Documentation in Support of Category 4e for WBID 1497D: Lake Gibson

Waterbody/Watershed Identification

Organization	City of Lakeland – Local Government Agency
Point of Contact	Laurie Smith, 407 Fairway Avenue, Lakeland, FL 33801, laurie.smith@lakelandgov.net, 863-834-6276
Waterbody(s)	WBID 1497D – Lake Gibson
No. Waterbody / Pollutant Combinations	1 waterbody segment; verified impaired in 2022 for chlorophyll-*a*, total nitrogen, and total phosphorus
EPA Completed TMDL	EPA has not completed a TMDL for the impaired waterbody segment listed in this document.

Description of Baseline Conditions

Watershed(s): Basin Group 3, Sarasota Bay - Peace - Myakka, Upper Peace River (HUC 03100101)

Baseline Data:

Data from 2013 through 2022 for Lake Gibson are summarized below. Bioassessments, and annual geometric means (AGMs) for chlorophyll-*a* (CHL-A), total nitrogen (TN), and total phosphorous (TP) were reviewed to assess verified and potential impairments for the 2015 through 2022 verified period. The long-term true color and alkalinity geometric means were calculated to be 32 PCU and 32 mg/L, respectively, using the long-term period of record data from 2000 to 2021. Therefore, Lake Gibson is classified as a low color, high alkalinity lake. Data were obtained from Impaired Waters Rule (IWR) Run 64, with additional bioassessment data from the City and County. All data are collected by certified samplers.

WBID	Waterbody Name	Parameter	Criterion Concentration or Threshold Not Met	Data*
1497D	Lake Gibson	Biology	Average score of at least two temporally independent LVI scores ≥ 43; or either of the two most recent LVI scores ≥ 43; or if there are only two LVI scores and there is less than or equal to a 20 point difference.	**LVI (n=1) WBID Mean (35) Mean 1 (35), Mean 2 (ND)** Supplemental LVI data 6/17/2021 39 10/26/2021 44 11/2/2022 43

1497D	Lake Gibson	Nutrients (CHLA)	≤ 20 µg/L	AGM 2013 (11 µg/L) 2014 (17 µg/L) **2015 (49 µg/L)** **2016 (52 µg/L)** **2017 (67 µg/L)** **2018 (56 µg/L)** **2019 (60 µg/L)** **2020 (51 µg/L)** **2021 (45 µg/L)**
1497D	Lake Gibson	Nutrients (TN)	Chl-a AGM ≤ 20 µg/L, TN AGM ≤ 1.91 mg/L; If Chl-a has Insufficient or No Data to calculate AGM or if Chl-a AGM > 20 µg/L, TN AGM ≤ 1.05 mg/L	AGM 2013 (0.81 mg/L) 2014 (0.89 mg/L) **2015 (1.31 mg/L)** **2016 (1.51 mg/L)** **2017 (1.79 mg/L)** **2018 (1.58 mg/L)** **2019 (1.17 mg/L)** **2020 (1.79 mg/L)** **2021 (1.84 mg/L)**
1497D	Lake Gibson	Nutrients (TP)	Chl-a AGM ≤ 20 µg/L, 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	AGM 2013 (0.07 mg/L) 2014 (0.07 mg/L) **2015 (0.10 mg/L)** **2016 (0.12 mg/L)** **2017 (0.14 mg/L)** **2018 (0.10 mg/L)** **2019 (0.08 mg/L)** **2020 (0.11 mg/L)** **2021 (0.10 mg/L)**

***Bolded values represent data used in the 2015 to 2022 verified period assessment.** Non-bolded values either do not meet the data sufficiency requirements used by FDEP to verify impairment, or they represent data from previous verified impairment assessment periods.

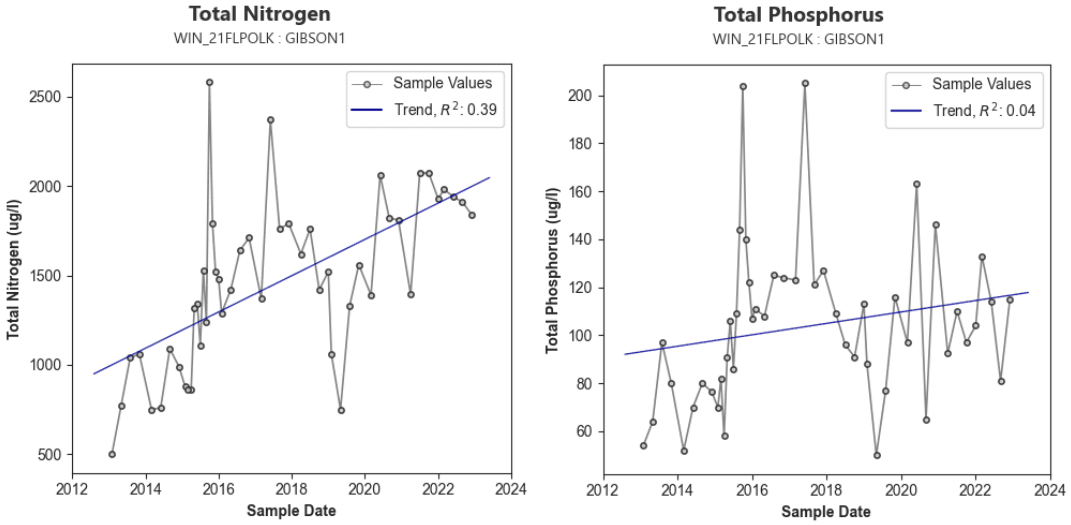
Map

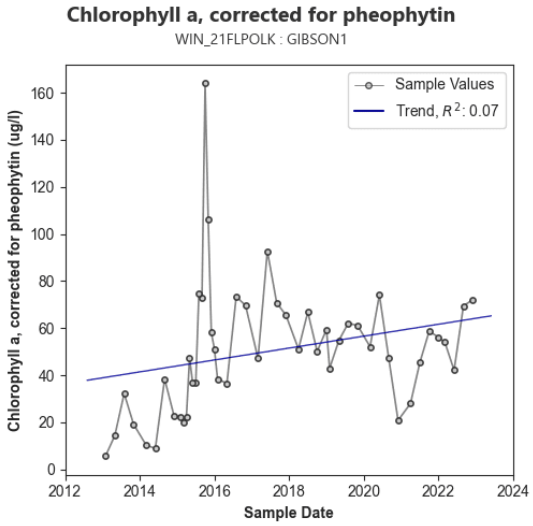
Attachment 1 delineates the watershed area.

Restoration Approach

Area of Effort

Lake Gibson is located within the Peace River watershed, and the immediate contributing watershed to the lake is 2,294 acres, with about 1,137 acres within the City of Lakeland's city limits, and 1,157 acres in unincorporated Polk County. The entire HUC12 watershed is 39,430 acres in size (please see Attachment 1). The lake is located within the Lakeland/Bone Valley Upland lake region of Florida. Lake Gibson encompasses a surface area of approximately 485 acres and is located in the northern portion of Lakeland, near the junction of I-4 and US Highway 98. Maximum water depth is reportedly 20 feet, with an average water depth of 6.6 feet. Operational water elevations range from 140.57 to 142.57 ft NAVD88 and is governed by an adjustable control structure managed by the Southwest Florida Water Management District (SWFWMD).

Key Stakeholders Involved and Their Roles	• The City of Lakeland and Polk County cooperatively oversee Lake Gibson assessment and restoration projects. Polk County Natural Resources Division conducts quarterly ambient water quality sampling and both City and County complete routine invasive and nuisance aquatic vegetation management activities. • The Florida Department of Transportation maintains 2.3 miles of US 98 in the Lake Gibson watershed. • SWFWMD regulates the water levels in the lake through a remotely controlled adjustable water control gate. • SWFWMD and/or Florida Department of Environmental Protection (FDEP) may be involved in future restoration projects by providing cooperative funding and/or grants.
Watershed Plan & Other Supporting Documentation	*Impaired Waters Listing* This WBID is impaired for nutrients (chlorophyll-*a*, TP, and TN) based on exceedances of the AGMs during the Verified Period (2015-2022). In the most recent assessment cycle, Lake Gibson was placed on the planning list for biology based on the failing lake vegetation index (LVI) survey during the verified period; however, the two most recent LVI surveys completed in October 2021 and November 2022 had passing scores of 44 and 43, respectively. Based on historic ambient water quality monitoring data, Lake Gibson was not impaired for nutrients prior to 2015 (see graphs below). A whole-lake hydrilla treatment using Sonar aquatic herbicide was completed by Polk County on February 27, 2012, and in 2013 the lake was stocked with 474 grass carp even though it appeared that the previous years' treatment eradicated hydrilla in the lake. Shortly thereafter, elevated levels of TN, TP and chl-a have been recorded in the surface water. The prevalence of grass carp combined with the February 2012 aquatic treatment event likely exacerbated the degradation of water quality. 



City of Lakeland Water Quality Management Plan (WQMP), October 2019
The WQMP noted that there is no correlation between TN concentrations and annual rainfall, indicating that external sources such as stormwater runoff are not likely dominant influences on in-lake water quality. The WQMP concluded that projects focusing on stormwater retrofits may not be appropriate candidates for restoring water quality in Lake Gibson, but the maintenance and enhancement of native submerged and emergent aquatic vegetation was recommended. Therefore, efforts described in this plan focus on the restoration and maintenance of aquatic vegetation.

Other Supporting Documentation
Lake Gibson Bathymetric Survey, September 2020, August of 2022
Lake Gibson Submerged Aquatic Vegetation Survey, September 2020, August of 2022
LVI survey supporting documentation for June 2021, October 2021, and November 2022

Note: LVI and SAV reports were generated using data collected by certified samplers.

Point Sources and Indirect Source Monitoring (Sites)

There are approximately 35 stormwater outfalls that discharge into to Lake Gibson. Throughout the watershed there are 51 retention/detention ponds that provide both water quality treatment and flood attenuation. Please refer to Attachment 2.

Except for the northeast and southern portion of the watershed within the City of Lakeland, the majority of parcels in the northern section of the watershed appear to be serviced by septic systems (Attachment 3).

The entire area is regulated under MS4 permit # FLS000015-004 issued to Polk County. Co-permittees include the City of Lakeland and FDOT District 1, who also have facilities in the Lake Gibson watershed. The Cycle 4 permit was issued on October 26, 2016, and will be in effect until the Cycle 5 permit is issued.

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

Nonpoint Sources

Sixty-nine percent of the Lake Gibson catchment is urban or built-up land uses, with 45 percent in residential land use (Attachment 4), and much of the urban stormwater receives treatment via stormwater retention and detention ponds (see Attachment 2). As

	noted in the supporting documentation, stormwater runoff and other external sources to the lake are not likely to be dominant influences on in-lake water quality. Loss of submerged and emergent aquatic vegetation is believed to be the most significant contributing factor to degradation of in-lake water quality.
Water Quality Criteria	Lake Gibson is a low-color lake with high alkalinity (lake assessment type 2). Based on the procedure for determining numeric nutrient criteria (NNC), outlined in Rule 62-302.531, F.A.C., the NNC for nutrients in Lake Gibson are 20 ug/L, 0.03 – 0.09 mg/L, and 1.05 – 1.91 mg/L for chlorophyll-*a*, TP, and TN, respectively, which is anticipated to be achieved upon successful implementation of the restoration work described in this plan.

Restoration Work	Individual project descriptions, costs (if known), and completion dates are included below for ongoing, completed, and planned projects in the Lake Gibson watershed.
	
	Ongoing Efforts
	• The City of Lakeland has a robust street sweeping program in place where the streets within the Lake Gibson watershed (7.44 road miles) are swept every 3 to 4 weeks. See Attachment 5 for the current street sweeping routes.
	• Polk County has a street sweeping program that includes 12.17 road miles in the Lake Gibson watershed. Roads in this section are targeted to be swept every month, however, the current frequency is every other month. The County is working towards re-establishing monthly street sweeping in this watershed. Street sweeping routes are shown in Attachment 5.
	• FDOT District 1 sweeps the section of U.S. 98 in the Lake Gibson watershed (2.29 road miles) approximately every 4 weeks (see Attachment 5).
	• Polk County passed a fertilizer ordinance in 2013, and it was adopted by the City of Lakeland the same year. The “Polk County Fertilizer Management Ordinance” is provided under separate cover. Additional relevant City ordinances are provided in Attachment 6.
	• The City has a very active outreach and education program that provides the public with information on the importance of stormwater pollution prevention. The program includes informational/educational signage at the lakes, handouts such as brochures and youth activity booklets, attendance at local public events, the use of social media, Public Services Announcements (PSA’s) through the Toby’s Water Warriors campaign, as well as providing school and neighborhood presentations. Examples of current and ongoing public outreach and education activities and events include:
	  ◦ Educational display signage around the lakes. Two signs at the Lake Gibson boat ramp are titled “The Lake Gibson Watershed” and “Stormwater Runoff and Land-Use Impacts on Lake Gibson” (see Attachment 7).
	  ◦ Toby’s Water Warriors public education campaign which promotes stormwater pollution prevention and the importance of healthy lakes. PSA’s are shown at local movie theaters as well as local cable TV channels that promotes proper use of fertilizers and pollution prevention.
	  ◦ Advertisement wraps on the City’s 6 street sweepers
	  ◦ Annual Water, Wings, & Wild Things event which reaches more than 2,000 2nd grade students throughout Polk County
	  ◦ City of Lakeland Cardboard Boat Challenge and Lakes Festival - held each October
	  ◦ Plant-a-Palooza - event held downtown on Lake Mirror
	  ◦ Participation in the Great American Teach every November (K-5)

- Library display that includes educational materials for youth, such as an activity book and educational stormwater pollution prevention poster
- Utilization of social media (Facebook and Instagram) to post lakes education on featured days – Water Warriors Tuesday and Lakefront Friday

- Employment of a City Environmental Code Enforcement Officer that focuses on stormwater pollution prevention and illicit discharge identification and elimination activities within City limits.

Completed

- Lake Gibson Southwest Drainage Basin BMP Project – Completed in 2008
  - BMP consists of two wet detention attenuation ponds in an "upstream" location between Carpenters Way and Wedgewood Estates Boulevard. One upstream pond is a two-acre wet detention pond constructed on the east bank of the stream and serves 64 acres of the basin. The other upstream pond is a three-acre wet detention pond that serves 54 acres of the basin constructed west of the stream. Both upstream ponds discharge to a flow-through marsh for further attenuation, and the flow-through marsh discharges back to the stream. A third settling pond was constructed "downstream" on the north side of the stream just before it discharges to Lake Gibson. This third two-acre pond discharges by sheet flow into a restored wetland area.
- Lake Gibson Bathymetric survey, September 2020
- Lake Gibson Submerged Aquatic Vegetation (SAV) survey, September 2020

Planned

- Detailed Aquatic Vegetation Survey & Propagation Plan
  - Complete an updated survey of SAV in Lake Gibson to include areal location, extent, and volume of SAV.
  - Complete a survey of emergent aquatic vegetation (EAV) to include species present and areal extent of EAV.
  - Develop and implement a detailed planting plan for SAV and EAV.
    - To be submitted to FDEP for concurrence once developed

Additional information on completed, ongoing, and planned projects is included in Attachment 7.

Critical Milestones/Monitoring

Anticipated Critical Milestone(s) and Completion Dates:

Detailed Aquatic Vegetation Survey & Propagation Plan

- Estimated start of project – June 2023
- Completion of surveys – September 2023
- Map production – December 2023
- Planting Plan – December 2023
  - Delivered to FDEP upon completion of plan
- Planting Activities – September 2024

Monitoring Component

The City of Lakeland Lakes & Stormwater Division and the Polk County Natural Resources Division collect ambient water quality samples as part of their monitoring of Lake Gibson on a quarterly basis. FDEP collected samples in 2019-2020, and these data were included in the most recent impairment assessment. A summary of the sampling activities is presented in Table 1 below.

Table 1. Summary of water quality sampling in Lake Gibson

Sampling Entity	Station Name	Start Date	End Date	Number of Samples				
				TN (mg/L)	TP (mg/L)	TSS (mg/L)	Chl-A (µg/)	Corrected Chl-A (µg/L)
FDEP	Lake Gibson @ Center	5/14/2019	6/8/2020	2	2	2	2	2
City of Lakeland	Lake Gibson	12/1/2008	Ongoing (number of samples as of 6/8/2021)	50	49	18	17	49
Polk County	Gibson1	4/24/1985	Ongoing (Number of samples as of 5/3/2022)	151	148	68	116	102

A list of parameters sampled by the City and County is provided in Attachment 8.

Other Key Dates

Estimated Date for Delisting from Verified List or Removal from Study List

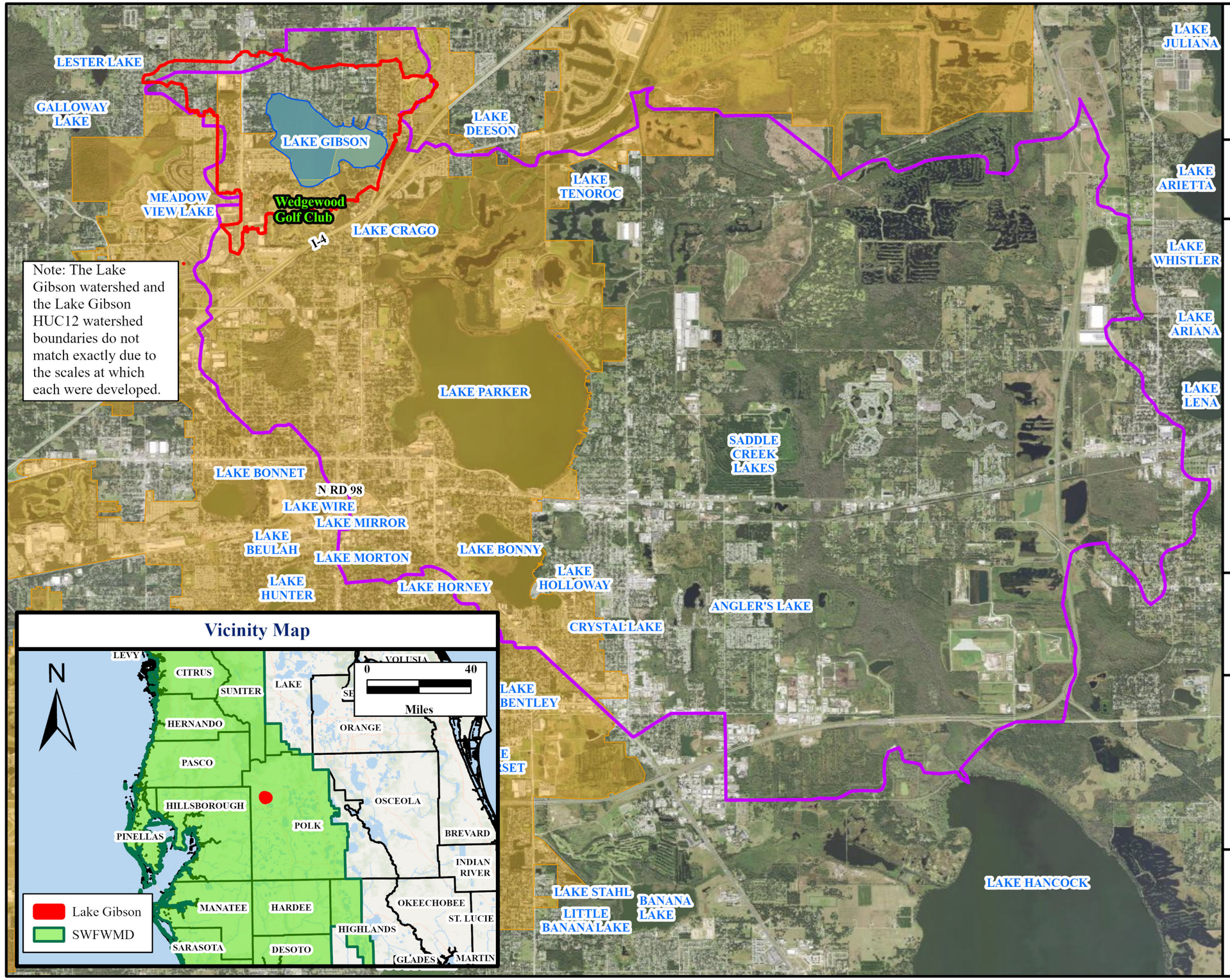
WBID 1497D (Lake Gibson) is in the state's Group 3 Sarasota Bay – Peace – Myakka basin. The most recent review and assessment cycle (the initial biennial assessment) was completed in 2022. This waterbody is currently impaired for nutrients (chlorophyll-*a*, TN, and TP), and the earliest opportunity for delisting would happen during the upcoming biennial assessment (2024). However, since planting activities are not expected to begin until September 2024 and completed over several annual events, it is not likely that the lake will be delisted in 2024. Improvements to water quality are anticipated for the 2026 biennial assessment. If these parameters do not meet delisting requirements in 2026, they will remain in assessment category 4e for an additional biennial assessment cycle, which will postpone TMDL development, at which time applicable data sufficiency will be required to fully assess the impaired parameters. If it is determined that the parameters in question are no longer impaired, DEP is expected to request the WBID be delisted from the federal 303(d) list (if applicable).

Financial Commitments

Estimated Implementation Costs	
	Completed Projects Design and Construction $3,200,000 Land Acquisition $ NA Annual Operation and Maintenance (O & M) $5,000 Estimated 20-year O & M Cost $100,000 Funding Source(s): City of Lakeland CIP, Polk County CIP
	Planned Projects Study $ 50,000 Land Acquisition $ NA Annual Operation and Maintenance (O & M) $ TBD Estimated 20-year O & M Cost $ TBD Funding Source(s): City of Lakeland CIP, Polk County CIP
	Ongoing Projects Annual Operation and Maintenance (O & M) $ 1,376,906 Estimated 20-year O & M Cost $_____ Funding Source(s): City of Lakeland CIP, Polk County CIP

Attachments:

1) Lake Gibson Location Map
2) Lake Gibson Stormwater Systems
3) Lake Gibson Septic Systems
4) Lake Gibson Land Use
5) Lake Gibson Street Sweeping Routes and Zones
6) City of Lakeland Codes and Ordinances
7) Lake Gibson Completed, Ongoing, and Planned Projects
8) Water Quality Monitoring Program Sampled Parameters Table



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N

0 6,000

Feet

Legend

- Watershed - HUC12
- Lake Gibson Watershed
- Lake Gibson WBID Boundary
- Lakeland City Limits

Sources:
WBIDs: FDEP, 2022
HUC Watershed: USGS, 2020
Lake Watershed: City of Lakeland, 2019
Aerial Imagery: ESRI, 2020

Attachment 1

Lake Gibson Location Map

Geosyntec consultants

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N

0 1,500
Feet

Legend

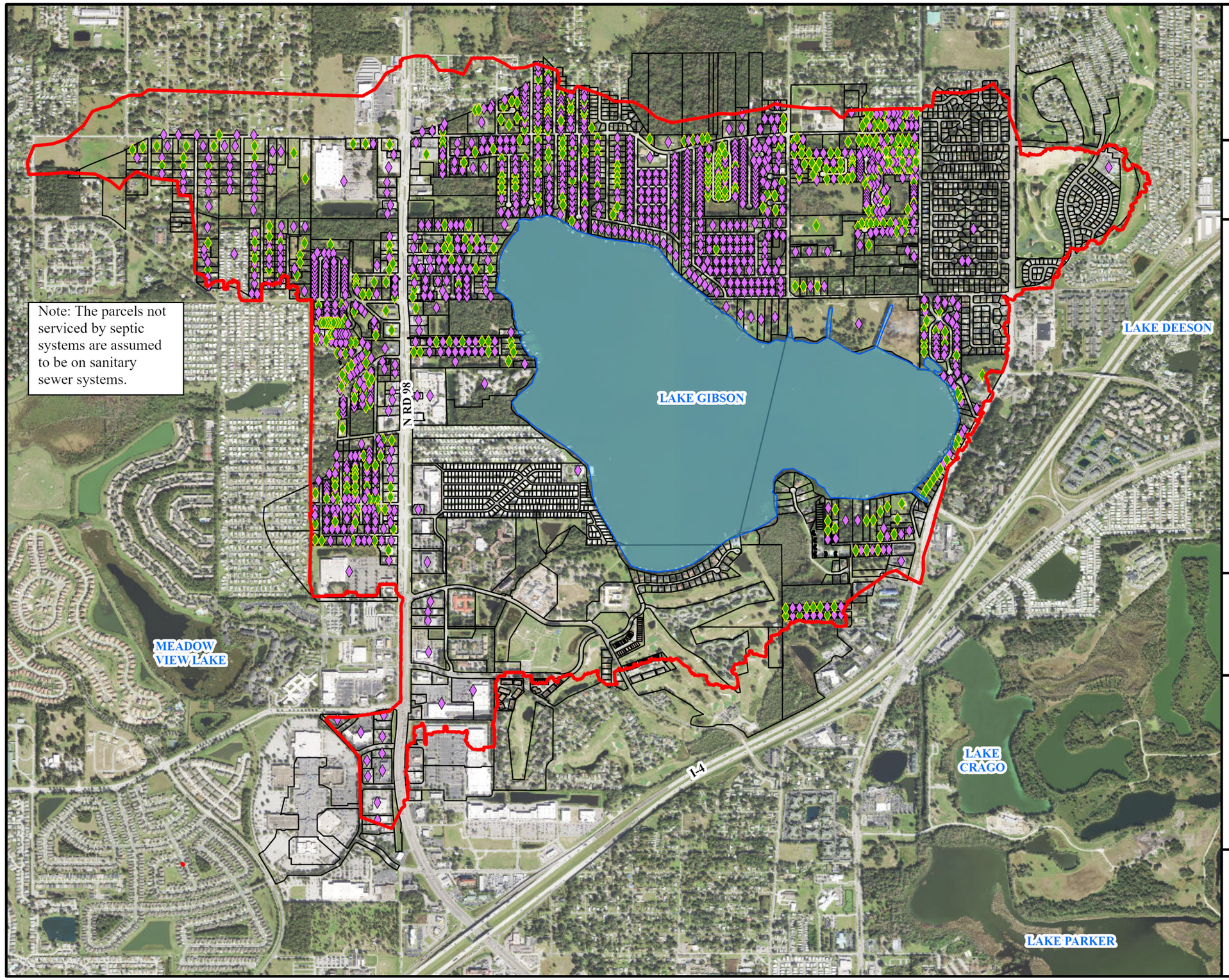
- Lake Gibson Watershed
- Lake Gibson WBID Boundary
- Discharge to Lake
- Storm Inlets
- Pipes
- Stormwater Ponds

Sources:
Stormwater Infrastructure: Lakeland, 2021
WBIDs: FDEP, 2022
Lake Watershed: City of Lakeland, 2019
Aerial Imagery: ESRI, Polk County, 2020

Attachment 2

Lake Gibson Stormwater Systems

Geosyntec consultants



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N

0 1,500

Feet

Legend

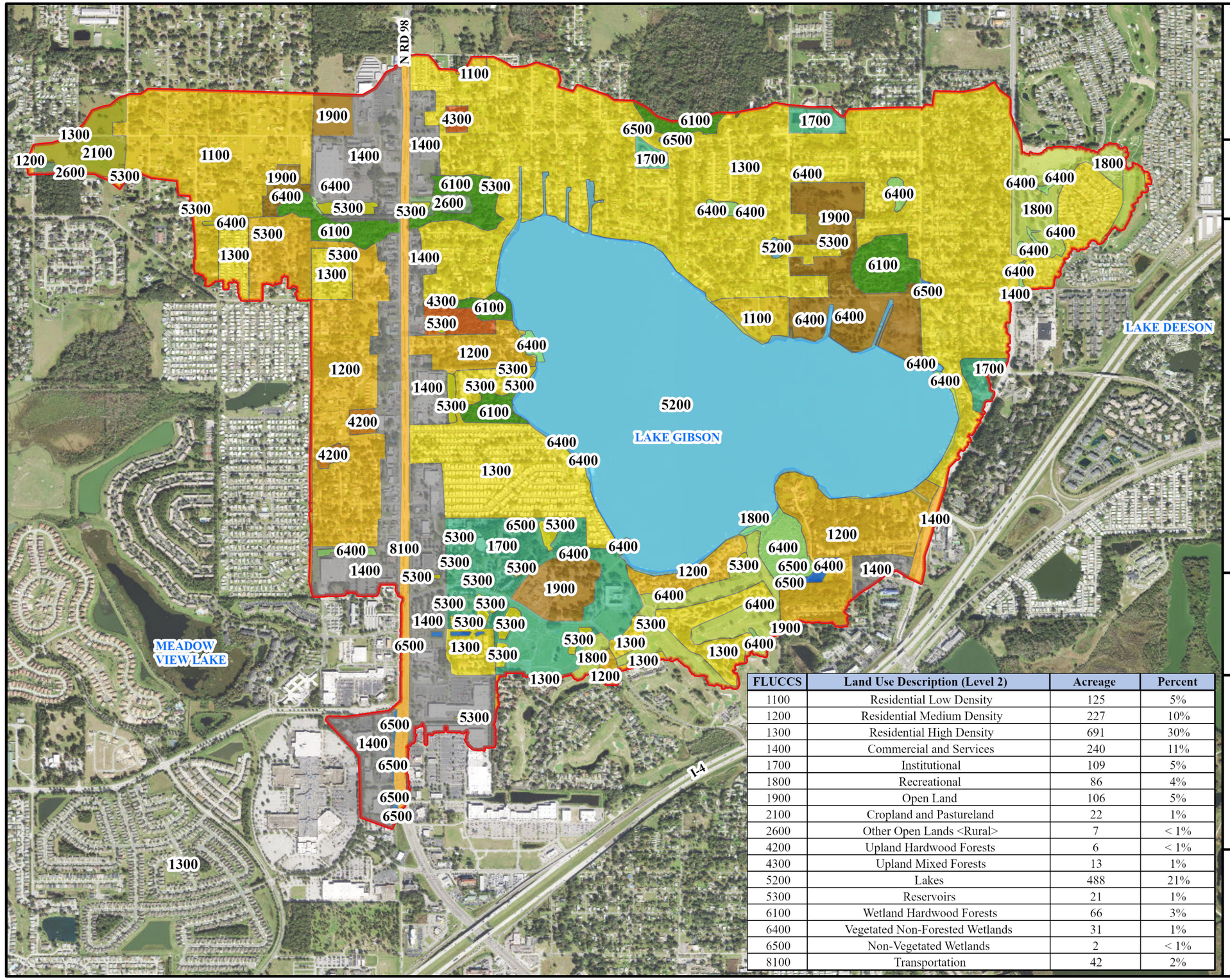
- Lake Gibson Watershed
- Parcels
- Known Septic
- Likely Septic

Sources:
Septic Systems: FDOH, 2020
WBIDs: FDEP, 2022
Lake Watershed: City of Lakeland, 2019
Aerial Imagery: ESRI, Polk County, 2020

Attachment 3

Lake Gibson Septic Systems

Geosyntec consultants



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N

0 1,500
Feet

Legend

- Lake Gibson Watershed
- Lake Gibson WBID Boundary

Land Use Type

- 1400: Commercial and Services
- 2100: Cropland and Pastureland
- 1700: Institutional
- 5200: Lakes
- 6500: Non-Vegetated Wetlands
- 1900: Open Land
- 2600: Other Open Lands <Rural>
- 1800: Recreational
- 5300: Reservoirs
- 1300: Residential High Density
- 1100: Residential Low Density
- 1200: Residential Medium Density
- 8100: Transportation
- 4200: Upland Hardwood Forests
- 4300: Upland Mixed Forests
- 6400: Vegetated Non-Forested Wetlands
- 6100: Wetland Hardwood Forests

Sources:
Land Use: SWFWMD, 2019
WBIDs: FDEP, 2022
Lake Watershed: City of Lakeland, 2019
Aerial Imagery: ESRI, Polk County, 2020

FLUCCS	Land Use Description (Level 2)	Acreage	Percent
1100	Residential Low Density	125	5%
1200	Residential Medium Density	227	10%
1300	Residential High Density	691	30%
1400	Commercial and Services	240	11%
1700	Institutional	109	5%
1800	Recreational	86	4%
1900	Open Land	106	5%
2100	Cropland and Pastureland	22	1%
2600	Other Open Lands <Rural>	7	< 1%
4200	Upland Hardwood Forests	6	< 1%
4300	Upland Mixed Forests	13	1%
5200	Lakes	488	21%
5300	Reservoirs	21	1%
6100	Wetland Hardwood Forests	66	3%
6400	Vegetated Non-Forested Wetlands	31	1%
6500	Non-Vegetated Wetlands	2	< 1%
8100	Transportation	42	2%

Attachment 4

Lake Gibson Land Use

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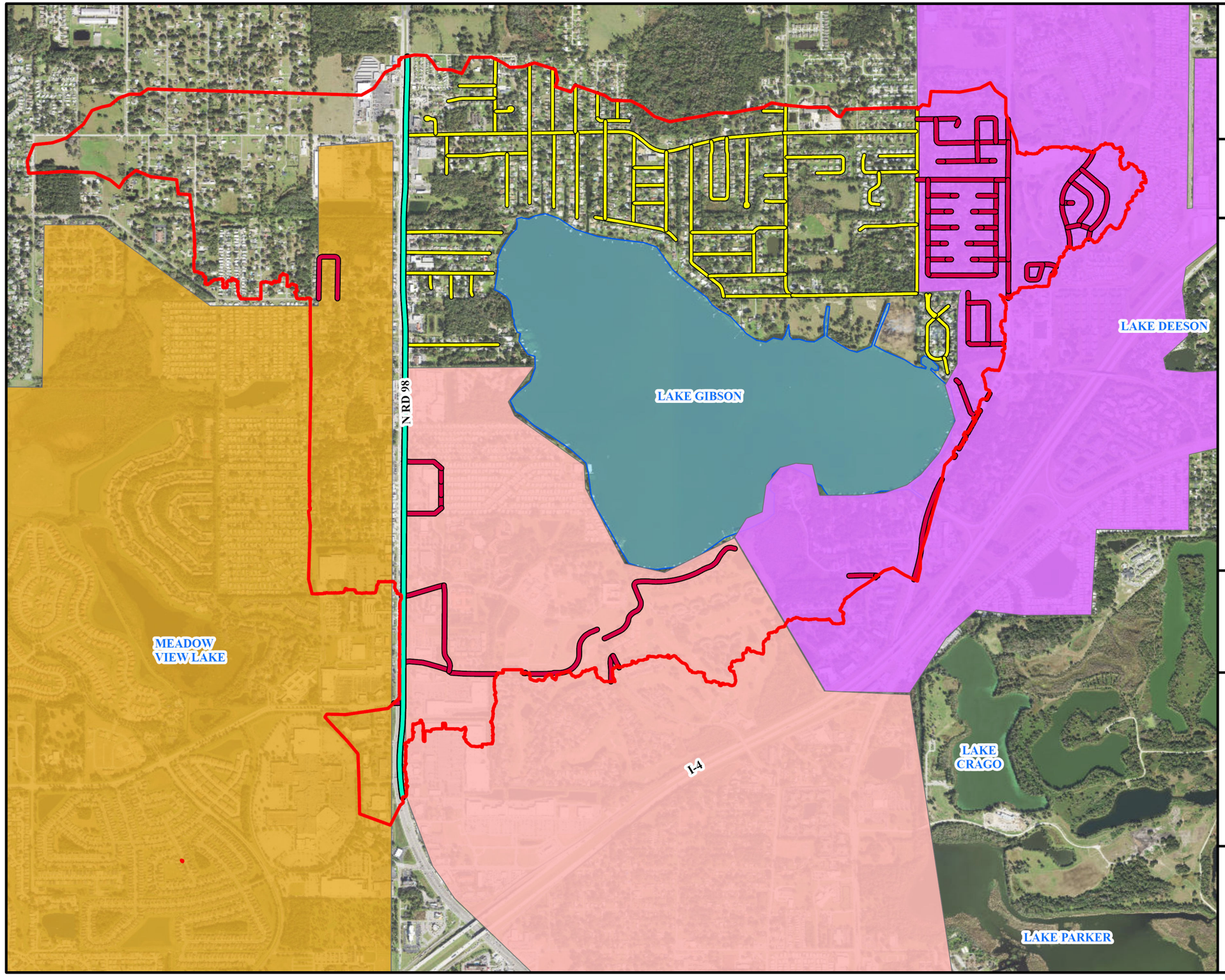

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N

0 1,500

Feet

Legend

- Lake Gibson Watershed
- Sweeping Routes - City
- Sweeping Routes - FDOT
- Sweeping Routes - County

City of Lakeland Sweep Zones

- NE ZONE 3
- NE ZONE 4
- NW ZONE 4

Sources:
Sweep Zones: Lakeland, 2022
Sweep Routes: Lakeland, FDOT, Polk County, 2023
WBIDs: FDEP, 2022
Lake Watershed: City of Lakeland, 2019
Aerial Imagery: ESRI, Polk County, 2020

Attachment 5

Lake Gibson Street Sweeping

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Attachment 6 - City of Lakeland Codes and Ordinances

Code of the City of Lakeland, Ordinance no. 5080, Chapter 86, Section 86-3:

It shall be unlawful for any person to throw, spill, place deposit or leave, or cause to be thrown, spilled, placed, deposited or left, or to permit any servant, agent or employee to throw, spill, place deposit in or upon any street, highway, alley, sidewalk, park or other public place in the city any dirt, sweepings, filth, shells, garbage, vegetables, dead carcasses, sewage, slops excrement, compost, stable manure, ashes, soot, tin cans, rags, wastepaper, leaves, brush, weeds, grass, straw, hay, excelsior, shavings, barrels, crates, boxes, litter, or loose combustible material; materials subject to be carried by the wind, or unwholesome, noisome or putrescible matter of any kind.

Code of the City of Lakeland Land Development Regulations under Natural Resource Protection Regulations, *Article no. 34.06.05.01*:

Adequate measures of erosion control shall be established upon all applicable sites. Compilation of all features on site may necessitate unified measures of control. Adequate measure of control shall be defined as those needed to minimize or eliminate any transfer or removal of soil from a site during a rainfall event.

Code of the City of Lakeland, Chapter 86, Ordinance 5080 Section 86-4

It shall be unlawful for any person to allow any swill, slops or malodorous or noxious liquids to run, drop, or fall into or upon any sidewalk, street, alley, park, lake, stream, or other public place and it shall be unlawful for any person to allow any water, grease, or any slippery matter to fall, drop, or to be deposited upon any sidewalk, street, highway, or alley within the city.

Attachment 7 - Lake Gibson Completed, Ongoing, and Planned Projects

Projects in the Lake Gibson Watershed

Completed / In Progress Projects

Project Name	Description	Cost	Restoration Activity	Completion Date
SW Drainage Basin BMP	Installed 2 wet detention attenuation ponds and 1 settling pond to serve 118 acres of residential area in the SW corner of the Lake Gibson basin.	$3,200,000 design and construction; $5,000 annual maintenance	Improve water quality by routing discharges from ponds to a flow-through marsh restored wetland area prior to discharge into Lake Gibson	2008

Ongoing Projects

Project Name	Description	Cost	Restoration Activity	Completion Date
Street Sweeping	Sweep streets in the Lake Gibson watershed every 3 to 4 weeks	$1,296,906 (FY23)	During fiscal year 2022, street sweeping removed 2,357 pounds of TN and 1,494 pounds of TP from the City streets.	Ongoing
Educational Display Signage around City's Lakes	Two Education Signs at Lake Gibson Boat Ramp (see following pages)	Total annual budget for outreach and public education - $80,000	Inform the public on the importance of stormwater pollution prevention	Ongoing

Planned Future Projects

Project Name	Description	Cost	Restoration Activity	Estimated Completion Date
Detailed Aquatic Vegetation Survey & Propagation Plan	Conduct detailed SAV and EAV surveys for use in developing a detailed planting plan	$50,000	Re-establish healthy SAV and EAV communities in the lake	
	Complete SAV and EAV surveys	*$20,000*		*September 2023*
	Produce maps of SAV and EAV in the lake	*$5,000*		*December 2023*
	Develop detailed planting plan, identifying appropriate species, recommended density, planting locations	*$25,000*		*December 2023*
	Initiate planting activities (first of several annual events)	*TBD*		*September 2024*

Attachment 8 - Water Quality Monitoring Program Parameters

Ambient Monitoring Program Sampled Water Quality Parameters	
Parameter	**Collected By**
Alkalinity	City, County
Cadmium	City
Calcium	City, County
Chloride	County
Color	City, County
Copper	City
Dissolved Oxygen	City, County
Fecal Coliform	City
Hardness	City, County
Iron	County
Lead	City
Magnesium	City, County
Nitrogen, Kjeldahl	City, County
Nutrients (Chlorophyll Corrected)	City, County
Nutrients (Chlorophyll)	City, County
Nutrients (Nitrate-Nitrite)	City, County
Nutrients (Total Nitrogen)	City, County
Nutrients (Total Phosphorus)	City, County
pH	City, County
Phosphorus Dissolved Orthophosphate	County
Phosphorus in Total Orthophosphate	City
Salinity	City, County
Secchi depth	City, County
Sodium	County
Specific Conductance	City, County
Sulfate	County
Temperature	City, County
Total Ammonia	City, County
Total Coliform	City
Total Residue	City
Total Suspended Solids (TSS)	City, County
Turbidity	City, County
Un-ionized Ammonia	City, County
Zinc	City