Lake Weston falls within the Wekiva River and Wekiwa and Rock Springs Basin Management Action Plan (BMAP) areas.
EPA Completed TMDL	The Environmental Protection Agency (EPA) has not completed a Total Maximum Daily Load (TMDL) for the impaired waterbody segment listed in this document.

Description of Baseline Conditions

Watershed(s)	Basin Group 2: Middle St. Johns
Baseline Data	Parameter: Nutrients (Chl-a) Criterion Concentration or Threshold not met: ≤ 20 µg/L. Annual geometric mean chlorophyll-a values exceeded the criterion in 2008, 2009, 2010, 2011, 2012 and 2018 with values of 30 µg/L, 23 µg/L, 23 µg/L, 22 µg/L, 22 µg/L and 27 µg/L respectively. Parameter: Nutrients (TN) Criterion Concentration or Threshold not met: TN ≤ 1.91 mg/L; If Chl-a has Insufficient or No Data to calculate AGM or if Chl-a AGM > 20 µg/L, TN ≤ 1.05 mg/L. Annual geometric mean total nitrogen values did not exceed in any year. Parameter: Nutrients (TP) Criterion Concentration or Threshold not met: TP AGM ≤ 0.09 mg/L; If Chl-a has Insufficient or No Data to calculate AGM or if Chl-a AGM > 20 µg/L, TP AGM ≤ 0.03 mg/L. Annual geometric mean total phosphorus values exceeded the criterion in 2008, 2011 and 2018 with a value of 0.04 mg/L in each year.

IWR Run 60: Assessment Data – Annual Geometric Means (AGMs)

Nutrient AGMs - Assessment Data			
Year	Chla-a (µg/L)	TN (mg/L)	TP (mg/L)
2008	30	0.72	0.04
2009	23	0.84	0.03
2010	23	0.87	0.03
2011	22	0.81	0.04
2012	22	0.63	0.03
2013	Insufficient Data	Insufficient Data	Insufficient Data
2014	12	0.67	0.03
2015	4	0.96	0.02
2016	Insufficient Data	Insufficient Data	Insufficient Data
2017	14	0.71	0.04
2018	27	0.73	0.04
2019	Insufficient Data	Insufficient Data	Insufficient Data

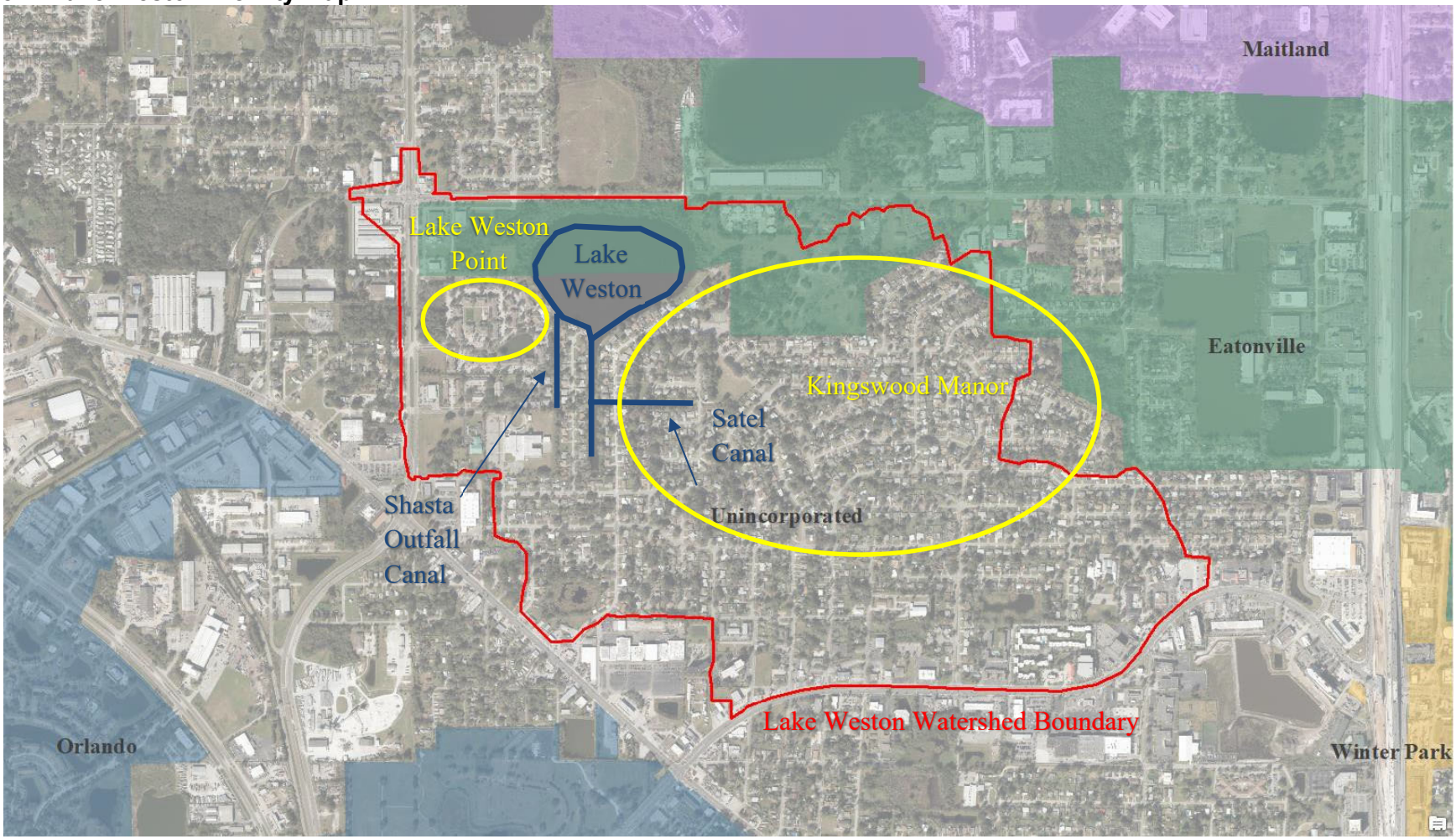
Stations used in the Chl-a assessment:
21FLORANLW20

Map

Figure 1 provides a Lake Weston Vicinity map that includes the watershed, jurisdictional boundaries, and neighborhoods within the watershed.

Figure 2 provides the WBID boundary and monitoring stations that fall within the WBID. Note that based on IWR Run 60 data, it appears only monitoring station 21FLORANLW20 was sampled during the assessment period.

Figure 1: Lake Weston Vicinity Map



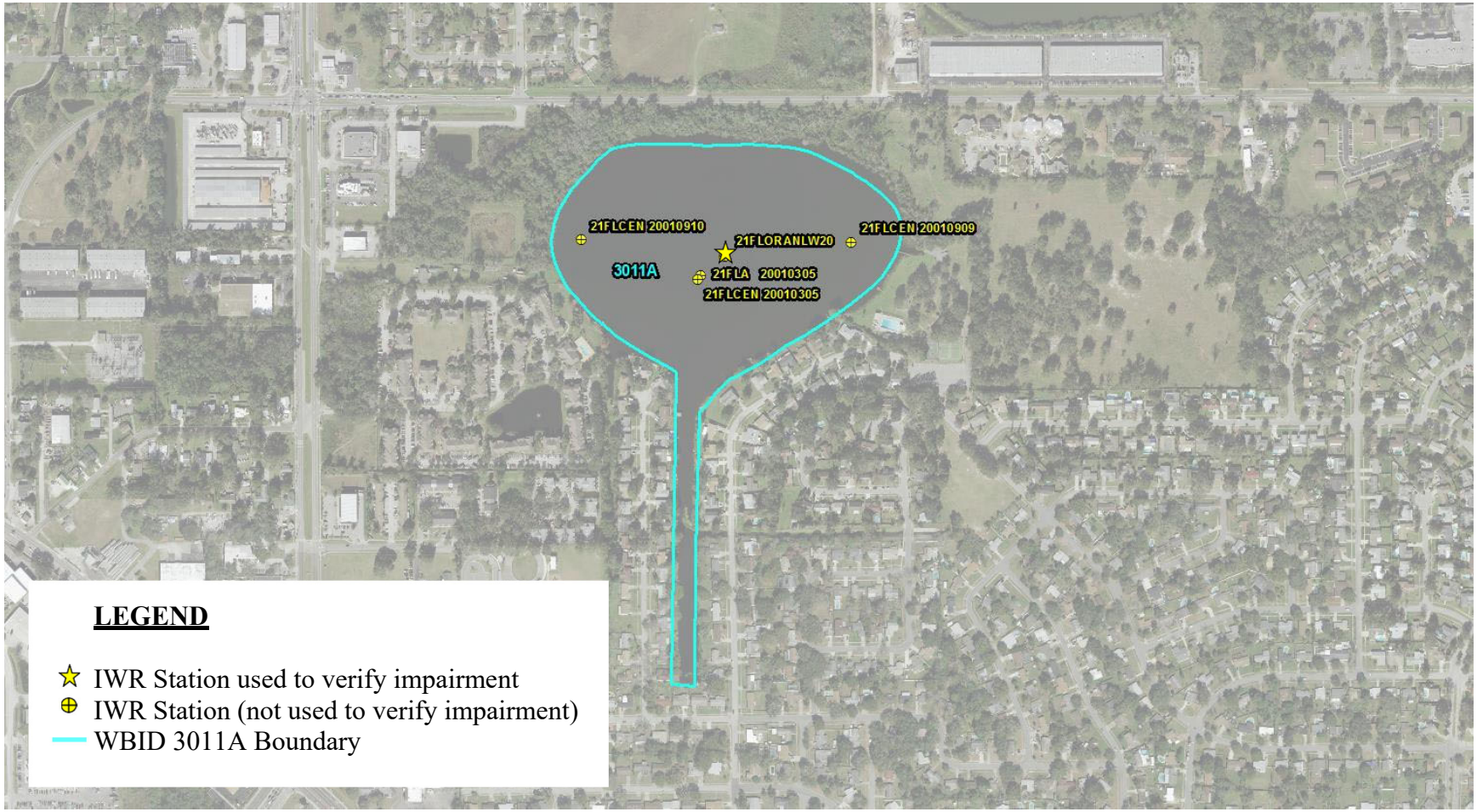


Figure 2: Lake Weston WBID Boundary and IWR Stations

Evidence of Watershed Approach

Area of Effort	**Figure 3** shows an aerial image of the 664-acre Lake Weston Watershed in red and the sub-basins in gray. Lake Weston is a 31-acre lake north of Lake Fairview within the larger Little Wekiva Watershed. The lake is located within the Wekiva River planning unit and the drainage basin is largely within unincorporated Orange County, but portions fall within the Town of Eatonville. **Figure 1** shows the labeled canals and connections to Lake Weston. Satel Canal flows west into the main canal south of the lake. Shasta Outfall Canal drains the area to the southwest and connects directly to the southwest portion of the lake.
Key Stakeholders Involved and Their Roles	Key Stakeholders: • Orange County • Town of Eatonville – potential participant in future projects Additional Stakeholders: • Kingswood Manor Homeowners Association (HOA) – neighborhood southeast of Lake Weston; potential participant in future projects • Lake Weston Point Apartment Complex – neighborhood west of Lake Weston; potential participant in future projects • Others; potential participants in future projects

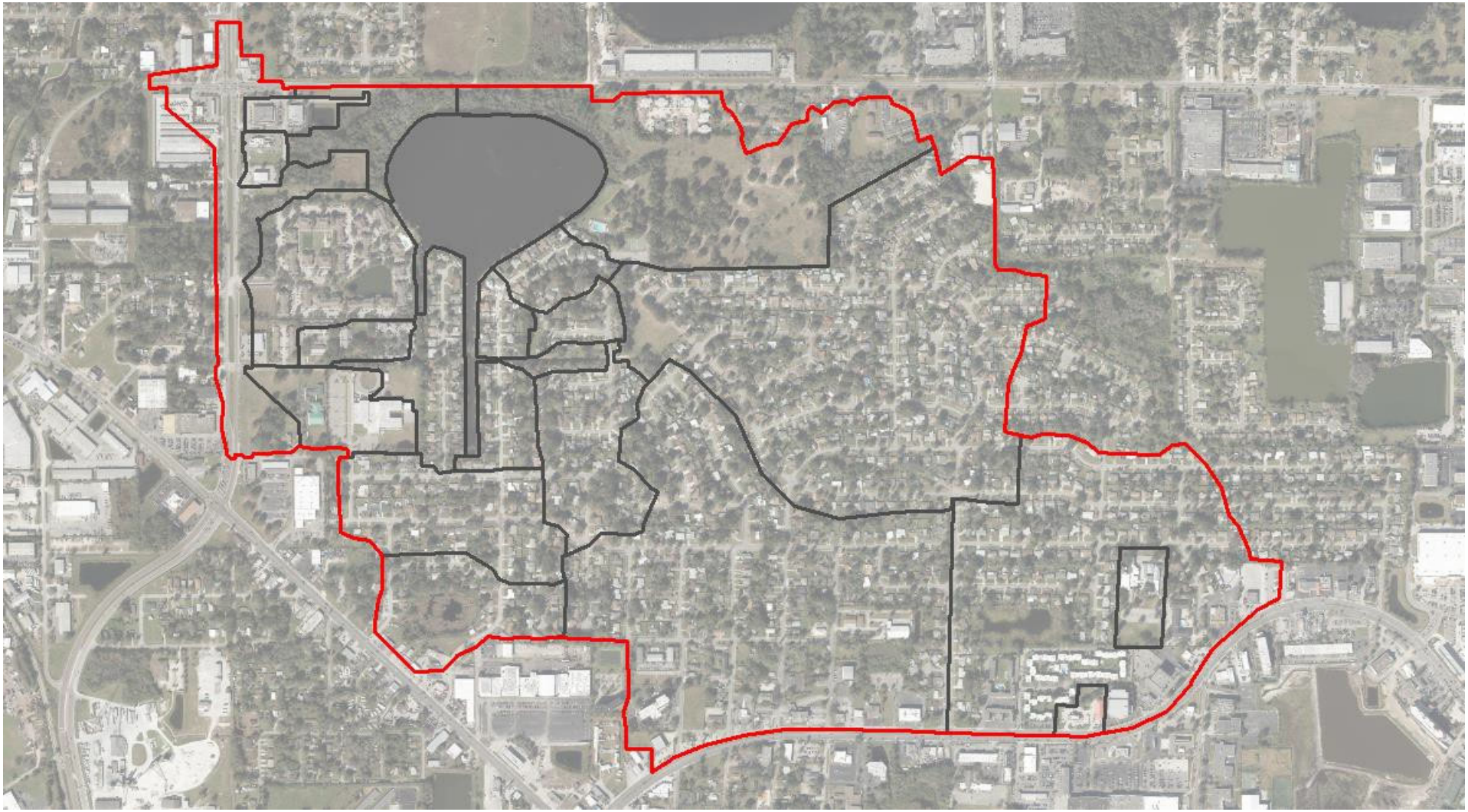


Figure 3: Lake Weston Watershed Boundary with Sub-basins

Watershed Plan & Other Supporting Documentation

The area includes the watershed drainage area to WBID ID # 3011A Lake Weston. This WBID is impaired for Nutrients (chla) based on the number of exceedances for the sample size. The objectives outlined by this 4e Alternative Restoration Plan and the *Lake Weston Loading Study and Lake Management Plan* (Lake Management Plan) addresses this impairment.

Orange County has taken a proactive approach to addressing Lake Weston water quality issues and contracted the Lake Management Plan in 2019-2020 to identify pollutant load sources contributing to the water quality impairments. The Lake Management Plan provides a list of project alternatives, ranked by nutrient reduction efficiency, to address the chla impairment and attain surface water quality standards.

The WBID drainage area includes existing key project(s) that Orange County has already completed or budgeted (**Figure 4**), as follows:

- Curb inlet basket installation and ongoing maintenance,
- Street sweeping,
- Education and Ordinances, and
- Future Projects.

The Lake Management Plan identified and ranked a list of additional structural projects and programmatic activities that can be undertaken to further reduce nutrient load to Lake Weston, thereby reducing chla within the lake.

Point Sources and Indirect Source Monitoring (Sites)

No point sources were identified in the Lake Weston drainage basin.

MS4 monitoring sites are included in the November 2019 MS4 annual report.

The entire area is regulated by a Municipal Separate Storm Sewer System (MS4) permit (if applicable). Yes, permit FLS000011-004. Note that the Town of Eatonville is a co-permittee with Orange County on this permit. The Florida Department of Transportation also has stormwater discharge into the lake and is also a co-permittee on the Orange County permit.

Note: Generic Permits for stormwater discharge from large and small construction activities are considered temporary; therefore, are not included in this listing.

Nonpoint Sources

Land Use	Approximate % of Watershed
Residential, High Density	9
Residential, Medium Density	61
Residential, Low Density	1
Institutional	4
Commercial	9
Forest	10
Open Water	1
Wetland	3
Highway	2

Hydrologic Soil Group	Approximate % of Watershed
A	18
A/D	59
B/D	17
D	5
W	1

Pollutant loadings sources were evaluated in the Lake Management Plan. Stormwater loads were estimated based on land use, soil types, percent impervious area, event mean concentrations, and site-specific measured data. The land use types, hydrologic soil groups, and approximate percentages above were calculated in the Lake Management Plan. The following other sources were also evaluated: precipitation, groundwater seepage, evapotranspiration, internal recycling from lake sediments, and wastewater sources (septic).

Water Quality Criteria

Lake Weston is expected to meet Class III surface water quality standards as defined in Chapter 62-302 of the Florida Administrative Code upon successful completion of all projects.

Restoration Work

EXISTING PROJECTS:

Existing projects are currently implemented and ongoing.

PROJECT 1: CURB INLET BASKET INSTALLATION AND ONGOING MAINTENANCE

In 2016, Orange County installed 49 curb/grate inlet baskets on storm drains treating 500 acres and removing 20 lbs TN/year and 5 lbs TP per year. This project had a capital cost of $160,000 and ongoing annual maintenance costs of approximately $6,000. Weights of recovered material are provided by the maintenance contractor for calculation of load reductions using the FSA Tool recommended by FDEP. Locations of the baskets are shown on **Figure 4.**

PROJECT 2: EDUCATION AND ORDINANCES

- Orange County, in conjunction with curb/grate inlet basket installation, applied storm drain markers in 2016.
- Orange County coordinates with the local Institute of Food and Agricultural Sciences (IFAS) Extension office to provide TMDL and impaired waters elements in their presentations.
- Orange County also has Ordinances in place for:
  - Fertilizer, Chapter 15 Article XVII: https://library.municode.com/fl/orange_county/codes/code_of_ordinances?nodeId=PTIIORCOCO_CH15ENCO_ARTXVIIFEMAOR
  - Pet Waste, Chapter 5 Article II: https://library.municode.com/fl/orange_county/codes/code_of_ordinances?nodeId=PTIIORCOCO_CH5AN_ARTIIANSE and
  - Landscape and Irrigation, Chapter 24 Article I: https://library.municode.com/fl/orange_county/codes/code_of_ordinances?nodeId=PTIIORCOCO_CH24LABUOPSP_ARTIINGE.
- Public Service Announcements are shown on Orange TV.

- Orange County maintains its website as well as providing additional water quality, fertilizer, and NPDES information on the Orange County Water Atlas.
- Brochures are provided to the public explaining the ordinances and encouraging nutrient-reducing activities in the watershed.

PROJECT 3: STREET SWEEPING
Current County Public Works street sweeping program includes 21 curb miles in the Kingswood Manor neighborhood at a frequency of every six-weeks.

FUTURE PROJECTS:
Projects 4, 5, and 6 were identified during by the Lake Management Plan and will be evaluated further. Project 4 and a feasibility evaluation for Project 6 have been budgeted in the Orange County Environmental Protection Division (EPD) Water Quality Capital Improvement Projects (WQ-CIP) for Fiscal Years 2020 and 2021. Feasibility of Project 5: Increased Street Sweeping will be determined by EPD and, if feasible, it will be considered for Operating Budget funding. Design and Construction of Structural Projects will be included in the prioritization process for development of future EPD WQ-CIP.

PROJECT 4: SEDIMENT INACTIVATION –
The Lake Management Plan identified a sediment inactivation project that would treat suspended/dissolved phosphorus in the water column, available phosphorus at the sediment-water interface, and dissolved phosphorus in groundwater as it flows into the lake through the sediments. Orange County will move forward with the design and implementation of the alum treatment. Performance monitoring will include sediment sampling prior to and immediately following treatment and quarterly in-lake water quality monitoring. See the Monitoring Component section, where the “Orange County Ambient Monitoring Program – Ongoing” portion provides details for the water quality monitoring.

PROJECT 5: INCREASED STREET SWEEPING
Orange County EPD will evaluate available budget to increase street sweeping within the Lake Weston watershed above and beyond current sweeping. Current street sweeping of the 21 curb mile Kingswood Manor area is performed by Orange County Public Works on a 6-week cycle.

PROJECT 6: NUTRIENT REMOVAL STRUCTURES FEASIBILITY STUDY
Orange County will evaluate feasibility of nutrient removal structure projects identified in the Lake Management Plan with respect to constructability and cost effectiveness of the Best Management Practice (BMP) projects and provide all necessary information to proceed to design and construction. This feasibility study is budgeted in EPD’s Fiscal Year 2020/2021 Capital Improvement Project list. Design and Construction are dependent on Orange County’s budgeting procedures and EPD’s WQ-CIP prioritization process.

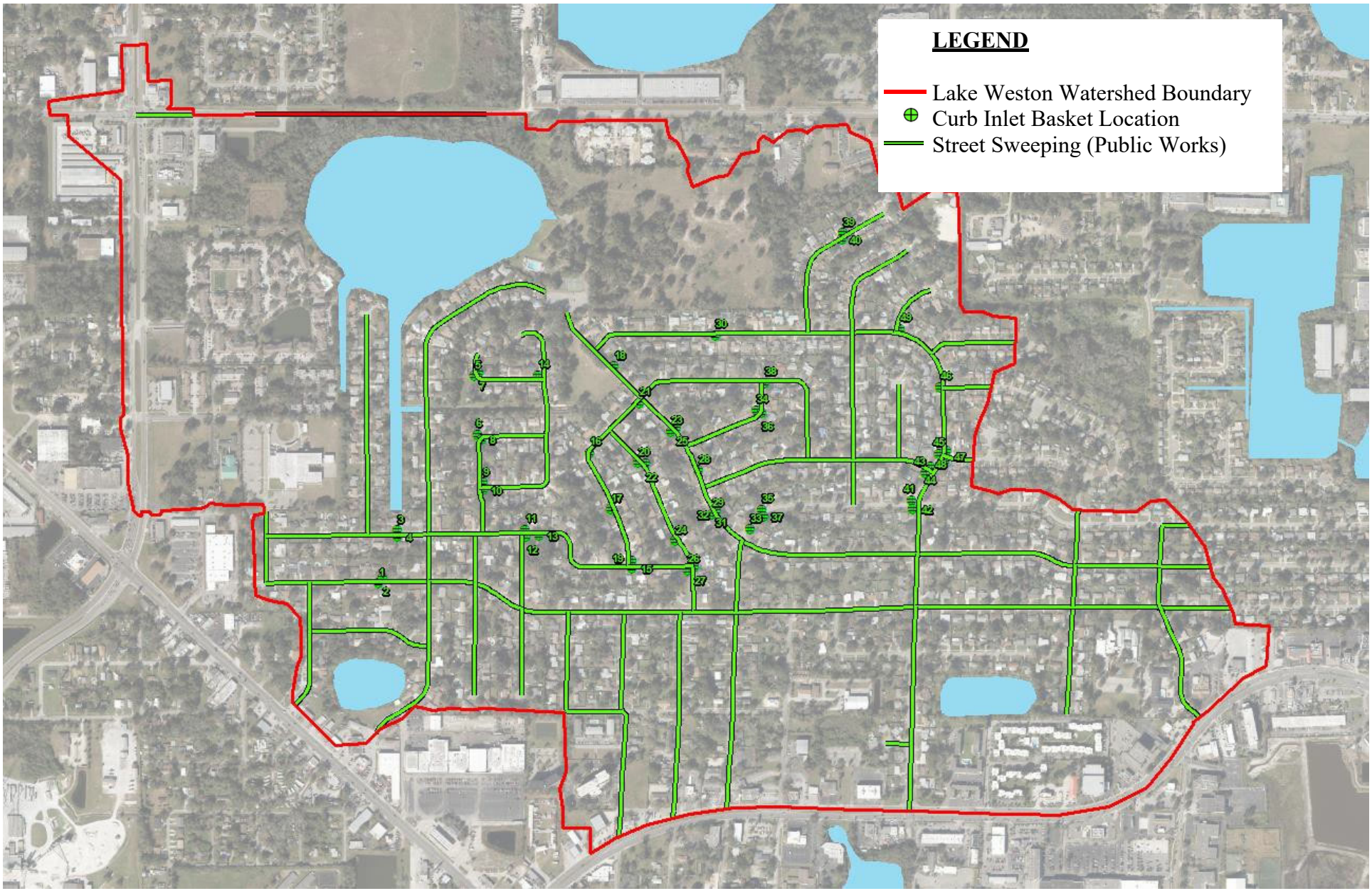


Figure 4: Lake Weston Existing BMPs (Curb Inlet Basket and Street Sweeping)

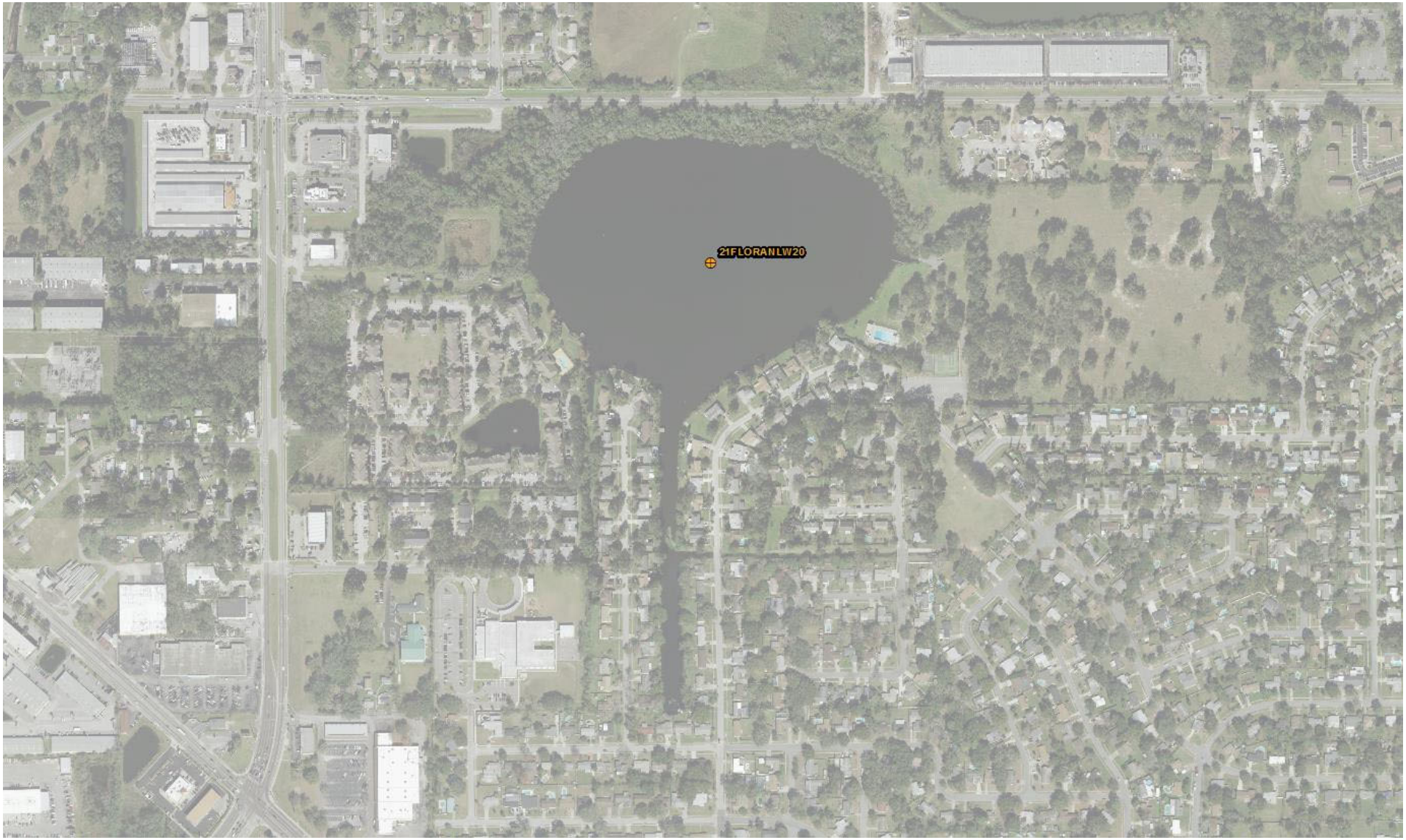


Figure 5: Orange County Monitoring Location LW20 (21FLORANLW20)

Critical Milestones/Monitoring

Anticipated Critical Milestone(s) and Completion Dates:	Orange County Existing Projects: • Project 1: Curb Inlet Basket Installation in 2016 and continues to fund ongoing maintenance of these structures, • Project 2: Education and Ordinances, and • Project 3: Street Sweeping. Future Project 4: Alum treatment has been budgeted, Feasibility of Project 5: Increased Street Sweeping will be evaluated by EPD and, if feasible, it will be considered for Operating Budget funding, and Project 6: Nutrient Removal Structure Feasibility has been budgeted. Design and Construction of Structural Projects will be included in the prioritization process for development of future EPD WQ-CIP and are anticipated to occur within the next 5 years.
Monitoring Component	***ORANGE COUNTY AMBIENT MONITORING PROGRAM - Ongoing*** The Orange County monitoring location is provided on **Figure 5** and coordinates are 28.61655 Latitude and -81.40906 Longitude. Trend graphs for TN, TP, and chl-a are provided in the **Attachment** for the period 2005 through 2020. Orange County will continue to monitor on a quarterly basis to review nutrient and chlorophyll-a trends. The monitoring station was established in 1971 and Orange County will evaluate all historical data from that location. Samples from the monitoring location, the center of Lake Weston (monitoring location ID FLORANLW20, aka LW20), will be analyzed for the following parameters: • Alkalinity • Chloride • Color • Chla • Sulfate • Turbidity • Metals (200.7 and 200.8) • *Escherichia coli* • Ammonia • Nitrite • Nitrate • Nitrate + Nitrite (NOx) • total Kjeldahl nitrogen (TKN) • Organic nitrogen • TN • Orthophosphate • TP • Dissolved phosphorus • Total suspended solids (TSS) • Total dissolved solids (TDS) • Total solids (TS)

Water quality field parameters are also collected from the surface (0.5 meters) for pH, specific conductance, temperature, and dissolved oxygen (% saturation and concentration).

Water quality data is and will continue to be uploaded to the Orange County Water Atlas and the FDEP Watershed Information Network (WIN).

LAKE MANAGEMENT PLAN MONITORING PROGRAM-Completed

The Lake Management Plan included significant field monitoring for one year (2019-2020), including:

- Seepage Meter Monitoring (bimonthly grab samples, 6 at each location):
  - ammonia
  - NOx
  - TKN
  - TN
  - orthophosphate
  - TP

- Surface Water Monitoring (bimonthly grab samples, 6 at each location):
  - ammonia
  - NOx
  - TKN
  - TN
  - orthophosphate
  - TP
  - Alkalinity
  - Color
  - Chla
  - Turbidity
  - TSS

  Water quality profiles were also collected from the surface and every 0.5 meters to total depth for pH, specific conductance, temperature, and dissolved oxygen (% saturation and concentration).

- Stormwater monitoring (6 flow-weighted composite samples, 0.25-inch or greater storm events; 3 wet season and 3 dry season)
  - ammonia
  - NOx
  - TKN
  - TN
  - orthophosphate
  - TP

  Staff gauges with pressure transducers provided water elevation to correlate to a flow rating curve. The rating curve was created using flow measurements collected during the bimonthly surface water sampling and elevations based on the pressure transducer data.

- Sediment phosphorus fractionation and flux (four cores for fractionation, four locations (8 cores) for flux study)

Specific monitoring locations from the Lake Management Plan monitoring activities are included in the final report.

Other Key Dates

Estimated Date for Delisting from Verified List or Removal from Study List	WBID 3011A (Lake Weston) is in the state's Group 2 Basin in the Middle St. Johns, Wekiva River Basin. The current review and assessment cycle (the initial biennial assessment) is scheduled for completion in 2022. This waterbody is currently impaired for nutrients (chlorophyll-a) and the earliest opportunity for delisting would happen during the upcoming biennial assessment. However, if this WBID doesn't meet delisting requirements, it will remain in assessment category 4e for an additional biennial assessment cycle, which will postpone TMDL development.

Financial Commitments

Estimated Implementation Cost	Project 1: Curb Inlet Baskets The capital cost of installing 49 curb/grate inlet baskets was $160,000. The estimated 20-year operation and maintenance (O&M) costs for Project 1 are $120,000. Project 2: Education and Ordinances Orange County has implemented several ordinances that positively affect water quality. Orange County provides educational outreach and educational materials and works with other local stakeholders to share resources. Project 3: Street Sweeping Orange County Public Works Department implements the current street sweeping program as part of its regional program. Annual Costs for street sweeping in the Lake Weston watershed are estimated to be $6,300. Project 4: Sediment Inactivation The budgeted feasibility study (bench study and dosing plan) is estimated at $75,000. Sediment inactivation implementation costs, assuming a dose required to treat approximately 3,000 lbs of phosphorus over a 20-year period, are estimated at $665,000. Project 5: Increased Street Sweeping If Orange County EPD takes over and increases street sweeping frequency within the Lake Weston watershed, annual costs are estimated to increase to $12,000. Project 6: Nutrient Removal Structures Feasibility Study The budgeted feasibility study is estimated at $95,000. Project construction and operation and management costs over a 20-year period are estimated at between $29,000 to $705,000 in the Lake Management Plan. The sediment inactivation project and a structural project may be eligible for Section 319(h) Clean Water Act grants. The total estimated capital cost of all other projects, including land acquisition (if applicable), and estimated 20-year O&M costs will be determined by which projects are prioritized for the EPD WQ-CIP.

Land Acquisition (if applicable)	**Funding Source (NA)** Total ..... $ NA
Design and Construction (if applicable)	**Primary Funding Source: Orange County** **With Potential Support From: Town of Eatonville, FDOT, SJRWMD, FDEP, and others.** Total estimated future project costs are dependent on Feasibility Study results and County Prioritization and Budgeting procedures. Orange County has budgeted a sediment inactivation and feasibility study for structural water quality improvement projects identified during by the Lake Management Plan and will be evaluated further. Feasibility of increased street sweeping will be determined by EPD and, if determined feasible, it will be considered for Operating Budget funding. Implementation of Design and Construction of Structural Projects will be included in the prioritization process for development of future EPD WQ-CIP.

Figures:

Figure 1: Lake Weston Vicinity Map
Figure 2: Lake Weston WBID Boundary and IWR Stations
Figure 3: Lake Weston Watershed Boundary with Sub-basins
Figure 4: Lake Weston Existing BMPs (Curb Inlet Basket and Street Sweeping)
Figure 5: Orange County Monitoring Location LW20 (21FLORANLW20)

ATTACHMENT: Trend Graphs (2005 to 2020)

ATTACHMENT: TREND GRAPHS (2005 to 2020)