

3 PROJECTED POPULATION, WASTEWATER FLOW AND QUALITY

3.1 Population and Development Projections Methodology

The Okeechobee County area has seen a substantial increase in population over the last twenty six years. As land along the east coast of Florida is developed, population growth has moved inward to the inland counties where waterfront property is still available. The north Okeechobee Lake area is popular because it offers waterfront living for a fraction of the cost of coastal areas in Florida. Based upon the 2006 Census, the total population of Okeechobee County was 40,406. This is up from 20,264 in 1980, an increase of 2.7% per year. The census predicts that by 2030 the population of Okeechobee County will increase to 45,713. This is an increase of approximately 0.5% per year. This seems to be a reasonable rate as much of the area closest to the Lake yet to be developed is much less than what was available in the past 26 years. For the purposes of this study a 0.5% annual increase was used in calculating future growth.

3.1.1 Comprehensive Plans/Planning Documents

The northern rim of Lake Okeechobee has developed into a popular retirement and seasonal residential community. The mild winters in central Florida, as well as the natural resources available at the Lake, combine to encourage development in the region.

Currently, many of the existing developments either have small package wastewater treatment plants or individual septic tanks. Concerns for the health of Lake Okeechobee, especially phosphorus loading, are driving the implementation of alternatives to reduce phosphorus loading to the Lake by providing additional publicly owned wastewater collection and treatment facilities.

The Water Management District developed a pollution load reduction goal for Lake Okeechobee for 40 percent reduction in phosphorus loading from the watershed, based upon the conditions that existed from 1973 to 1979. This percent reduction is necessary to achieve the trophic state and biological integrity of the Lake. In 2001, a phosphorus total maximum daily load (TMDL) of 140 tons per year was established for the Lake in an effort to achieve the in-lake phosphorus concentration of 40 ppb (Lake Okeechobee Surface Water Improvement and Management

(SWIM) Plan, February 28, 2003, SFWMD). State and local agencies are cooperating in many efforts to reduce the total phosphorus loading in the lake to meet the TMDL. Wetland treatment systems for surface water have been planned and water hyacinths are being used in controlled facilities to reduce phosphorus in the water prior to discharging into Lake Okeechobee.

Every activity that reduces phosphorus is valuable. The Authority will contribute to these efforts by providing a regional sewerage system for the connection of existing package plants and septic tanks, thereby removing phosphorus loadings from these sources. Upon completion of the Authority expansion program described in this report, it is estimated that phosphorus loading in the Lake will be reduced by approximately 17 metric tons per year.

3.1.2 Planned Developments and Projected Growth Areas

In order to identify and analyze development areas in this study, the Authority service area was divided into several subareas. Figure 3-1 shows the defined development areas. Individual area maps can be found in Appendix B. Many of these areas are already developed, but will infill over the next 25 years. As can be seen from Figure 3-1, the red outlined areas are those which are in the closest proximity to Lake Okeechobee and are therefore more important in the plan to reduce phosphorus output to the Lake. As a result of the Ousley Service area Vacuum Sewer System project and Taylor Creek Isles project, portions of these areas have now been connected to the sewer system feeding to the Cemetery WWTP. The three areas that are included in this most proximal area are **Area 3** (which includes Treasure Island and King's Bay), **Area 2** (which includes the Big O RV Park), and **Area 1**, which is inside of Glades County and includes the Buckhead Ridge Area. The second closest areas in proximity to Lake Okeechobee, as defined on the map, are **Area 4**, which includes the Blue Heron Country Club, Bet Her Acres, Okeechobee Estates, and **Area 5**, which includes Connors Gables, Cedar Cove, Pine Ridge, Sherman Wood Ranches, and others. One of the third most proximal areas to Lake Okeechobee is **Area 6** which is the City of Okeechobee Area. The other area that is considered third most proximal to Lake Okeechobee is **Area 7** and contains the Railroad Addition, Wright & Bass Subdivision, Southern Pines, Carey Subdivision, Bass Subdivision, and others. The areas farthest from Lake Okeechobee are **Areas 8, Area 9 and Area 10**. These areas include the R Bar Area, Basswood Area, and Playland Area, respectively.

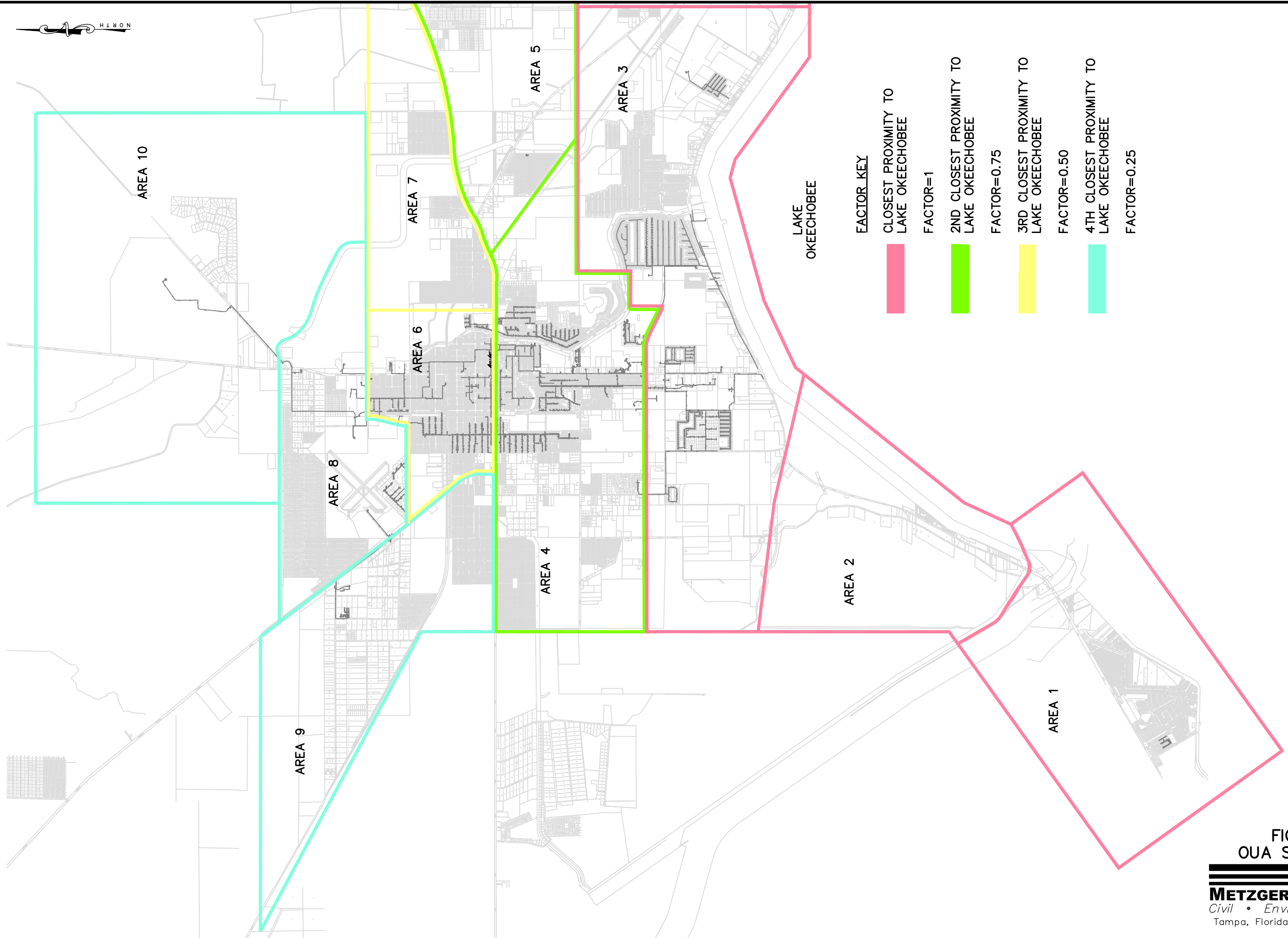


FIGURE 3-1
OUA SERVICE AREA

Area 1

Area 1 is the one OUA area found outside of Okeechobee County. **Area 1** is inside of Glades County and contains the Buckhead Ridge subdivision. This area has an existing development of approximately 1,340 residential lots, 276 RV lots, 3 clubhouse units, 5 businesses, and a wastewater Package plant. There are two section/township/ranges found in this area: 19/38/35 and 25/38/34. At a one half percent growth rate per year over the next 25 years, there will be approximately 1,526 residential units, 314 RV units, 3 clubhouse units, and 6 businesses to be served in this area. Okeechobee Utility Authority plans to hook-up **Area 1** to sewers beginning in 2015.

Area 2

Area 2 contains the McIntyre Mobile Home Park, Big O RV Park, Eagle Bay, and Casablanca consisting of approximately 244 residential lots, 472 RV lots, 2 clubhouses, 6 businesses, and a wastewater package plant. The following section/township/ranges are found in this area: 05/38/35, 04/38/35, 06/38/35, 01/38/35, 08/38/35, 17/38/35, 18/38/35, and 19/38/35. At a one half percent growth rate per year over the next 25 years, there may be approximately 278 residential units, 537 RV units, 2 clubhouses, and 7 businesses to be served in this area. Okeechobee Utility Authority plans to begin removing existing septic systems and installing a sewer system into **Area 2** in 2013. The full development of **Area 2** and the Glades area will require the development of a Western Regional Pump Station.

Area 3

For the purposes of this report, **Area 3** is defined as the area that includes Treasure Island, Taylor Creek Isles, Eagle Point, Seminole Cove, Ousley Estates, Palm Village Ranch, Brindaban Forest, Hi-Lo Acres, Eagle's Nest Lake, Larkee Lakes, Oak Hammock, Quail Woods, Suncreek Ranch, West Sherman, Pioneer Estates, Ancient Oaks RV Park, Okeechobee Hammocks, Trinkle Estates, Oasis Village, Powell, Heritage Village, and King's Bay subdivisions. It should be noted that Taylor Creek Isles, Seminole Cove, Ousley Estates, Palm Village Ranch, and Oasis Village are already sewered. The section/township/ranges that are included in the defined area are as

follows: 33/37/35, 36/37/35, 25/37/35, 35/37/35, 03/38/36, 31/37/36, 05/38/36, 32/37/36, 06/38/36, 04/38/36, 09/38/36, 30/37/36, 33/37/36, 34/37/36, 28/37/35, 04/38/35, 06/38/35, 27/37/35. This area consists of approximately 1,551 residential units, 950 RV units, 8 clubhouses, 41 businesses, and a wastewater package plant. **Area 3** is in an area of great importance to decrease the phosphorus input into Lake Okeechobee. It is believed that failing drain fields in **Area 3** allow seepage of nutrients and pollution into canals and Taylor Creek, which directly flow into the Lake. Based upon a one half percent growth level per year over the next 25 years, there will be approximately 1,766 residential units, 1,082 RV units, 9 clubhouses, 47 businesses and 700 public school students to be served in this area. Okeechobee Utility Authority will remove existing septic systems and install a sewer system into **Area 3** beginning in 2009.

Area 4

Area 4 contains the following mobile home parks or subdivisions: Sunset Park, Legacy Court, Brooklyn Park, Pine Acres, Gloria's Dell, Oak Park, Southwest Addition, Winta Park, Sloan's Subdivision, Okeechobee Heights, Petit Park, Gerald Rucks Subdivision, River Lakes, Old Dixie, Belvedere Lawn, Central Park, City of Okeechobee Proper, First Addition to the City of Okeechobee, South Okeechobee, Palm Creek Estates, Renfro Park, Oak Lake Estates, Riverside Park, Granada Terrace, Wilcox Shores, Okeechobee Development Company, Airi Acres, Okeechobee Estates, and Blue Heron Country Club. The following section/townships/ranges cover the Blue Heron CC Area (**Area 4**): 20/37/34, 21/37/35, 19/37/35, 29/37/35, 15/37/35, 22/37/35, 14/37/35, 24/37/35, 23/37/35, 28/37/35, and 30/37/35. This area has an existing development of approximately 1,338 residential lots, 100 RV lots, 13 Clubhouse units, 43 businesses, 2,800 public school students and a wastewater package plant. At a one half percent growth rate per year over the next 25 years, there will be approximately 1,523 residential lots, 114 RV lots, 15 clubhouse units, 49 businesses, and 3,188 public school students to be service in this area. Okeechobee Utility Authority is proposed to be hooked-up to sewers in **Area 4** in 2018. The sewerage in **Area 4** is proposed to be hooked up to the Eastern Force Main that is currently being designed by Boyle Engineering.

Area 5

Area 5 includes the following mobile home parks and subdivisions: Conners Gables, First Addition to Pine Ridge Park, West Sherman, Sherman Wood Ranches, Cypress Creek, Cypress Creek Phase I, Four Season Estates, Cedar Cove II, and Rosewood Estates. The area is covered by the following combinations of section/township/ranges: 14/37/35, 24/37/35, 18/37/36, 17/37/36, 20/37/36, 16/37/36, 21/37/36, 08/37/36, 08/37/36, 30/37/36, 29/37/36, and 22/37/35. This area has an existing development of approximately 251 residential lots, 5 RV lots, 2 clubhouse units, 3 businesses, 1 wastewater package plant, and 700 public school students. At a one half percent growth rate per year over the next 25 years, there will be approximately 286 residential lots, 6 RV lots, 2 clubhouse units, 3 businesses, and 797 public school students to be served in this area. Okeechobee Utility Authority is proposed to begin hook-up to sewers of **Area 5** in 2020. The sewerage in **Area 5** is proposed to be hooked up to the Eastern force main that is currently being designed by Boyle Engineering.

Area 6

Area 6 is already sewerred but will require expansion do to infill. **Area 6** includes the City of Okeechobee proper, the Northwest Addition, Conners Highlands, Bass Subdivision, River Run, Okeechobee Park, and Parkwest Subdivision. The section/township/range combinations that cover this area are as follows: 15/37/35, 16/37/35, and 17/37/35. It is important to note that the majority of the City of Okeechobee is already sewerred, but the amount of phosphorus that it would contribute to the Lake would increase as infill to this area increases over the next 25 years. Okeechobee Utility Authority will increase connections to sewers within the City of Okeechobee Area as development occurs. This area has an existing development of approximately 367 residential lots, 41 RV lots, 5 clubhouse units, 108 businesses, 1 WWTP, and 2,100 public school students. At a one half percent growth rate per year over the next 25 years, there will be approximately 418 residential lots, 47 RV lots, 6 clubhouse units, 123 businesses, and 2,391 public school students to be served in this area.

Area 7

Area 7 contains Okeechobee Gardens, Pine Ridge Park, Wright & Bass Subdivision, Southern Pines, Carey Subdivision and Riverside Park. The section/township/range combinations that cover this area include: 07/37/36, 18/37/36, 12/37/35, 15/37/35, 13/37/35, 14/37/35, 11/37/35, 08/37/36, 10/37/35, 17/37/36, 09/37/36 and 24/36/35. This area has an existing development of approximately 270 residential lots, 14 RV lots, 1 clubhouse unit, 32 businesses, and 1 wastewater Package Plant. At a one half percent growth rate per year over the next 25 years, there will be approximately 307 residential lots, 16 RV lots, 1 clubhouse units, 36 businesses to be served in this area. The sewerage in the **Area 7** is proposed to be hooked up to the Eastern force main that is currently being designed by Boyle Engineering. Okeechobee Utility Authority is proposed to begin hook-up to sewers of **Area 7** in 2023.

Area 8

Area 8 is adjacent to the Okeechobee Airport and includes the Basswood subdivision as well as Whispering Pines and Tropical Gardens. **Area 8** includes the following section/township/range combinations: 05/37/35, 04/37/35, 08/37/35, 03/37/35, 10/37/35, 09/37/35, 03/37/35, 17/37/35 and 09/37/35. This area has an existing development of approximately 901 residential lots, 62 RV lots, 14 businesses, 4 clubhouse units, 1 wastewater package plant and 3,495 students. At a one half percent growth rate per year over the next 25 years, there will be approximately 1,026 residential lots, 71 RV lots, 5 clubhouse units, 16 businesses, and 3,979 public school students to be served in this area. The sewerage in **Area 8** is proposed to be hooked up to an existing force main. Okeechobee Utility Authority is proposed to begin hook-up to sewers of the **Area 8** in 2028.

Area 9

Area 9 includes Playland RV Park, El Mira Sol, Okeechobee Park, and other unspecified areas, including section/township/range combinations 12/37/34, 07/37/35, 17/37/35, 02/37/34, 01/37/34 and 18/37/35. **Area 9** has an existing development of approximately 926 residential lots, 100 RV lots, 37 businesses, 6 clubhouse units, 1 wastewater package

plant and 950 students. At a one half percent growth level over the next 25 years, there will be approximately 1,054 residential lots, 114 RV lots, 7 clubhouse units, 42 businesses, and 1,082 public school students to be served in this area. The sewerage in the **Area 9** is proposed to be hooked up to a new Western force main. Okeechobee Utility Authority will be proposed to be hooked up to sewers of the **Area 9** in 2031.

Area 10

Area 10 includes JH Taylor Estates, Daniel Subdivision, Amber Acres, Evergreen Cemetery, and R Bar Estates. The section/township/range combinations included in this area are: 28/36/35, 27/36/35, 33/36/35, 26/36/35, 35/36/35, 34/36/35, 36/36/35, 32/36/35, 04/37/35, 05/37/35, 03/37/35, and 02/37/35. **Area 10** has an existing development of approximately 99 residential lots, 59 RV lots, 7 businesses, and 1 wastewater package plant. At a one half percent growth level over the next 25 years, there will be approximately 113 residential lots, 67 RV lots, 8 businesses to be served in this area. The sewerage in **Area 10** is proposed to be hooked up to the Eastern force main that is currently being designed by Boyle Engineering. Okeechobee Utility Authority is proposed to begin hook-up to sewers of **Area 10** in 2026.

3.1.3 Updated Flow Criteria (ERCs)

An Equivalent Residential Connection (ERC) was used in determining the existing flows and in projecting future flows. As shown in Section 3.1.2 above, the number of residences, RV Lots, businesses and clubhouses for each development area were obtained from property appraiser records and converted to ERCs based on the following criteria:

≥ 900 Square Feet = 1 ERC

$\geq 400 < 900$ Square Feet = 0.8 ERC

< 400 Square Feet = 0.33 ERC

For this study a rate of 250 Gallons per day per ERC was used in calculating the flows. School population was obtained from Okeechobee County School Board. A flow of 29 gallons per student was used for present and projected flow calculations.

Projected flows for this study were developed based upon system growth anticipated from infill, inclusion of existing package plants that are removed from service and collection system expansion.

3.2 Existing Flows

Existing flows for each area were calculated using the criteria above. Phosphorus concentration of 4.09 mg/L was used to calculate phosphorus load as per section 1.3.1. Table 3-1 below represents the present area flows and estimated existing phosphorus contribution to Lake Okeechobee. Areas 4 and 6 were not included in the calculation as the majority of these two areas are already sewered and pumped to the Cemetery Road WWTP. It is estimated that presently the planned area is contributing approximately 11.25 metric tons per year of phosphorus to Lake Okeechobee.

Table 3-1. Estimated existing phosphorus contribution to Lake Okeechobee based on 2007 population.

<u>Area</u>	<u>Flow, GPD</u>	<u>Phosphorus(Metric Tons/Year)</u>
Area 3 (Treasure Island)	607,900	3.43
Area 6 (City of Okeechobee)	186,123	----
Area 2 (Big O RV Area)	170,591	0.96
Area 1 (Glades Area)	390,556	2.21
Area 4 (Blue Heron CC)	441,909	----
Area 5 (Conner Gables)	83,463	0.47
Area 7 (Railroad Addition)	76,470	0.43
Area 10 (R Bar Estates Area)	39,332	0.22
Area 8 (Basswood Area)	338,286	1.91
Area 9 (Playland Area)	285,302	1.61
Total	2,619,932	11.25

Historical flows at the existing WWTP from January 1986 through November 2007 are shown in Appendix C. Figure 3-2 below shows the historical rate of increased average monthly flow over the last 22 years of approximately 4.6% per year with strong increases between 1994 and 1997 and 2002 to 2005. These huge increases can be attributed to expansion of the service area and growth of existing service areas. The plant is seeing an average daily flow of approximately 0.8

MGD with peaks close to 0.9 MGD. As stated earlier, construction is underway on the expansion of the facility.

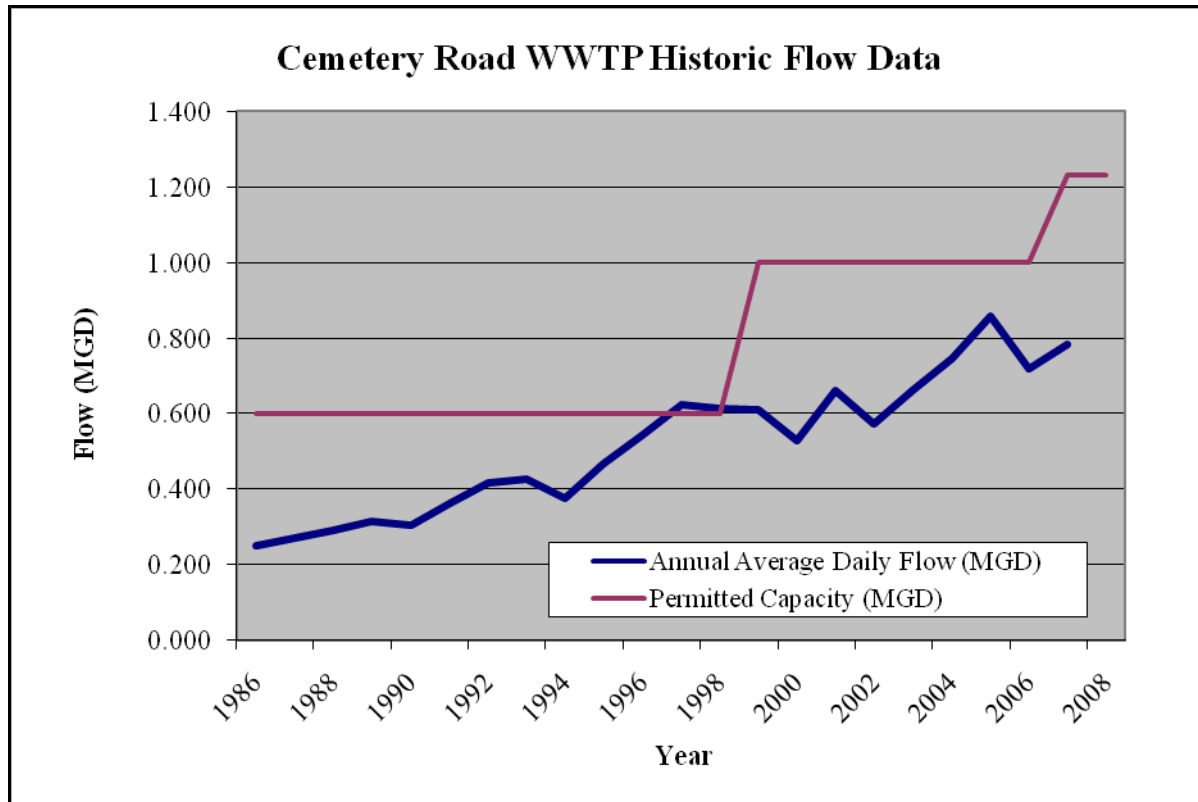


Figure 3-2. Cemetery Road WWTP Historical Average Monthly Flows

3.3 Projected Flows

Projected flows were calculated by taking the current number of residences, businesses, clubs, RV lots and school population numbers and increasing them by 0.5 percent a year over the next 25 years converting to ERCs and calculating flows based on section 3.1.3 above. Table 3-2 below shows the projected flow and annual phosphate loading in the year 2033. This increase in phosphorus in metric ton units per year is without any sewage connections, just population growth. If the proposed sewer systems are not constructed, there will be a 50 percent increase in the amount of phosphorus entering Lake Okeechobee from residences, businesses, agricultural uses, and schools by 2033 than is seen today.

Table 3-2. Projected Phosphorus Input to Authority Regional WWTP by the year 2033

<u>Area</u>	<u>Flow, GPD</u>	<u>Phosphorus (Metric Tons/Year)</u>
Area 3 (Treasure Island)	692,070	3.91
Area 6 (City of Okeechobee)	211,893	1.20
Area 2 (Big O RV Area)	194,211	1.10
Area 1 (Glades Area)	444,632	2.51
Area 4 (Blue Heron CC)	503,096	2.84
Area 5 (Conner Gables)	95,020	0.54
Area 7(Railroad Addition)	87,058	0.49
Area 10 (R Bar Estates Area)	44,778	0.25
Area 8 (Basswood Area)	385,125	2.17
Area 9 (Playland Area)	324,805	1.83
Total	2,982,687	16.84

3.4 Collection System Expansion Scheduling

A proposed schedule was developed for the sewerage of the 10 areas outlined in the study to develop a collection system expansion program. The proposed collection system expansion program was based on projected flow, phosphorus load reduction and funding. Projected flows are shown in Table 3-3. A projected wastewater flow is illustrated in Figure 3-3 incorporating the expansion schedule for the plant.

The WWTP was originally designed to be expanded in one MGD increments. Initially, planning included adding a 1.0 MGD expansion to the existing facility; however, due to rate of increasing flows and costs for constructing an additional 1.0 MGD capacity, while keeping the existing plant in operation without interruption and without violation of the operating permit, made it more desirable and cost effective to construct the new expansion as 2.0 MGD, at minimum.

Table 3-3. Projected Flows For Cemetary Road WWTP

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Area 1 (Glades Area)	390,556	392,509	394,471	396,444	398,426	400,418	402,420	404,432	406,454	408,487	410,529	412,582	414,645	416,718
Area 2 (Big O RV Area)	170,591	171,444	172,301	173,163	174,029	174,899	175,773	176,652	177,535	178,423	179,315	180,212	181,113	182,018
Area 3 (Treasure Island)	607,900	610,940	613,994	617,064	620,150	623,250	626,367	629,499	632,646	635,809	638,988	642,183	645,394	648,621
Area 4 (Blue Heron CC)	441,909	444,119	446,340	448,571	450,814	453,068	455,334	457,610	459,898	462,198	464,509	466,831	469,165	471,511
Area 5 (Conner Gables)	83,463	83,881	84,300	84,722	85,145	85,571	85,999	86,429	86,861	87,295	87,732	88,170	88,611	89,054
Area 6 (City of Okeechobee - Infill)	186,123	187,053	187,989	188,929	189,873	190,823	191,777	192,736	193,699	194,668	195,641	196,619	197,602	198,590
Area 7 (Railroad Addition Area)	76,470	76,852	77,236	77,623	78,011	78,401	78,793	79,187	79,583	79,981	80,380	80,782	81,186	81,592
Area 8 (Basswood Area)	338,286	339,977	341,677	343,385	345,102	346,828	348,562	350,305	352,056	353,817	355,586	357,364	359,150	360,946
Area 9 (Playland Area)	285,302	286,729	288,162	289,603	291,051	292,506	293,969	295,439	296,916	298,401	299,893	301,392	302,899	304,413
Area 10 (R Bar Estates Area)	39,332	39,528	39,726	39,925	40,124	40,325	40,527	40,729	40,933	41,137	41,343	41,550	41,758	41,966
Total To Plant			613,994	805,993	810,023	814,073	993,917	998,886	1,410,335	1,417,387	1,424,474	1,898,427	1,907,919	2,006,513
Existing Plant Flow with 0.5% infill	800,000	804,000	808,020	812,060	816,120	820,201	824,302	828,424	832,566	836,728	840,912	845,117	849,342	853,589
Total Plant Flow	800,000	804,000	1,422,014	1,618,053	1,626,143	1,634,274	1,818,219	1,827,310	2,242,901	2,254,115	2,265,386	2,743,544	2,757,262	2,860,102
	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	
Area 1 (Glades Area)	418,801	420,895	423,000	425,115	427,241	429,377	431,524	433,681	435,850	438,029	440,219	442,420	444,632	
Area 2 (Big O RV Area)	182,928	183,843	184,762	185,686	186,615	187,548	188,485	189,428	190,375	191,327	192,283	193,245	194,211	
Area 3 (Treasure Island)	651,864	655,124	658,399	661,691	665,000	668,325	671,666	675,025	678,400	681,792	685,201	688,627	692,070	
Area 4 (Blue Heron CC)	473,869	476,238	478,619	481,012	483,417	485,835	488,264	490,705	493,159	495,624	498,103	500,593	503,096	
Area 5 (Conner Gables)	89,500	89,947	90,397	90,849	91,303	91,760	92,218	92,679	93,143	93,609	94,077	94,547	95,020	
Area 6 (City of Okeechobee - Infill)	199,583	200,581	201,584	202,592	203,605	204,623	205,646	206,674	207,708	208,746	209,790	210,839	211,893	
Area 7 (Railroad Addition Area)	82,000	82,410	82,822	83,236	83,652	84,071	84,491	84,914	85,338	85,765	86,194	86,625	87,058	
Area 8 (Basswood Area)	362,751	364,565	366,387	368,219	370,061	371,911	373,770	375,639	377,517	379,405	381,302	383,209	385,125	
Area 9 (Playland Area)	305,935	307,465	309,002		312,100	313,661	315,229	316,805	318,389	319,981	321,581	323,189	324,805	
Area 10 (R Bar Estates Area)	42,176	42,387	42,599	42,812	43,026	43,241	43,457	43,675	43,893	44,113	44,333	44,555	44,778	
Total To Plant	2,016,546	2,026,629	2,119,584	2,130,182	2,140,833	2,194,778	2,205,752	2,592,420	2,605,382	2,618,409	2,953,082	2,967,848	2,982,687	
Existing Plant Flow with 0.5% infill	857,857	862,146	866,457	870,789	875,143	879,519	883,916	888,336	892,778	897,242	901,728	906,236	910,768	
Total Plant Flow	2,874,403	2,888,775	2,986,041	3,000,971	3,015,976	3,074,297	3,089,669	3,480,756	3,498,160	3,515,651	3,854,810	3,874,084	3,893,455	

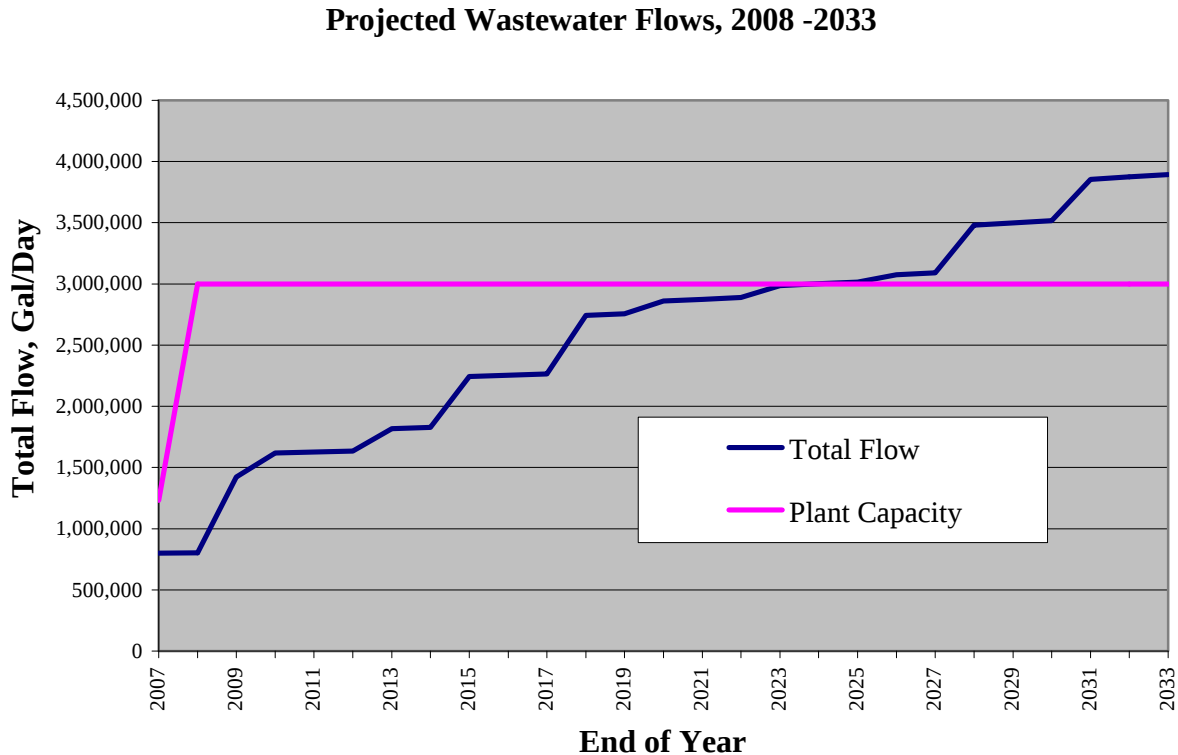


Figure 3-3. Projected Plant Flows

As mentioned earlier, the construction of the 2 MGD expansion started last year with estimated completion in November 2008. Based on the projected flows and the proposed collection system expansion program, the Cemetery Road WWTP would be reaching 80 percent capacity by the year 2017. However, after all areas have been connected to the system scheduled for 2031, increased flow would be through infill of sewerred areas only as shown by the gradual increase to approximately 3.9 MGD by the year 2033.