UPDATED CAPACITY ANALYSIS REPORT

City of Lakeland
Glendale Water Reclamation Facility

Polk County

Renewal of Operating Permit No. FL0039772

Permit Expiration Date: December 2, 2020

CS FILE NO. 9922.21

Prepared by:
Chastain-Skillman, Inc.
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Prepared for:
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Lakeland, Florida 33801

Submitted to:
Florida Department of Environmental Protection
Southwest District
13051 North Telecom Parkway
Temple Terrace, FL 33637

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CERTIFICATIONS

Applicant/Permittee

I certify that I am fully aware of the information contained in this "2020 Glendale WRF Updated Capacity Analysis Report" prepared by Chastain-Skillman, Inc. and intend to comply with the recommendations and schedules in this report.

Date: 7/2/2020

Bill Anderson, Director of Water Utilities
City of Lakeland
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Lakeland, Florida 33801
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Bill.Anderson@lakelandgov.net

Lead Operator

I certify that I am fully aware of the information contained in this "2020 Glendale WRF Updated Capacity Analysis Report" prepared by Chastain-Skillman, Inc. and intend to comply with the recommendations and schedules in this report.

Date: 7/2/2020

Jeremy Jacobson, Chief Operator, Class A, 0012634
City of Lakeland
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Jeremy.Jacobson@lakelandgov.net

Professional Engineer

I certify that the information contained in this "2020 Glendale WRF Updated Capacity Analysis Report" is true and correct to the best of my knowledge and has been reviewed and discussed with the Permittee's lead operator. This report was prepared in accordance with sound engineering principles, using Florida Department of Environmental Protection's "Guidelines for Preparation of Capacity Analysis Reports" published in July 1992.

Date: 06/26/2020

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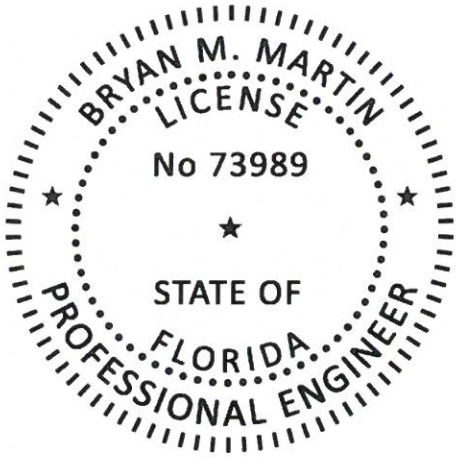

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1.0 INTRODUCTION

The last Capacity Analysis Report (CAR) for the City of Lakeland Glendale Water Reclamation Facility (WRF) was prepared by Chastain-Skillman, Inc. (CSI) and submitted to the Florida Department of Environmental Protection (FDEP) in 2014. This current updated CAR is being submitted to fulfill the requirements of Chapter 62-600, Florida Administrative Code (F.A.C.). As defined in Chapter 62-600.45, F.A.C., the purpose of the CAR is to (1) establish a mechanism for assessing the operations and physical capabilities of wastewater treatment facilities on a regular basis, and (2) implement necessary preventative measures, including the planning, design, and construction of new or expanded facilities. These criteria will be satisfied in this document by the reporting of (1) the evaluation of past growth trends in wastewater flows at the Glendale facility, (2) the estimation of future growth rates, and (3) the evaluation of the capacity of the existing facility and the need for expansion.

The City of Lakeland owns and operates one pretreatment facility and two wastewater treatment facilities. The Glendale WRF is located adjacent to the intersection of Glendale Street and Lakeland Highlands Road (see **Figure 1 – General Location Map in Appendix A**). The facility began operation in 1926 as a primary treatment plant and has been expanded and upgraded multiple times.

The WRF is currently designed to provide partial advanced treatment. A portion of the effluent is pumped to two ground storage tanks near the City's McIntosh Power Generation Plant where it is combined with effluent from the Northside WWTF. The transmission pipeline from the Glendale WRF to the ground storage tanks provides chlorine contact time for disinfection. The combined effluent is permitted for industrial reuse at the McIntosh Power Plant and the Matheson Tri-Gas Facility. These reuse systems are identified as R-001 and R-003, respectively. Total effluent flow from the Glendale WRF and Northside WWTF to R-003 is reported in the Glendale WRF permit.

The blowdown water and other process waters from the McIntosh Power Plant and Matheson Tri-Gas Facility are pumped to the Glendale WRF, mixed with effluent from the WRF, and pumped to a 1400-acre, manmade wetlands system for advanced treatment. The effluent is then discharged to a drainage ditch leading to the North Prong of the Alafia River (D-001). The surface water discharge from both treatment plants is authorized under the Glendale WRF operating permit. Effluent from the wetlands system is also permitted to be transferred to the

Tampa Electric Polk Power Station for industrial reuse (R-002). This reuse system was put into operation in 2015.

A site map of the Glendale WRF is shown in **Figure 2 (Appendix A)**. A flow schematic of the entire treatment system is shown in **Figures 3A, 3B, and 3C (Appendix A)**.

The Glendale WRF headworks includes two mechanically cleaned bar screens and a manually cleaned bar screen in a bypass channel as a standby unit. Influent flow is metered by a Parshall flume prior to discharge to the influent pump station. The screened influent is pumped to two vortex-type grit chambers. From the grit chambers, influent flows to a splitter box for distribution to three primary clarifiers. The primary clarifier effluent flows by gravity to an intermediate lift station, where it is mixed with return activated sludge (RAS) and then pumped to another splitter box for distribution to three aeration tanks. The aeration tanks operate in a Modified MLE process (anoxic zone followed by aerobic zone with an internal recycle) with fine bubble diffused aeration. Mixed liquor flows from the basins to another flow splitter box prior to entering four secondary clarifiers.

A portion of the treated effluent from Clarifiers 3 and 4 is reused inside the treatment plant for wash-down and make-up water. The remaining effluent flows by gravity to Reuse Basin A where it is chlorinated and a portion is pumped to the ground storage tanks at the City's Northside WWTF. Effluent from the storage tanks can be used at the McIntosh Power Plant (R-001) and the Matheson Tri-Gas Facility (R-003) for non-contact cooling water. The remainder of the Glendale WRF effluent mixes with blowdown return water from the power plant and Matheson, and any unused effluent from the Northside WWTF. The combined flow is then pumped to Reuse Basin D where it is disinfected with chlorine prior to being pumped to the wetlands system for advanced treatment. The advanced treated effluent is then discharged to the TECO Polk Power Station (R-002) for non-contact cooling water or discharged to the drainage ditch that leads to the North Prong of the Alafia River (D-001). The treatment and transmission infrastructure associated with the TECO Polk Power Station is not owned or operated by the City. The City uses a series of holding ponds (Reuse Basins B, C, E, F, and H) at the Glendale WRF for the storage of treated effluent during abnormal flow events.

Sludge from the primary clarifiers is pumped directly to the Feed Sequencing Tank (FST). RAS is pumped to the flow splitting structure immediately prior to the aeration tanks. Waste activated

sludge (WAS) is pumped to aerated holding tanks and then thickened using gravity belt thickeners.

The thickened sludge is then pumped to the FST where it is mixed with the primary sludge prior to two-phase anaerobic digestion (2PAD) process for further stabilization. Blended sludge is pumped batchwise to the egg-shaped thermophilic digester (ESD) for the acid digestion phase. Partially digested sludge from the thermophilic digester is pumped in batches to the mesophilic methane digesters for completion of the digestion process. Batching of the sludge transfer to and from the thermophilic digester is controlled so that feed and withdrawal do not occur at the same time, thus eliminating short circuiting of pathogens through the process.

The residuals are then dewatered using centrifuges. The process produces Class AA residuals which are transported and applied as a fertilizer to sites in north Lakeland. The facility currently holds a fertilizer license (F001967) issued by the Florida Department of Agriculture and distributes fertilizer to various locations in Polk County. The facility is currently permitted for land application, distribution and marketing, transport to an RMF, or disposal in a Class I solid waste landfill. The facility includes administrative offices and a certified laboratory. On-site emergency generator systems are provided to power critical components of the treatment plant during power outages. Treatment facility flow and sidestream flows are measured at several locations throughout the plant.

A 2002 Capacity Analysis Report identified that the Glendale WRF would exceed its design organic loading capacity well before reaching its hydraulic capacity. The West Lakeland Wasteload Reduction Facility (WLWRF) was constructed to reduce organic loading at the Glendale WRF by treating high-strength wastewater from industrial, commercial, and residential areas on the west side of Lakeland. The facility became operational in 2010 and includes headworks, four aeration basins, one anoxic basin, one clarifier, and one biosolids holding tank. The facility has a design capacity of 1.5 million gallons per day (mgd) and is capable of reducing BOD_5 from 2,000 mg/L to 100 mg/L. The WLWRF discharges the treated high strength wastewater into the City's gravity sewer system where it flows to the Glendale WRF for additional treatment. The WLWRF is permitted under the Glendale WRF operating permit.

2.0 EXISTING CONDITIONS

2.1 Permitted Capacities

The treatment facility is currently operating under FDEP Permit No. FL0039772 with an existing permitted annual 12-Month average daily flow of 13.7 mgd. The current permit limits are shown in **Exhibit 1**.

Exhibit 1 Permitted Plant Flow and Effluent Capacity

	Units	Permit Limit	Basis
Plant Flow	mgd	13.7	12-Month ADF (AADF)
Effluent Flow			
North Prong of Alafia River (D-001)	mgd	20.0	AADF
McIntosh Power Plant (R-001)	mgd	No Limit	
Tampa Electric Polk Power Station (R-002)	mgd	No Limit	
Matheson Tri-Gas Facility (R-003)	mgd	No Limit	

Permit limits for specific effluent parameters are shown in **Exhibit 2**. The surface water discharge has a limit for both nitrogen concentration and loading. There is no limit on phosphorus for the surface water discharge; report only.

Exhibit 2 Permitted Effluent Quality

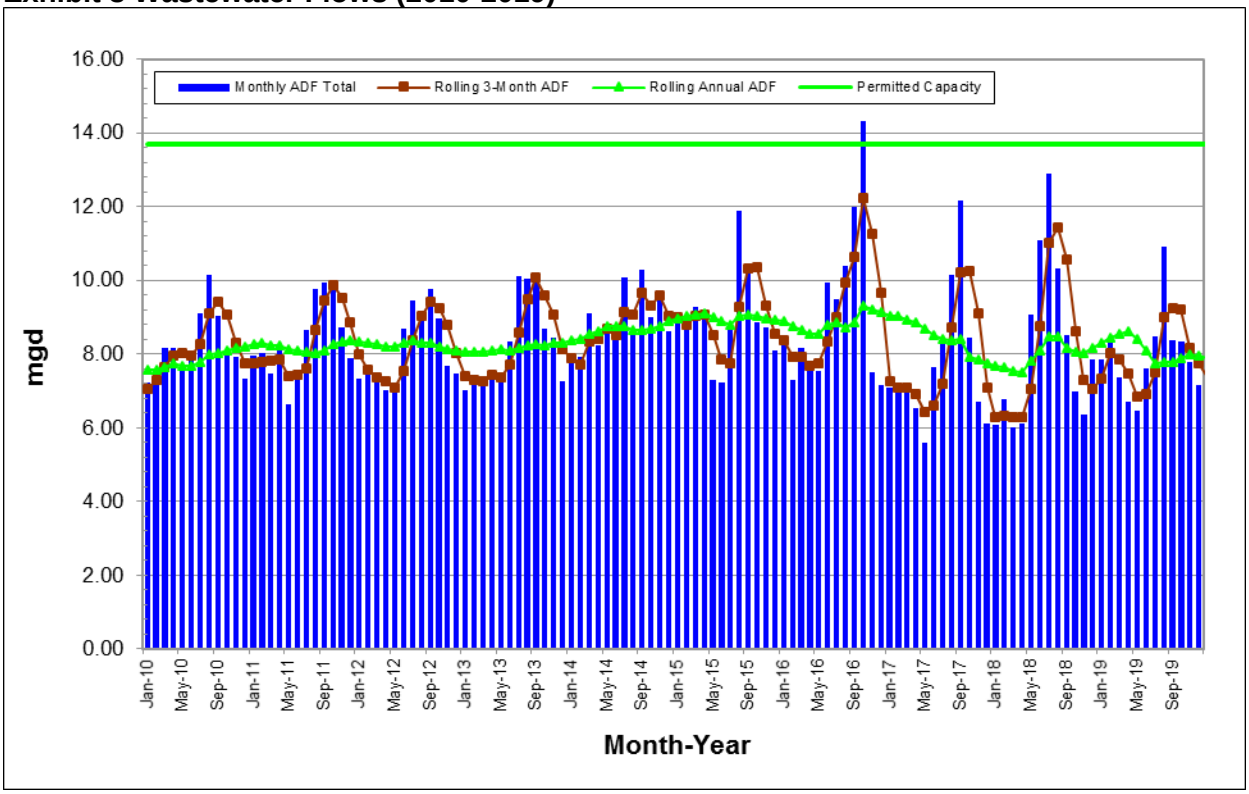
	Units	Annual Average	Monthly Average	Weekly Average	Single Sample
North Prong of Alafia River (D-001)					
$CBOD_5$	mg/L	5.0	6.25	7.5	10.0
TSS	mg/L	5.0	6.25	7.5	10.0
Total Nitrogen	mg/L	3.0	3.75	4.5	6.0
Total Nitrogen	Tons/yr	30.3			
Total Nitrogen	Tons/yr	20.2 (5-yr average)			
pH	S.U.	Min. 6.0 – Max. 8.5: Continuous			
Dissolved Oxygen	mg/L				5.0
Specific Conductance	UMHO/CM				1.5 x Background or 1275
Fecal Coliform	#/100 mL	14	14 (Median)		86
Chlorine, Total Residual (For Disinfection)	mg/L	Min. 1.0: Continuous			
Chronic Whole Effluent Toxicity	Percent	Minimum 100% - Quarterly			
Reuse Sites (R-001, R-002, R-003)					
$CBOD_5$	mg/L	20.0	30.0	45.0	60.0
TSS	mg/L	20.0	30.0	45.0	60.0

	Units	Annual Average	Monthly Average	Weekly Average	Single Sample
North Prong of Alafia River (D-001)					
$CBOD_5$	mg/L	5.0	6.25	7.5	10.0
TSS	mg/L	5.0	6.25	7.5	10.0
Total Nitrogen	mg/L	3.0	3.75	4.5	6.0
Total Nitrogen	Tons/yr	30.3			
Total Nitrogen	Tons/yr	20.2 (5-yr average)			
pH	S.U.	Min. 6.0 – Max. 8.5: Continuous			
Dissolved Oxygen	mg/L				5.0
Specific Conductance	UMHO/CM				1.5 x Background or 1275
Fecal Coliform	#/100 mL	14	14 (Median)		86
Chlorine, Total Residual (For Disinfection)	mg/L	Min. 1.0: Continuous			
pH	S.U.	Min. 6.0 – Max. 8.5: Continuous			
Fecal Coliform	#100 mL	200	200 (Geometric Mean)		800
Chlorine, Total Residual (For Disinfection)	mg/L	Min. 0.5: Continuous			

2.2 Monthly, Three-Month, and Annual Average Daily Flows

Compliance flow monitoring of plant flows is measured at the Parshall flume prior to the influent pump station. Plant MADF, 3-month average daily flow (3-MADF), and annual average daily flow (AADF) for the last ten years are presented in **Appendix B**. Data from January 2010 through December 2019 is shown graphically in **Exhibit 3**. The highest monthly ADF and the highest AADF for the last five years both occurred in October 2016 (14.330 mgd and 9.323 mgd, respectively). The highest rolling AADF was approximately 68% of the permitted plant capacity (occurring in October 2016). During the past five years, the highest rolling 3-Month ADF occurred in October 2016 (12.243 mgd) which was approximately 89% of the permitted capacity.

Exhibit 3 Wastewater Flows (2010-2019)



2.3 Seasonal Variations in Flow

Per FDEP guidelines, the seasonal variation in flow was evaluated by calculating the ratio of the maximum 3-month ADF to Annual ADF. These values for the last ten years are presented in **Exhibit 4**. The average ratio of the maximum 3-month ADF to the annual ADF is 1.22.

Exhibit 4 Summary of Seasonal Flow Variations

Year	Annual ADF (mgd)	Maximum 3-MADF (mgd)	Month of Maximum Occurrence	Maximum 3-Month Peaking Factor
2010	8.193	9.433	September	1.15
2011	8.383	9.883	October	1.18
2012	8.093	9.413	September	1.16
2013	8.296	10.088	September	1.22
2014	8.884	9.661	September	1.09
2015	8.937	10.370	October	1.16
2016	9.144	12.243	October	1.34
2017	7.752	10.257	October	1.32
2018	8.170	11.440	August	1.40
2019	7.946	9.253	September	1.16
Average				**1.22**

2.4 Updated Flow and Loading Information

To satisfy Rule 62-600.405(6), F.A.C., the current hydraulic and constituent loadings were compared to the loadings that were used to establish the design capacity. **Exhibit 5** summarizes the influent loading from 2010 through 2019. Current $CBOD_5$ and TSS mass loading are within the ranges used to establish the design capacity.

Exhibit 5 Summary of Plant Influent CBOD5 and TSS for 2010-2019

Year	$CBOD_5$ (lbs/day)		TSS (lbs/day)	
	Maximum Month	Annual Average	Maximum Month	Annual Average
2010	36,177	23,045	29,498	22,855
2011	33,525	21,939	30,589	24,011
2012	22,050	17,154	23,352	20,820
2013	22,120	18,698	29,019	24,990
2014	21,461	19,113	27,969	24,101
2015	23,657	18,802	27,005	22,485
2016	23,663	17,349	42,307	21,849
2017	29,634	17,111	32,073	19,561
2018	21,621	17,362	29,879	22,124
2019	17,945	16,090	23,503	20,420
Design Criteria	**44,478**	**40,930**	**31,260**	**28,679**

3.0 FUTURE CONDITIONS

FDEP guidelines require that the Capacity Analysis Report must project the Annual ADF and the maximum 3-Month ADF for each of the next ten years. Population projections, in combination with water usage rates, wastewater flow records, or appropriate per capita flow rates may be used to predict the Annual ADFs. The average ratio of the yearly maximum 3-Month ADF to the Annual ADF is then used to determine the maximum 3-Month ADF for each year.

Population projections must be tabulated on a yearly basis for ten years. Historic and projected populations are summarized in **Section 3.1** followed by flow projections in **Section 3.2**.

3.1 Population Projections

To project wastewater flows for the City ten years into the future as required by Chapter 62-600.405, F.A.C., it is necessary to project the population of the area served for that time period.

Figure 4 (Appendix A) shows a map of the Glendale WRF service area. The area highlighted in red represents parcels that are currently served by the WRF. The area highlighted in blue represents parcels that the City expects to serve within the next ten years. **Figure 5 (Appendix A)** shows the future land use for the service area.

Exhibit 6 shows the population for these areas through 2030 as projected by the Southwest Florida Water Management District (SWFWMD). SWFWMD's peak population data is shown. The peak population includes both permanent and seasonal residents. SWFWMD provides a population estimate for 2018 and projections at 5-year intervals beginning with 2020 through the year 2030. For the interceding years, the population projections were calculated based on linear annual growth rate between each 5-year interval. The SWFWMD peak population projections were used as the basis for wastewater flow projections because it represents both permanent and seasonal population.

The projected population for the area served does not take into account future connections that are outside the current area served and within the City's service area. The City does not anticipate that it will in the future connect a significant number of customers that are currently served by septic systems. The majority of the City's future customers outside of the area currently served will likely be new developments. The projected peak population of the service area and the area actually served is summarized in **Exhibit 6**. These new developments do not include certain industrial/commercial customers that have reserved capacity with the City. Wastewater projections for these developments are accounted for in **Section 3.2** of this report.

Exhibit 6 Projected Population of Service Area and Area Actually Served

Year	Service Area SWFWMD Peak Population	Area Actually Served SWFWMD Peak Population
2018	119,316	72,348
2019	121,187	72,997
2020	123,057	73,646
2021	124,431	74,013
2022	125,804	74,380
2023	127,178	74,748
2024	128,551	75,115
2025	129,925	75,482
2026	130,919	75,691
2027	131,914	75,900
2028	132,908	76,109
2029	133,903	76,318
2030	134,897	76,527

3.2 Flow Projections

A per capita wastewater generation rate was developed to project future flows. The per capita wastewater generation rate was developed by dividing the annual ADF wastewater flow by the estimated population of the area served. The per capita flow rate includes all wastewater flow, including residential, commercial, industrial, institutional, and inflow and infiltration. This per capita rate was calculated for 2015 through 2019 and then the average for these five years was utilized for future flow projections **(Exhibit 7)**.

Exhibit 7 Per Capita Wastewater Flows

Year	AADF Wastewater Flow (gpd)	Estimated Service Population	Per Capita Rate (gpcd)
2015	8,936,667	69,549	128
2016	9,144,167	70,482	130
2017	7,751,667	71,415	109
2018	8,170,000	72,348	113
2019	7,945,833	72,997	109
Average			**118**

Average annual wastewater flows were projected for each of the next ten years by multiplying the per capita flow by the projected population of the area served **(Exhibit 8)**.

Exhibit 8 Projected Wastewater Flows Based on Per Capita Flow Rate

Year	Projected Population	Per Capita Flow Rate (gpcd)	Population-Based Wastewater Flows (mgd)
2019	72,997	118	7.946
2020	73,646	118	8.669
2021	74,013	118	8.712
2022	74,380	118	8.755
2023	74,748	118	8.799
2024	75,115	118	8.842
2025	75,482	118	8.885
2026	75,691	118	8.910
2027	75,900	118	8.934
2028	76,109	118	8.959
2029	76,318	118	8.983
2030	76,527	118	9.008

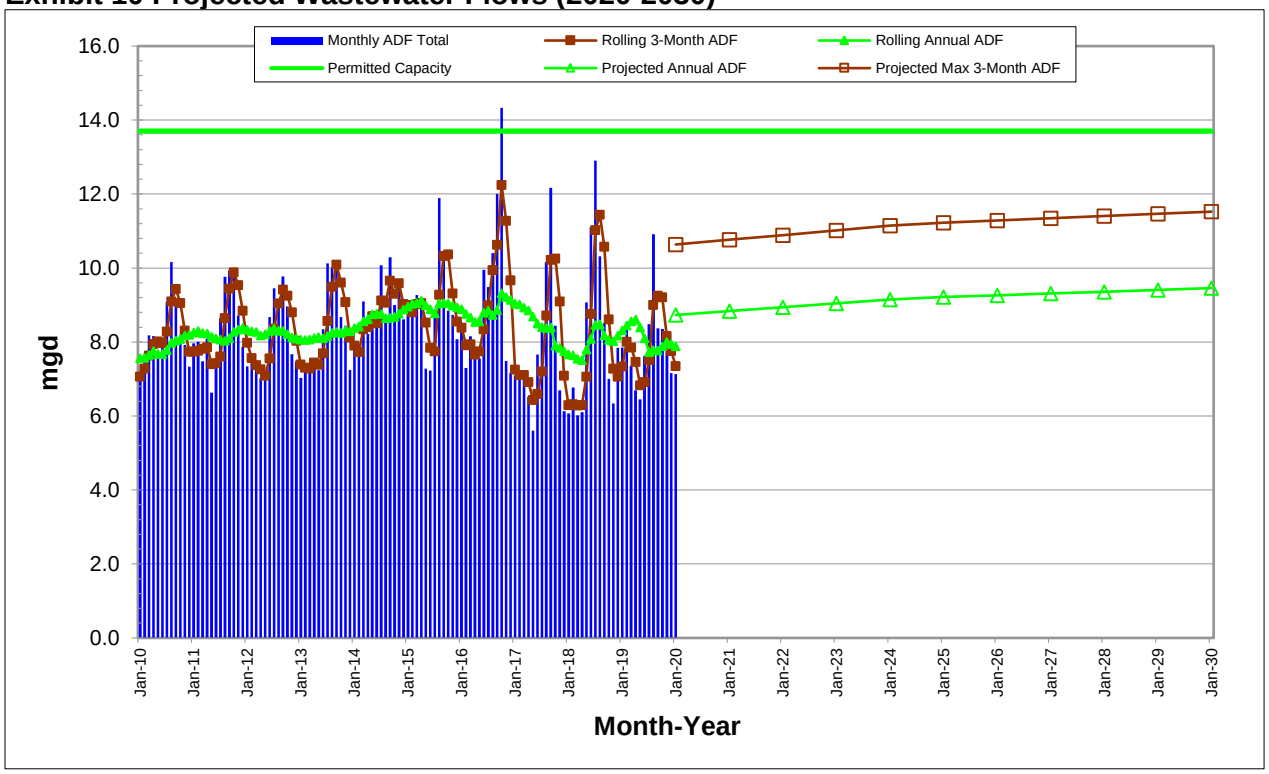
The City provided a list of future industrial/commercial developments that were classified as “Active” and “Future”. The future residential developments have already been accounted for in SWFWMD’s population projections and their projected wastewater flow in the Population-Based Wastewater Flows in **Exhibit 8**. For the purpose of this Capacity Analysis Report, the projected flow at build-out of the industrial/commercial developments was phased in over five years for the “Active” developments and ten years for the “Future” developments.

Exhibit 9 shows the projected flows to the Glendale WRF based on population-based flows and future industrial/commercial developments. Maximum 3-month ADF was calculated for each year by multiplying the projected annual average daily flow by the 3 month peaking factor developed in **Exhibit 4**. **Exhibit 10** provides a graphical representation of the projected flow rates.

Exhibit 9 Projected Annual and Maximum 3-Month Average Daily Flow

Year	Projected Per Capita Based Flow (mgd)	Future Industrial * Commercial Developments		Total Projected Annual ADF (mgd)	Projected Maximum 3-Month ADF (mgd)
		Approved Capacity Active (mgd)	Approved Capacity Future (mgd)		
2020	8.669	36,802	24,172	8.730	10.637
2021	8.712	73,603	48,343	8.834	10.764
2022	8.755	110,405	72,515	8.938	10.891
2023	8.799	147,206	96,686	9.042	11.017
2024	8.842	184,008	120,858	9.147	11.144
2025	8.885	184,008	145,029	9.214	11.227
2026	8.910	184,008	169,201	9.263	11.286
2027	8.934	184,008	193,372	9.312	11.345
2028	8.959	184,008	217,544	9.360	11.405
2029	8.983	184,008	241,715	9.409	11.464
2030	9.008	184,008	265,887	9.458	11.524

Exhibit 10 Projected Wastewater Flows (2020-2030)



4.0 SUMMARY AND CONCLUSIONS

4.1 Time Required for the 3-MADF to Reach the Permitted Capacity

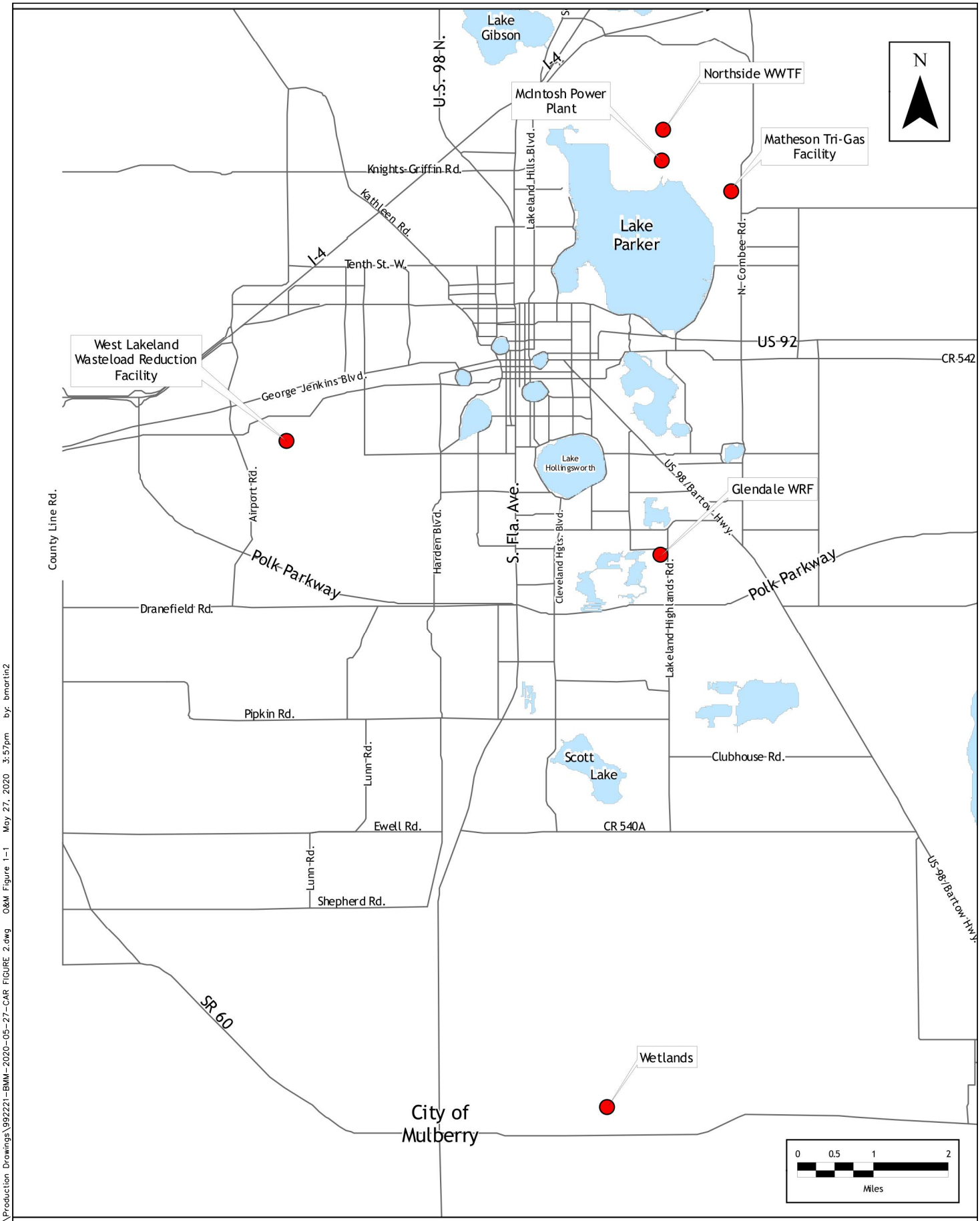
Based on the data shown above, it is projected that the peak 3-MADF will not exceed the 13.7 mgd permit limit within the next ten years.

4.2 Recommendations for Expansion

There are no recommendations for expansion of the treatment facility at this time.

Appendix A

Figures



P:\992221\CAD\Envir\992221\Production Drawings\992221-BMM-2020-05-27-CAR FIGURE 2.dwg O&M Figure 1-1 May 27, 2020 3:57pm by: bmartin2

CITY OF LAKELAND
GLENDALE WRF PERMIT RENEWAL

General Location Map

CHASTAIN-SKILLMAN, INC.

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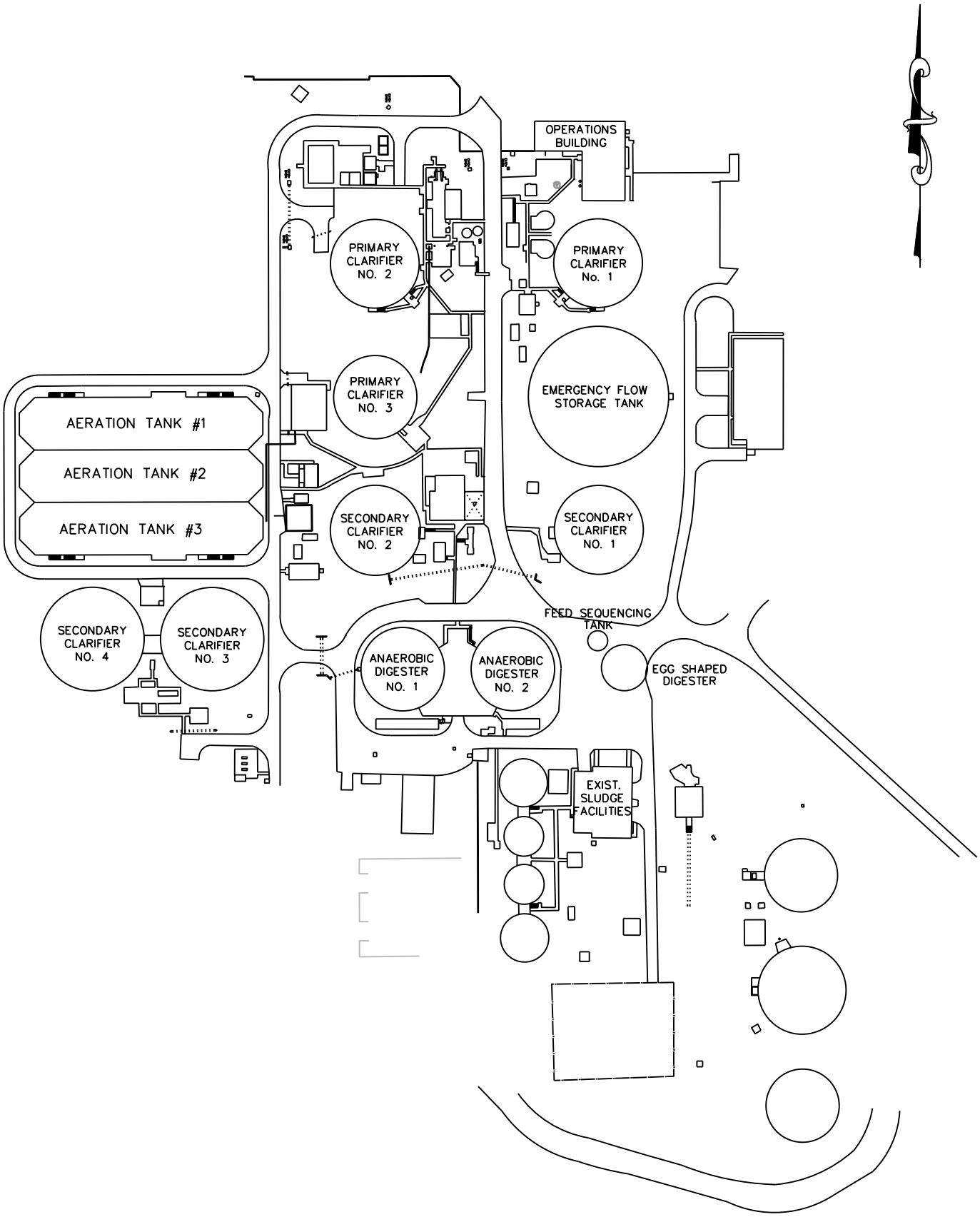
REVIEWED/APPROVED BY: BMM

PROJECT NO. 9922.21

FIGURE 1



CITY OF LAKELAND
GLENDALE WRF PERMIT RENEWAL

Site Plan

CHASTAIN-SKILLMAN, INC.

DRAWN BY: BLF

REVIEWED/APPROVED BY: BMM

PROJECT NO. 9922.21

FIGURE 2

FROM COLLECTION SYSTEM

FLW-01
INF-01

INLET STRUCTURE & SCREENS

INFLUENT LIFT STATION

FLOW SPLITTER BOX NO. 1

GRIT TANK NO. 1

GRIT PUMPS

FLOW SPLITTER BOX NO. 2

GRIT TANK NO. 2

PRIMARY CLARIFIER NO. 2
425,000 gal.

PRIMARY CLARIFIER NO. 1
425,000 gal.

GRIT CONCENTRATOR AND DEWATERING SCREENS

ROUGHING PLANT

FROM GLENDALE SEWER COLLECTION SYSTEM

HEADWORKS

TO GLENDALE SEWER COLLECTION SYSTEM

SLUDGE TO GLENDALE WRF FOR TREATMENT

WEST LAKELAND WASTELOAD REDUCTION FACILITY

RAS PUMP STATION NO. 1

PRIMARY CLARIFIER NO. 3
594,280 gal.

INTERMEDIATE LIFT STATION

AERATION TANK NO. 3
1,370,000 gal.

AERATION TANK NO. 2
1,370,000 gal.

AERATION TANK NO. 1
1,370,000 gal.

FLOW SPLITTER BOX NO. 3

SECONDARY CLARIFIER NO. 2
424,500 gal.

SECONDARY CLARIFIER NO. 1
424,500 gal.

FLOW SPLITTER BOX NO. 4

SECONDARY CLARIFIER NO. 4
822,800 gal.

SECONDARY CLARIFIER NO. 3
822,800 gal

RETURN SLUDGE

TO REUSE BASIN A
(FIGURE 4-1C)

RAS PUMP STATION NO. 2 PUMPS:
3 RETURN SLUDGE
2 WASTE SLUDGE
2 SCUM

SCUM TO HEADWORKS

PRIMARY SLUDGE TO FEED SEQUENCING TANK

SCUM LINE TO HEADWORKS

SCUM LINE TO HEADWORKS

WAS HOLDING TANKS

BELT THICKENERS

TWAS PUMPS

TWAS TO FEED SEQUENCING TANK (FIGURE 4-1B)

CITY OF LAKELAND
WASTEWATER PERMIT RENEWAL

CHASTAIN-SKILLMAN, INC.

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Glendale WRF
Process Flow Diagram

PROJECT NO. 9922.21

FIGURE 3A

P:\992221\CAD\Envir\992221\Production Drawings\992221-BMM-20-FIGURES.dwg CAR FIG 4A May 18, 2020 2:01pm by: bmartin2

ESD/FST GAS BALANCING/TRANSFER

LEGEND

- MOTOR OPERATOR
- CHECK VALVE
- 3-WAY VALVE
- ECCENTRIC PLUG VALVE
- ELECTROMAGNETIC FLOW METER
- CENTRIFUGAL PUMP
- BLOWER
- SLUDGE OR WATER LINE
- GAS LINE

FEED SEQUENCING TANK (FST)

TWAS FROM GBT

PRIMARY SLUDGE FROM PRIMARY CLARIFIERS

FST RECIRCULATION/ESD FEED/ SLUDGE TRANSFER GRINDER PUMPS

ESD BYPASS

CONNECTION FOR FUTURE ESD

CONNECTION FOR FUTURE ESD

SLUDGE GRINDER

ESD SLUDGE HEAT EXCHANGER

ESD RECIRCULATION PUMPS

THERMOPHILIC DIGESTER (ESD)

55°c

OVERFLOW

EGG-SHAPED DIGESTER AND APPURTENANCES

SLUDGE GRINDER

PLANT EFFLUENT

TO WASTE

SUPPLEMENTARY COOLING HEAT EXCHANGER

HEAT RECOVERY EXCHANGER

HOT WATER CIRCULATING PUMPS

GAS MIXING COMPRESSORS

FROM PROPANE SYSTEM

BOILER

FROM 8 GAS MIXER WATER JACKETS

TO 8 GAS MIXER WATER JACKETS

TO 8 GAS MIXERS

37°c

EXISTING MESOPHILIC DIGESTER NO. 1

FROM 8 GAS MIXER WATER JACKETS

TO 8 GAS MIXER WATER JACKETS

TO 8 GAS MIXERS

37°c

EXISTING MESOPHILIC DIGESTER NO. 2

TWO-PHASE ANAEROBIC DIGESTION SYSTEM

DIGESTED SLUDGE PUMPS

DIGESTED SLUDGE PUMPS

GAS PURIFIERS

WASTE GAS BURNER

TRUCK TO LAND DISPOSAL

CITY OF LAKELAND
WASTEWATER PERMIT RENEWAL

CHASTAIN-SKILLMAN, INC.

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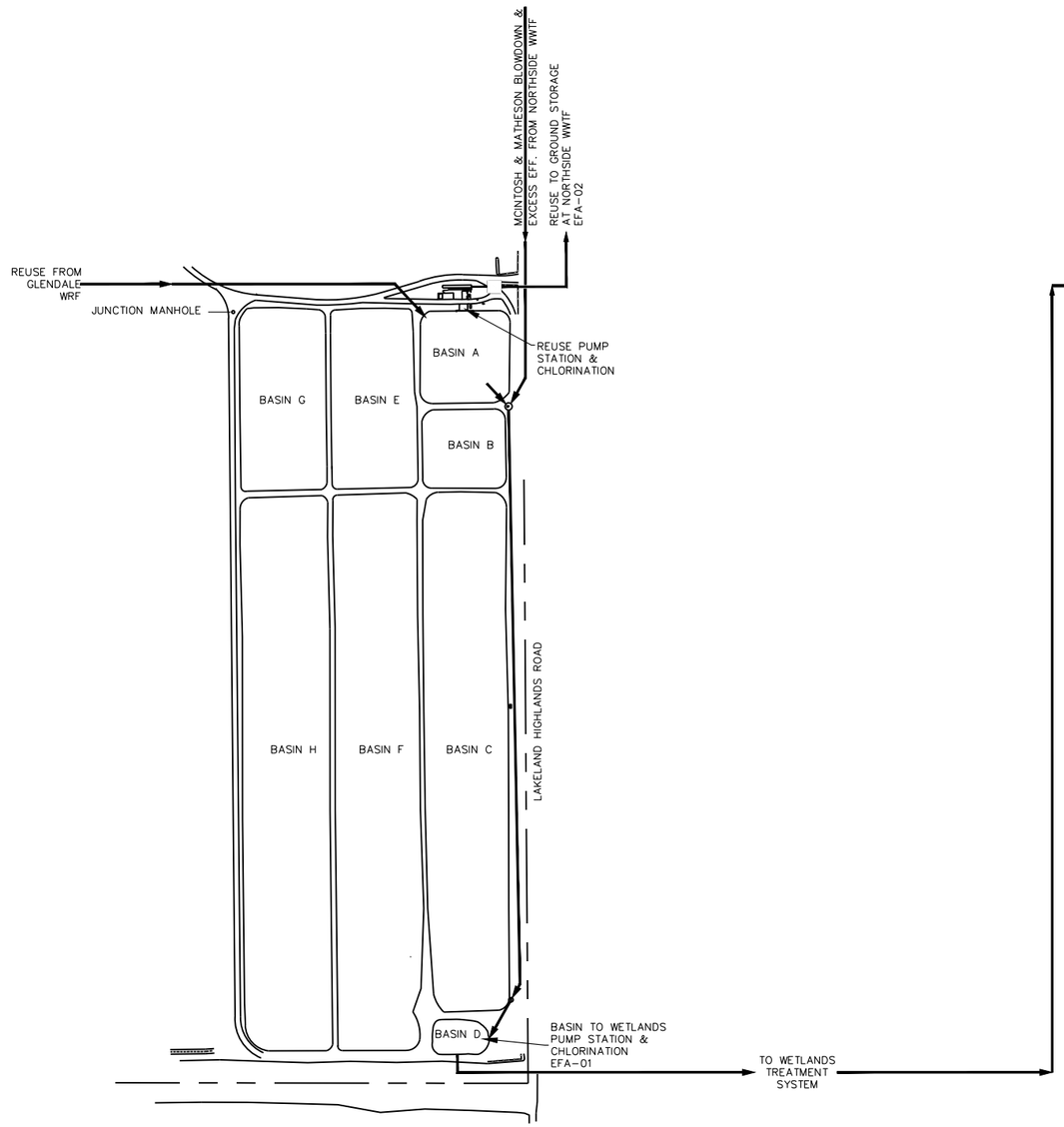
Glendale WRF
Process Flow Diagram

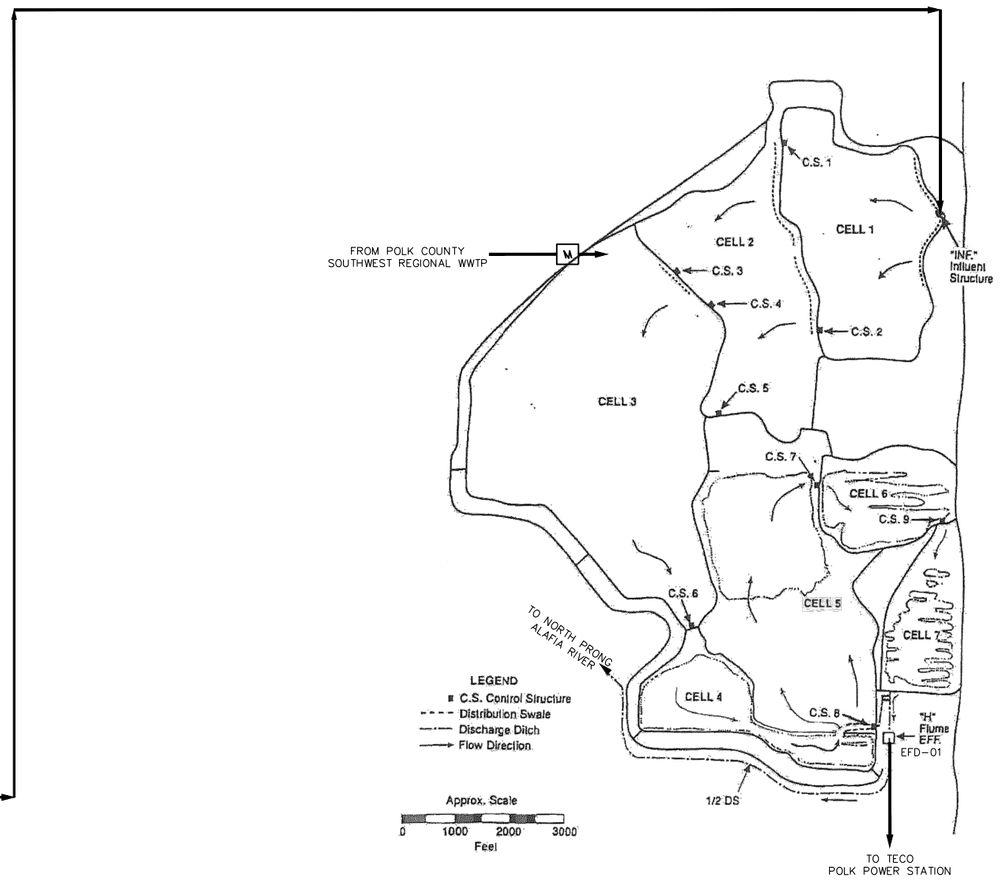
PROJECT NO. 9922.21

FIGURE 3B

P:\992221\CAD\Envir\992221\Production Drawings\992221-BMM-20-FIGURES.dwg CAR FIG 4B May 18, 2020 2:01pm by: bmartin2

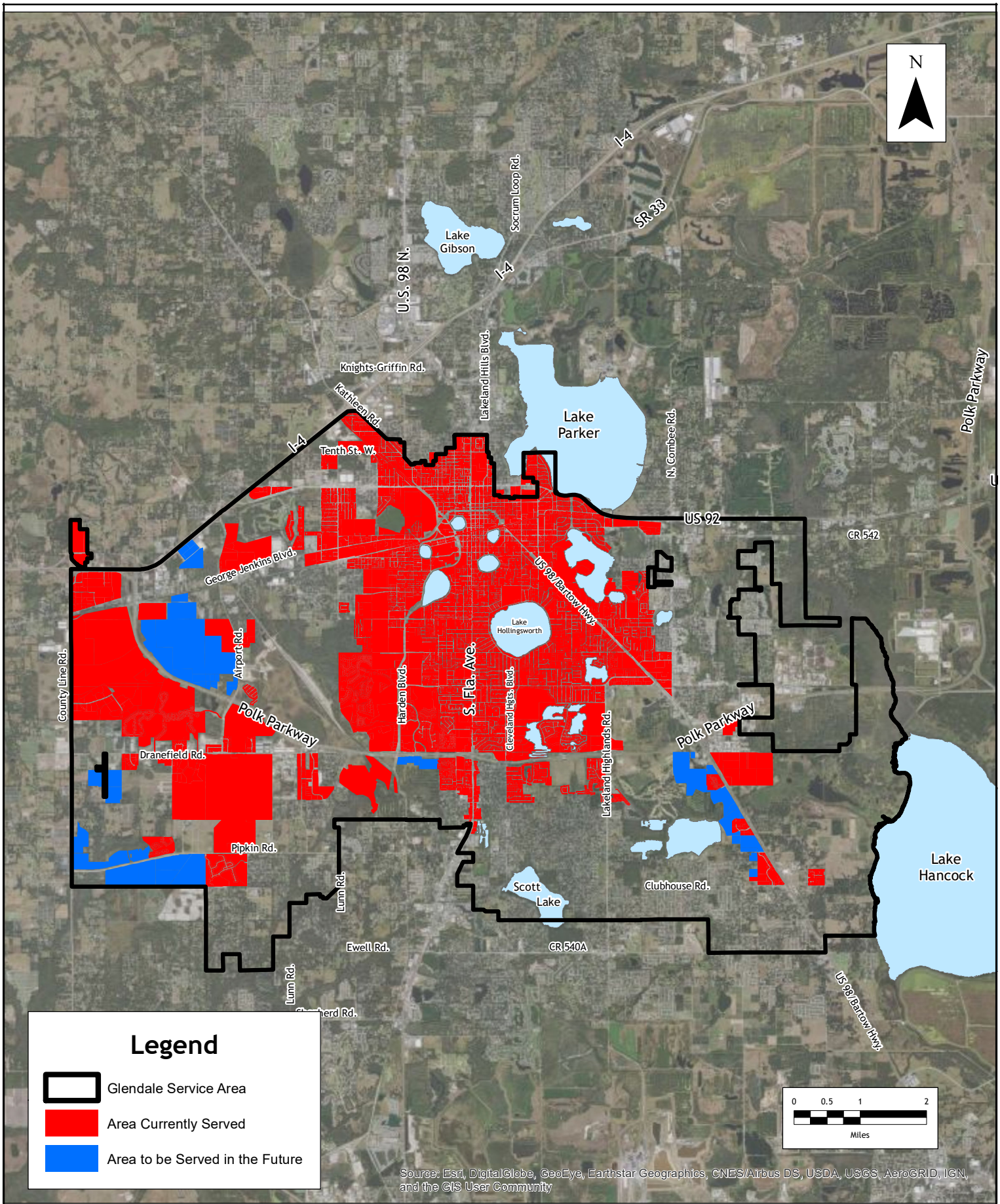


REUSE HOLDING BASINS



WETLANDS TREATMENT SYSTEM

CITY OF LAKELAND WASTEWATER PERMIT RENEWAL		Reuse Holding Basins & Wetlands Treatment System
CHASTAIN-SKILLMAN, INC.	DRAWN BY: BLF REVIEWED/APPROVED BY: BMM	PROJECT NO. 9922.21 | FIGURE 3C



CHASTAIN SKILLMAN

CITY OF LAKELAND
GLENDALE WRF
PERMIT RENEWAL

Glendale WRF Service Area

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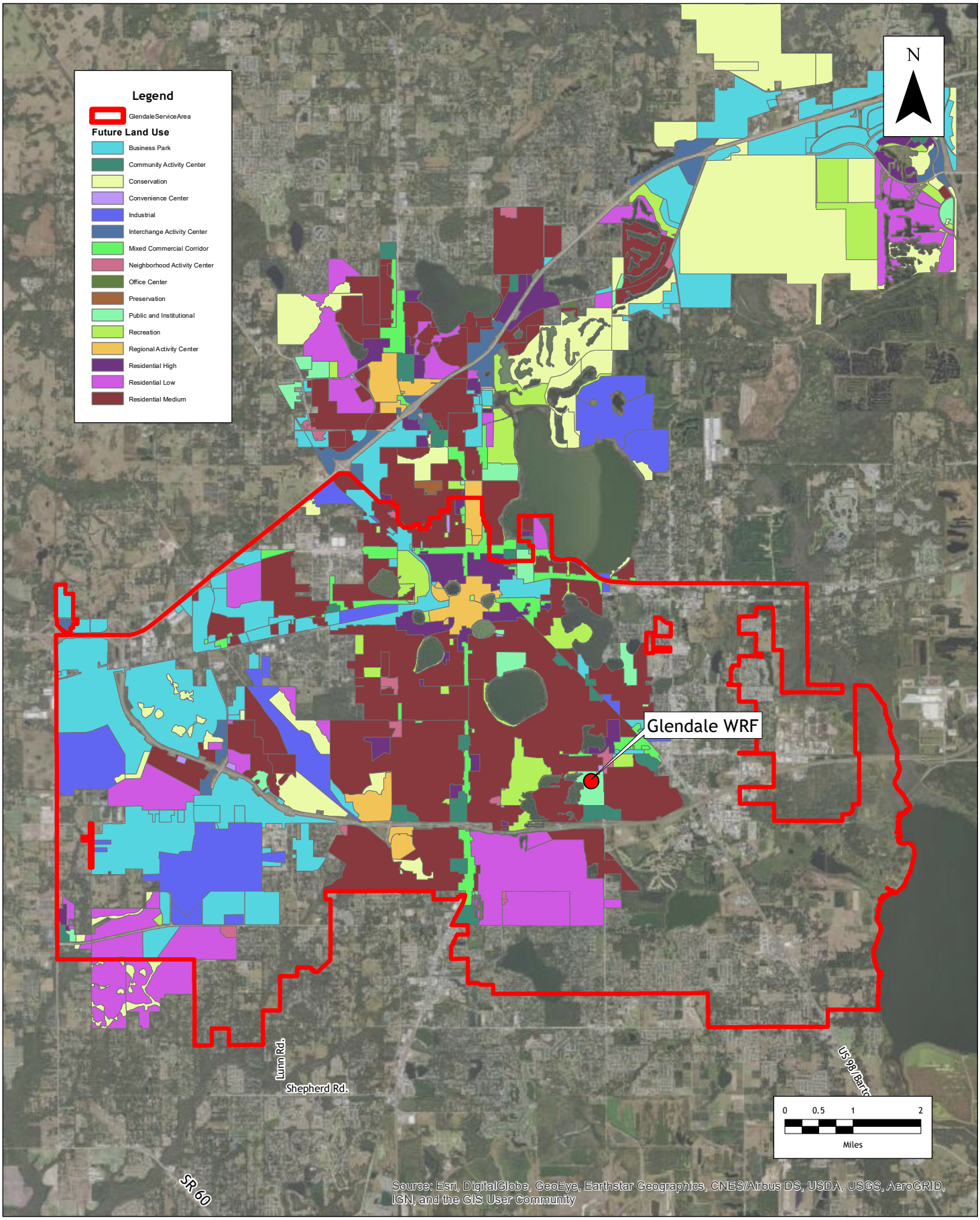
FIGURE 4



CHASTAIN SKILLMAN

CITY OF LAKELAND
GLENDALE WRF
PERMIT RENEWAL

Glendale WRF Future Land Use

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FIGURE 5

Appendix B

Historical Flows (2010-2019)

Glendale WRF Historical Flows (2010-2019)

Month/Year	Monthly ADF Total	Rolling 3-Month ADF	Rolling Annual ADF	Percent of Permitted Capacity	Permitted Capacity
Jan-10	7.220	7.060	7.566	52	13.7
Feb-10	7.500	7.280	7.576	53	13.7
Mar-10	8.180	7.633	7.656	56	13.7
Apr-10	8.160	7.947	7.753	58	13.7
May-10	7.700	8.013	7.676	58	13.7
Jun-10	8.050	7.970	7.678	58	13.7
Jul-10	9.090	8.280	7.778	60	13.7
Aug-10	10.160	9.100	7.984	66	13.7
Sep-10	9.050	9.433	8.039	69	13.7
Oct-10	7.960	9.057	8.086	66	13.7
Nov-10	7.920	8.310	8.176	61	13.7
Dec-10	7.330	7.737	8.193	56	13.7
Jan-11	7.960	7.737	8.255	56	13.7
Feb-11	8.010	7.767	8.298	57	13.7
Mar-11	7.480	7.817	8.239	57	13.7
Apr-11	8.090	7.860	8.233	57	13.7
May-11	6.630	7.400	8.144	54	13.7
Jun-11	7.550	7.423	8.103	54	13.7
Jul-11	8.640	7.607	8.065	56	13.7
Aug-11	9.760	8.650	8.032	63	13.7
Sep-11	9.930	9.443	8.105	69	13.7
Oct-11	9.960	9.883	8.272	72	13.7
Nov-11	8.720	9.537	8.338	70	13.7
Dec-11	7.870	8.850	8.383	65	13.7
Jan-12	7.340	7.977	8.332	58	13.7
Feb-12	7.490	7.567	8.288	55	13.7
Mar-12	7.290	7.373	8.273	54	13.7
Apr-12	7.020	7.267	8.183	53	13.7
May-12	6.970	7.093	8.212	52	13.7
Jun-12	8.670	7.553	8.305	55	13.7
Jul-12	9.450	8.363	8.373	61	13.7
Aug-12	9.020	9.047	8.311	66	13.7
Sep-12	9.770	9.413	8.298	69	13.7
Oct-12	8.960	9.250	8.214	68	13.7
Nov-12	7.670	8.800	8.127	64	13.7
Dec-12	7.470	8.033	8.093	59	13.7
Jan-13	7.025	7.388	8.067	54	13.7
Feb-13	7.419	7.305	8.061	53	13.7
Mar-13	7.388	7.277	8.069	53	13.7
Apr-13	7.524	7.444	8.111	54	13.7
May-13	7.234	7.382	8.133	54	13.7
Jun-13	8.340	7.699	8.106	56	13.7
Jul-13	10.122	8.565	8.162	63	13.7
Aug-13	10.025	9.496	8.246	69	13.7
Sep-13	10.118	10.088	8.275	74	13.7
Oct-13	8.676	9.606	8.251	70	13.7
Nov-13	8.438	9.077	8.315	66	13.7
Dec-13	7.244	8.119	8.296	59	13.7

Glendale WRF Historical Flows (2010-2019)

Month/Year	Monthly ADF Total	Rolling 3-Month ADF	Rolling Annual ADF	Percent of Permitted Capacity	Permitted Capacity
Jan-14	8.026	7.903	8.380	58	13.7
Feb-14	7.913	7.728	8.421	56	13.7
Mar-14	9.093	8.344	8.563	61	13.7
Apr-14	8.218	8.408	8.621	61	13.7
May-14	8.792	8.701	8.750	64	13.7
Jun-14	8.503	8.504	8.764	62	13.7
Jul-14	10.071	9.122	8.760	67	13.7
Aug-14	8.618	9.064	8.643	66	13.7
Sep-14	10.293	9.661	8.657	71	13.7
Oct-14	8.998	9.303	8.684	68	13.7
Nov-14	9.469	9.587	8.770	70	13.7
Dec-14	8.611	9.026	8.884	66	13.7
Jan-15	8.920	9.000	8.958	66	13.7
Feb-15	8.880	8.804	9.039	64	13.7
Mar-15	9.270	9.023	9.054	66	13.7
Apr-15	9.020	9.057	9.120	66	13.7
May-15	7.280	8.523	8.994	62	13.7
Jun-15	7.230	7.843	8.888	57	13.7
Jul-15	8.720	7.743	8.776	57	13.7
Aug-15	11.890	9.280	9.048	68	13.7
Sep-15	10.370	10.327	9.055	75	13.7
Oct-15	8.850	10.370	9.043	76	13.7
Nov-15	8.730	9.317	8.981	68	13.7
Dec-15	8.080	8.553	8.937	62	13.7
Jan-16	8.360	8.390	8.890	61	13.7
Feb-16	7.300	7.913	8.758	58	13.7
Mar-16	8.150	7.937	8.665	58	13.7
Apr-16	7.540	7.663	8.542	56	13.7
May-16	7.550	7.747	8.564	57	13.7
Jun-16	9.950	8.347	8.791	61	13.7
Jul-16	9.490	8.997	8.855	66	13.7
Aug-16	10.400	9.947	8.731	73	13.7
Sep-16	12.000	10.630	8.867	78	13.7
Oct-16	14.330	12.243	9.323	89	13.7
Nov-16	7.490	11.273	9.220	82	13.7
Dec-16	7.170	9.663	9.144	71	13.7
Jan-17	7.090	7.250	9.038	53	13.7
Feb-17	7.050	7.103	9.018	52	13.7
Mar-17	7.170	7.103	8.936	52	13.7
Apr-17	6.520	6.913	8.851	50	13.7
May-17	5.600	6.430	8.688	47	13.7
Jun-17	7.660	6.593	8.498	48	13.7
Jul-17	8.340	7.200	8.402	53	13.7
Aug-17	10.160	8.720	8.382	64	13.7
Sep-17	12.170	10.223	8.396	75	13.7
Oct-17	8.440	10.257	7.905	75	13.7
Nov-17	6.690	9.100	7.838	66	13.7
Dec-17	6.130	7.087	7.752	52	13.7

Glendale WRF Historical Flows (2010-2019)

Month/Year	Monthly ADF Total	Rolling 3-Month ADF	Rolling Annual ADF	Percent of Permitted Capacity	Permitted Capacity
Jan-18	6.070	6.297	7.667	46	13.7
Feb-18	6.770	6.323	7.643	46	13.7
Mar-18	6.020	6.287	7.548	46	13.7
Apr-18	6.100	6.297	7.513	46	13.7
May-18	9.070	7.063	7.802	52	13.7
Jun-18	11.100	8.757	8.088	64	13.7
Jul-18	12.900	11.023	8.468	80	13.7
Aug-18	10.320	11.440	8.482	84	13.7
Sep-18	8.510	10.577	8.177	77	13.7
Oct-18	7.000	8.610	8.057	63	13.7
Nov-18	6.340	7.283	8.028	53	13.7
Dec-18	7.840	7.060	8.170	52	13.7
Jan-19	7.850	7.343	8.318	54	13.7
Feb-19	8.340	8.010	8.449	58	13.7
Mar-19	7.360	7.850	8.561	57	13.7
Apr-19	6.690	7.463	8.610	54	13.7
May-19	6.450	6.833	8.392	50	13.7
Jun-19	7.620	6.920	8.102	51	13.7
Jul-19	8.480	7.517	7.733	55	13.7
Aug-19	10.910	9.003	7.783	66	13.7
Sep-19	8.370	9.253	7.771	68	13.7
Oct-19	8.350	9.210	7.883	67	13.7
Nov-19	7.770	8.163	8.003	60	13.7
Dec-19	7.160	7.760	7.946	57	13.7