Infrastructure, as defined by Rule 9J-5, Florida Administrative Code, means "those man-made structures that serve the common needs of the population." This element of the Lakeland Comprehensive Plan addresses the provision of potable water, wastewater treatment, solid waste disposal, stormwater management, and protection of natural groundwater aquifer recharge areas.

Growth through new development places increased demands on all public services, but the infrastructure for water, sewer, drainage and roads are, by far, the most costly needs to address. This Plan requires that infrastructure needed to support new development be in place concurrent with the impacts of such development, where not superseded by State law. The Plan also discusses the identification of methods to ensure that new development pays its proportionate share of the cost to provide the infrastructure needed by the development. Only through enforcement of these measures can local governments ensure that future growth will be orderly and economical.

The Infrastructure Element is divided into several major sections which address legislative requirements for the issues of potable water, wastewater, solid waste, stormwater and natural groundwater aquifer recharge. Following this introduction, the second section discusses a summary of findings or existing conditions for each infrastructure-related issue. The third section examines issues and opportunities related to the infrastructure system, while the fourth section includes goal, objective and policy statements.

Supplemental data and documentation for the potable water update may be found in the City's Technical Support Document.
SUMMARY OF FINDINGS

An important first step in the preparation of this Infrastructure Element was an inventory and analysis of Lakeland’s existing potable water, wastewater, solid waste, stormwater and natural groundwater aquifer recharge facilities and functions. The primary purpose of this inventory and analysis was to determine how well the existing infrastructure system is meeting present needs and how well it can be expected to meet future needs. For purposes of clarification, population projections used for estimating future needs were derived from the 1999 supplement to the Lakeland Population support document. These population projections represent the medium range projections utilized throughout this Comprehensive Plan. However, population for the water service area is projected by the Water Utilities staff; this service area has historically extended well beyond the City limits.

POTABLE WATER

The Lakeland water system began in 1905 with a single well at the corner of Massachusetts Avenue and Cedar Street. By 1979, a system of some 33 dispersed wells had become inefficient and the Lakeland City Commission approved a water master plan to meet the City's current and long-range potable water needs. The older wells were either phased out or converted to monitoring wells to track the potentiometric surface (pressure) within the upper Floridan aquifer which serves as a primary source for drinking water wells. In the early 1980’s, the City commenced a water improvement program and the Thomas B. Williams Water Treatment Plant and Northwest Wellfield were to be the City’s new primary potable water source. In December 1989, the City installed several production wells at that Northeast Wellfield. Most recently, the C. Wayne Combee Water Treatment Plant located on Old Combee Rd began operation in October 2005.

The raw water supply source for the water service area is drawn from a network of multiple deep wells between the Northwest Wellfield and Northeast Wellfield. As of March 2008, the permitted average daily flow for Lakeland’s entire potable water system is approximately 35.03 million gallons per day (MGD).

EXISTING SERVICE SYSTEMS AND DEMANDS

The City of Lakeland water service area has historically extended well beyond the city limits of Lakeland. Illustration IV-1 shows the water service area as of 2007, including changes south of the Airport as per an interlocal agreement with Polk County. The existing water service planning area contains approximately 85,540 acres, or 134 square miles. However, the planning area is not, in all cases, the same as where service currently exists, but is a potential service area. Lakeland
also had owned and operated a potable water system for Polk City but this system was sold to Polk City in January 2002. Since the wells and lines serving Polk City were located in Polk City, separate from the Lakeland system, the sale of the Polk City water system that served about 1,903 people did not have any impact on Lakeland’s water operations.

Since 1982, the service area has historically been supplied water from the Northwest Wellfield and the Thomas B. Williams treatment plant; see current water facilities Illustration IV-2. Water treatment occurs at the T.B. Williams Water Treatment Plant located on the east side of Kathleen Road; treatment consists of lime softening, water stabilization, filtration, fluoridation, chlorination and disinfection. Periodic system upgrades to both the treatment plant and the water distribution system should extend the facility’s life span through 2040 or later. Pump stations are expected to adequately perform through 2040. There are no current water quality problems; all finished water quality indicators meet or exceed state standards.

After water is treated, it is pumped to customers through a network of over 959 miles of pipeline, ranging in diameter from 2 to 54 inches, or the water is stored for peak use times. Primary storage for the system consists of two 5-million-gallon pre-stressed concrete tanks. Elevated storage tanks are no longer used. There is also a 3-million-gallon ground storage tank at the Lakeland Highlands Pump Station.

Until 1993, the withdrawal quantities permitted for the Northwest wellfield and treatment plant were 28.6 MGD annual average daily flow, 55 MGD maximum daily flow. A property in the northeast area of Lakeland consisting of approximately 770 acres was leased in 1989 and, then, eventually purchased in 1990 along with an additional 93.44 acres. The purchase was subject to the City being able to obtain a Water Use Permit from the Southwest Florida Water Management District for that site. This first required conducting a successful aquifer performance test (APT) on a well that was installed. The City installed several production wells on that site and the District issued a Water Use Permit for that Northeast Wellfield in December 1989 for up to 9 MGD annual average daily flow and 16 MGD maximum.

The SWFWMD issued a combined water use permit in 1993 for the Northwest and Northeast wellfields. This new 1993 permit would have allowed up to 9 MGD annual average flow and 11 MGD Peak Monthly Daily from the NE Wellfield to basically supplant that much withdrawal from the NW Wellfield, should it be needed. The total permitted withdrawals for our system was decreased to 28.1 MGD AADF and 33.7 MGD Peak Month Average Day. (The maximum day value was removed and replaced with a peak month average day.) In January 2003, the SWFWMD again
adoption of the Southern Water Use Caution Area (SWUCA). The permitted amount was lessened again to 28.03 MGD AADF.

However, except for monitoring and testing purposes, the opening of the NE Wellfield was postponed until the growth in demand for water justified the development of the NE Wellfield and the initiation of construction of the C. Wayne Combee Water Treatment Plant. This happened to coincide with the Water Utilities’ request for its Water Use Permit renewal in late 2003. The permit was renewed in March of 2008 at an increased allocation from 28.03 to 30.2 MGD and later revised to 35.03 in December of 2008. This new water treatment plant was necessary to provide redundancy for the City’s potable water system and to treat and serve water pumped from the NE Wellfield; the C. Wayne Combee Water Treatment Plant located on Old Combee Rd began operation in October 2005.

The City now has a total design capacity of 59 MGD (51 MGD for Williams WTP and 8 MGD for Combee WTP.) The SWFWMD permitted withdrawals are for only 28.03 MGD from the Northwest Wellfield, 3 MGD from the Combee WTP and 4 MGD from the Northeast Wellfield. According to the City Water Utilities, approximately seventy percent (70%) of plant demand serves the incorporated area with the remainder, 30%, serving the unincorporated area.

The existing demand on Lakeland’s water system, with a 2006 water service area functional population estimate of 170,020 persons, was about 25.6 MGD Annual Average Demand and 31.83 MGD on a Peak Monthly basis; this equates to about 148 gpd/capita for both residential and nonresidential uses.

The City of Lakeland Water Division operates as a regional water supplier in that it provides service to unincorporated areas such as Highland City as well as selling water to private franchise systems, including Polk County Utilities, Skyview Utilities, and AquaSource (Aqua Water) Utilities. In addition to these systems based on public supplies, there are a number of large private water systems in the Lakeland water service planning area, as shown in Illustration IV-3. (The complete list of private facilities is in the Technical Support Document, TSD IV-Two.)
FUTURE CONDITIONS

Water Use and Conservation: The top priority of the City of Lakeland is to provide customers within the corporate limits with an adequate and safe supply of potable water. Once the needs of City residents are met, surplus supplies are available for customers outside the corporate limits. The municipal water system currently provides potable water for residential, commercial and industrial uses. In order to ensure the availability of an adequate supply of quality potable water to meet demand, projections must be made of the future service area population.

In 1990, the Thomas B. Williams Treatment Plant serviced a population of 131,232 with a per capita consumption of approximately 183 gallons per day. In 1998, the service area population reached 156,471 and per capita consumption dropped to approximately 153 gallons per day. This reduction can be attributed, in part, to increased education and awareness of the need to practice water conservation. For the purpose of projecting future potable water needs, it is estimated that per capita consumption will continue to show a gradual decrease, as it has every year since 1981. The City has set a target or goal of per capita domestic (residential) water consumption of 150 gallons per capita per day and a long-term goal of additional reduction. The goal of reduced consumption will be achieved through the continued implementation of a City-wide water conservation plan, including the implementation of technological advances contributing to water conservation, and heightened public awareness of the significance of the decreasing supply of quality potable water and new/increased water reuse projects.

Key tools for water conservation have included implementation of an inverted-block rate structure for potable water consumption as of 1998. This encourages water conservation by increasing the cost of the service as consumption increases. For example, the City’s modified rate structure implemented in October 2006 incorporated a four-block tier versus the former three-block tier. The inverted rate increases the costs for water for residences that use over 7,000 gallons per month, with a significant increase if consumption exceeds 19,000 gallons per month. Additional rate increases are likely to be proposed over time as one of many ways to support water conservation.

In March, 2000, the City Commission approved adjusting Water Utility rates or fees each year based upon the Public Service commission’s Annual (Price) Index Adjustment for inflation. As a result, Lakeland is part of over 70% of the regulated utilities that utilize this price indexing option.

Other conservation efforts have included use of Florida-Friendly landscaping at City parks, City Hall, and other City properties, and increasing use of shallow aquifer wells to meet irrigation needs of new development wherever feasible. Lakeland also uses wastewater effluent to help meet cooling water needs at the City’s McIntosh Power Plant. New generators scheduled to be constructed are expected to significantly increase the effluent used for cooling water. Estimates by Lakeland Electric indicate the effluent use will increase from about 4.6 MGD in 2005 up to 10 MGD by 2017. Additionally, of the average
of about 10+/- MGD of wastewater treated at the City’s two wastewater treatment plants in FY 2007, as indicated below in Table IV-9, an average of about 5.39 MGD of treated effluent was used for cooling purposes at the City’s power generation facility known as McIntosh. An additional average of about 4.5 MGD was utilized that year for purposes of blending with the water leaving McIntosh; due to high concentrates of brine upon emission from the power plant, this water must be diluted prior to discharge to the City’s wetlands and later to the Alafia River. Thus virtually all of the City’s treated wastewater was re-used. In addition to conservation measures, the City also implements a number of water conservation strategies such as promoting the use of low flow water devices, rain sensors, and public educational programs. Details of water conservation strategies can be found in the Conservation Element of the Comprehensive Plan and in the Technical Support Document, TSD VI-Two.

Regulatory action has been taken to require the inclusion of reuse water systems in districts that may be established by the City as non-potable irrigation water service areas. In 2006 the City amended the City’s Land Development Regulations to require the installation of reuse lines, at the developer’s expense, for all new subdivision projects within the established non-potable water service areas. Engineering studies were conducted to establish the Southwest Lakeland area as a potential reclaimed water service area to be pursued as part of a cooperative effort with Polk County to address their need to dispose of excess treated wastewater effluent. However, the implementation of reclaimed water service has been deferred due to the City’s December 2008 agreement with Tampa Electric Power Company or TECO, to receive City treated wastewater effluent to meet TECO’s cooling water needs for its planned power generation facility expansion. This agreement was approved and encouraged by the SWFWMD as a means of delaying additional groundwater withdrawals to meet TECO’s future cooling water demands.

Reducing water consumption among residents takes time. The City did not achieve a reduction in use from 180 gpd/capita to about 148 gpd overnight; it took from 1990 to 2006, or sixteen years. In addition, like many things, reducing water consumption below a certain level is expected to become very difficult and perhaps expensive to achieve per City water officials. This reflects the principle of diminishing returns; that is, beyond a certain point, water demand reductions will be slow to occur and only very expensive options will render any additional change/reduction.

Given the City uses all of its wastewater effluent to meet the City and now TECO power plant cooling needs, the City by itself has no meaningful supply of public-access reuse/reclaimed water readily available to substitute for potable water for customers’
irrigation needs. As a result, the per capita rate in the Lakeland water service area may remain higher than communities/utilities that have that option. Thus, the use of higher water fees/rates, pursuit of water conservation initiatives, enforcement of watering restrictions and formulation of re-use (reclaimed) water cooperatives with Polk County, Mulberry, Auburndale or others who need to dispose of effluent are some of the most viable remaining options available to the City to reduce potable water consumption.

**FUTURE DEMAND & LEVEL OF SERVICE:**

Table IV-1 outlines potable water needs for the City of Lakeland through 2020. The level of service standard is not to exceed 150 gpd per capita as adopted by the City in 2000 and reiterated in 2003 as a Special Condition in the existing Water Use Permit for an agency within the Southern Water Use Caution Area (SWUCA). This requirement of 150 gpd/capita is consistent with the Public Supply guideline for per capita water use as published in the Southwest Florida Water Management District’s SWUCA II Rules adopted January 2007 in the “Basis of Review for Water Use Permit Applications”, (Water Use Permit Information Manual), Section 3.6. and Section 8, page 114, of the SWFWMD Southern Water Use Caution Area (SWUCA) Recovery Strategy, March 2006 Final Report.

It is important to recognize that the minimum level of service standard is a standard used to indicate the minimum, not maximum, volume of water that the City agrees to provide to a user on a daily basis. The level of service is needed to plan capital facility capacity needs for Lakeland’s potable water service system. Level of service, then, is needed to ensure an adequate water supply to new users needing to connect to the system as well as for current users. Potable water consumption is how much is actually used (drunk, flushed or otherwise consumed) by those receiving the water. Clearly, while water consumption and level of service are affected by each other, they are not the same. Therefore, water consumption targets can and should be separated from level of service standards.

It is also very important to recognize that Lakeland’s level of service for potable water addresses both residential and non-residential consumption needs. Non-residential water use is about 23 percent of total water sales and residential comprises about 63 percent. The Lakeland Water Department indicates that, using SWUCA methodology to calculate current per capita water use as per the 2006 Southwest Florida Water Management District’s “Public Supply Per Capita Water Use Survey” (Form A), after subtracting significant non-residential water users’ volumes, the per capita consumption was about 138 gpd/capita for customers of the Lakeland Water Service Area (includes customers outside the City limits).

Table IV-1 projects only the needs of the incorporated area of the City. This does look at population driven water needs, but using a per capita demand figure that is higher than the actual demand per person; that is, the 150 GPD is intended to estimate non-residential potable water needs as well as residential needs.
Table IV-1
PROJECTED WATER NEEDS: 2005-2020
CITY OF LAKELAND CORPORATE LIMITS

<table>
<thead>
<tr>
<th>YEAR</th>
<th>POPULATION</th>
<th>PROJECTED DAILY DEMAND (GPD/CAPITA)</th>
<th>TOTAL DAILY DEMAND (MGD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>89,562</td>
<td>150</td>
<td>13.4</td>
</tr>
<tr>
<td>2010</td>
<td>95,500</td>
<td>150</td>
<td>14.3</td>
</tr>
<tr>
<td>2015</td>
<td>101,400</td>
<td>150</td>
<td>15.2</td>
</tr>
<tr>
<td>2020</td>
<td>110,300</td>
<td>150</td>
<td>16.5</td>
</tr>
</tbody>
</table>

Source: City of Lakeland, Community Development Department, 2009.

Table IV-2 outlines residential potable water demand for the anticipated Lakeland Water Service Area through 2020. Since the water service area for the Water Department and the planning area for the Comprehensive Plan are not the same, the service area population projections from the City of Lakeland, Department of Water Utilities do not match planning area projections. The Water Department’s calculations for the Lakeland Water Service Area include the total water use (residential and non-residential) projections and look at water losses and export water.

The projections for the Lakeland Water Service Area were arrived at through a process of averaging several formal forecast methodologies including that used by the SWFWMD for its Regional Water Supply Plan or RWSP as adopted in November 2006. City water pumping data and per capita demand for year 2007 reflects actual data for that year. The City estimates also considered water losses and water exports. These figures correspond to the accepted water management district methodology for calculating water data.

For projection years of 2010, 2015 and 2020 estimates were made using BEBR-based population projection methodologies and arriving at more conservative (i.e., lower) population projections than those found in the adopted SWFWMD RWSP. For future year estimates, the City used the maximum value for per capita as allowed in the designated Southern Water Use Caution Area (SWUCA) to understand and be prepared for the worst case scenario. Per capita values can vary widely year to year depending on rainfall amounts. However, the City fully intends to continue its conservation and re-use strategies as discussed herein which should continue to lower our actual per capita value.
### TABLE IV-2
AVERAGE AND PEAK WATER USE PROJECTIONS: 2007-2020
LAKELAND WATER SERVICE AREA

<table>
<thead>
<tr>
<th>YEAR</th>
<th>POPULATION</th>
<th>ESTIMATED PER CAPITA DEMAND</th>
<th>INITIAL AVERAGE ANNUAL MGD</th>
<th>EXPORTED WATER &amp; TREATMENT LOSSES</th>
<th>TOTAL PUMPING ANNUAL MGD</th>
<th>PEAK MONTH MGD</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>180,081</td>
<td>133.14</td>
<td>23.98</td>
<td>0.743</td>
<td>24.72</td>
<td>29.39</td>
</tr>
<tr>
<td>2010</td>
<td>189,051</td>
<td>150</td>
<td>28.36</td>
<td>0.700</td>
<td>29.06</td>
<td>34.87</td>
</tr>
<tr>
<td>2015</td>
<td>205,690</td>
<td>150</td>
<td>30.85</td>
<td>0.700</td>
<td>31.55</td>
<td>37.86</td>
</tr>
<tr>
<td>2020</td>
<td>222,750</td>
<td>150</td>
<td>33.41</td>
<td>0.700</td>
<td>34.11</td>
<td>40.94</td>
</tr>
</tbody>
</table>

Source: City of Lakeland, Water Utilities Department, 2008.

Additional supporting data is found in Table IV-3 and outlines the potable water demand for all types of users, residential and non-residential, municipal, electric, resales and annual water losses. This data reveals a higher than average non-residential water demand and a lower than average water loss experience.

### TABLE IV-3
ESTIMATED WATER USE BY ACCOUNT TYPE
LAKELAND WATER SERVICE AREA

<table>
<thead>
<tr>
<th>ACCOUNT TYPE</th>
<th>AVERAGE # OF CUSTOMER ACCOUNTS</th>
<th>WATER SALES PER YEAR (1000 GALLONS)</th>
<th>% SALES</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESIDENTIAL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inside</td>
<td>27,339</td>
<td>3,799,606</td>
<td>40.05%</td>
</tr>
<tr>
<td>Outside</td>
<td>18,273</td>
<td>2,185,795</td>
<td>23.04%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>45,612</td>
<td>5,985,401</td>
<td>63.09%</td>
</tr>
<tr>
<td>NON-RESIDENTIAL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inside</td>
<td>4,136</td>
<td>1,788,683</td>
<td>18.85%</td>
</tr>
<tr>
<td>Outside</td>
<td>1,576</td>
<td>392,183</td>
<td>4.13%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>5,712</td>
<td>2,180,866</td>
<td>22.99%</td>
</tr>
<tr>
<td>SALES FOR RE SALE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polk County</td>
<td>5</td>
<td>110,139</td>
<td>1.16%</td>
</tr>
<tr>
<td>Polk County Standby</td>
<td>3</td>
<td>945</td>
<td>0.01%</td>
</tr>
<tr>
<td>Skyview Utilities</td>
<td>6</td>
<td>55,145</td>
<td>0.06%</td>
</tr>
<tr>
<td>Aqua Source Utilities</td>
<td>2</td>
<td>47,556</td>
<td>0.50%</td>
</tr>
<tr>
<td>Auburndale Standby</td>
<td>1</td>
<td>2,658</td>
<td>0.03%</td>
</tr>
<tr>
<td>Plant City Standby</td>
<td>2</td>
<td>36,146</td>
<td>0.38%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>19</td>
<td>252,589</td>
<td>2.66%</td>
</tr>
<tr>
<td>MUNICIPAL</td>
<td>TOTAL</td>
<td>527</td>
<td>285,453</td>
</tr>
<tr>
<td>UTILITY USES &amp; LOSSES (Not billed)</td>
<td></td>
<td>711,063</td>
<td>7.49%</td>
</tr>
<tr>
<td>ELECTRIC DEPT.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Larsen Plant</td>
<td>4</td>
<td>30,324</td>
<td>0.32%</td>
</tr>
<tr>
<td>McIntosh Plant</td>
<td>4</td>
<td>26,503</td>
<td>0.28%</td>
</tr>
<tr>
<td>All Other</td>
<td>39</td>
<td>14,421</td>
<td>0.15%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>47</td>
<td>71,248</td>
<td>0.75%</td>
</tr>
</tbody>
</table>

The residential use, 63%, and non-residential use, 23%, total 86% of all water sales within the water service area. Other uses besides Sales for Resale (3%) are relatively minor. Water losses consist of water used for things like fighting fires, flushing new utility lines for subdivisions or businesses under construction, unauthorized use, system leaks, and other losses. Water losses average about 7.5% with anything under 10% considered “good” performance for a utility (the industry norm is approximately 15%).

Probably one of the most important things to happen to water planning has been the need to account for not only normal or incremental water customer growth based on historical trends and Bureau of Economic and Business Research (BEBR) projection type forecasts, but also the need to account for growth-management based development commitments. As local governments make commitments to land development projects at the time of concurrency, which is typically at time of site plan or plat, prior to building permit approval, they have had to reserve and track trips on roadway segments. They now also have to reserve estimated allocations for potable water, per Senate Bill 360, passed in 2005 by the Florida Legislature. This means local governments must track potable water amounts that are committed to both residential and non-residential projects that are typically at the engineering plan approval stage. Where the new commitment is for an unexpectedly large development such as a Development of Regional Impact or DRI, the water demand will likely exceed anything projected in annual growth estimates based solely on historical trends which BEBR’s estimates tend to produce. As the estimated potable water demands for concurrency level projects are totaled, that total represents the “committed” water flow, not yet being pumped at the City’s water treatment plants. Typically these committed flows do not represent or include irrigation needs; due to the constrained nature of water resources, the City asks each developer to make every effort to utilize an alternate water source for irrigation needs and to phase development wherever possible.

The City Water Utility receives new water requests weekly within its water service territory, i.e., the geographic service area within the City and a portion of the unincorporated area. Thus, point in time committed flows do not represent all growth demands. In fact, the City had a growing waiting list for water requests above and beyond the list of committed water requests due to its delayed 2004 water use permit renewal issues, reinforcing the point that incremental growth is continuous.

Normal population growth, added to normal non-residential/business growth, accounts for the incremental growth that is the subject of the typical projection methodology recognized by the Water Management District and University of Florida’s Bureau of Economic and Business Research (BEBR). Therefore, our Water Utility staff made projections for normal growth using this accepted methodology. However, committed capacity for large, new projects may need to be added to this normal incremental growth projection since it may exceed historical trend projections. This is similar to the methodology used for many years in transportation planning where modelers trying to project future roadway demands consider existing road capacity minus reserved trips and projected annual (incremental) estimated growth to determine available capacity.
Similarly, water projections must consider at least three factors to ascertain future demand for the planning period:

1. existing demand (average flows);
2. reserved or committed demand; and
3. projected annual demand (from incremental growth)

**City Water Permit:** For the 1990-2000 period, the City of Lakeland had a consumptive use permit for the Northwest and Northeast Wellfield allowing withdrawal of an average daily flow of 28.03 MGD; historically some portion of this total was technically allowed to be withdrawn from the Northeast Wellfield. The maximum design capacity of the Thomas B. Williams Treatment Plant is 51 MGD. The maximum design capacity of the C. Wayne Combee Treatment Plant is 8 MGD.

In March 2008, the SWFWMD Governing Board approved a new Water Use Permit for the City of Lakeland that reflected findings from a January 2008 judicial proceeding (Division of Administrative Hearings Case No. 07-564.) The new water use permit issued by the SWFWMD authorized the City to pump 4 MGD from the Northeast Wellfield and 28 MGD from the Northwest Wellfield, i.e. for a total of up to 32.02 MGD withdrawals. However, in December 2008, the permit was revised to permit up to 35.03 MGD through 2028 contingent upon the an agreement to send treated wastewater effluents to the Southwest Polk TECO power generation facility to offset ground water withdrawals related to TECO’s generator cooling process. Monthly pumping distribution from the City’s facilities is limited to 28.03 MGD from the Northwest Wellfield, 3 MGD from the Combee Treatment Plant and 4 MGD from the Northeast Wellfield.

The City of Lakeland will continue to work with the SWFWMD to pursue adequate water supply resources to meet the Water Service Area’s long term needs. As required by Florida Statute, this Potable Water Supply Sub-Element must also address water facility capital needs for a 10 year period; see Tables IV-4 through IV-8.

**10-YEAR WATER SUPPLY PLAN**

The City of Lakeland’s 10-Year Water Supply Plan is a capital plan for developing water supplies for long-term demand. It identifies future capital projects and programs that are feasible which include the City’s conservation strategy. Currently, the plan’s primary focus is reuse and conservation.

Prior to adopting the Water Supply Plan the City has invested significant resources over the past 20 years to ensure sufficient water supply for residents and customers within the City water service area. The Northeast Wellfield and the C. W. Combee Water Treatment Plant have been developed at a total cost of $25.91 million and have been operational since 2005. The C.W. Combee Water Plant has a total design capacity of 8 million gallons per day. Table IV-4 outlines the City’s investment in potable water supply from 1989 to 2005.
TABLE IV-4
POTABLE WATER SUPPLY PROJECTS 1989-2005

<table>
<thead>
<tr>
<th>PROJECT</th>
<th>DATE COMPLETED</th>
<th>COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acquisition of NE Well Field Property</td>
<td>1989</td>
<td>$2.24 Million</td>
</tr>
<tr>
<td>Drilling of NE Well Field and setting casings</td>
<td>1989</td>
<td>$0.6 Million</td>
</tr>
<tr>
<td>Acquisition of C. W. Combee Water Treatment Plant Property</td>
<td>2000</td>
<td>$0.574 Million</td>
</tr>
<tr>
<td>Pipe installation from NE Well Field to C.W. Combee Water Treatment Plant</td>
<td>2005</td>
<td>$3.3 Million</td>
</tr>
<tr>
<td>Development/Construction of NE Well Field and C. W. Combee Water Treatment Plant</td>
<td>2005</td>
<td>$19.2 Million</td>
</tr>
<tr>
<td>Total Cost</td>
<td></td>
<td>$25.91 Million</td>
</tr>
</tbody>
</table>

Source: COL Water Department, 2007.

The Water Supply Plan currently has scheduled potable water projects to expand and upgrade the existing system. To provide new capacity for future demand additional upgrades to the C. W. Combee Water Treatment Plant are planned. The water management district is shifting its focus to alternative water sources and encouraging local governments that have the option to do the same pursuant to the 2006 Regional Water Supply Plan. At this time the City of Lakeland is studying the feasibility of alternative water sources. Table IV-5 outlines the 10-Year Water Supply Plan’s potable water capital improvement schedule by fiscal year.

The following is a summary of the 10-Year Water Supply Plan’s potable water capital projects:

- **Northeast Plant Expansion (CW Combee WTP):** Major construction project to expand the total capacity of the 9.0 MGD WTP to 18.0 MGD. The existing “footprint” of the WTP allows for an additional High Service Pump, an additional Transfer Pump, an additional Softening Unit, a Higher Filter Rating, and perhaps an additional 5.0 MG Ground Storage Tank. This project is to be linked with new production wells mentioned above.

TABLE IV-5
POTABLE WATER SUPPLY PROJECTS

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Northeast Plant Upgrade (C.W. Combee WTP)</td>
<td>100,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>TOTAL</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>100,000</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Source: COL Water Utilities Department, 2010.
**ALTERNATIVE WATER SUPPLY**

Similar to potable water supply projects, the efficient utilization of wastewater will play an important role in our overall water supply. As with increased demand for potable water there will be an increase in wastewater quantities that will be available for water re-use once such a system is implemented. Table IV-6 outlines wastewater projects included in the City’s Water Supply Plan 10-Year Schedule of Projects by fiscal year.

The following is a summary of each of the 10-Year Water Supply Plan’s wastewater capital projects related to potential water reuse, i.e., potential reclaimed water projects:

- **TECO Wastewater Reuse Agreement:** In 2008, shortly after the adoption of the City’s Water Supply Plan, the City negotiated an agreement with TECO to divert treated wastewater, which now flows into the Alafia River, a tributary of the Peace River, to the new Polk Power Station south of Mulberry. Using the treated wastewater averts the need for TECO to pump groundwater in order to cool the plant and meets the conditions of the Central Florida Coordination Area rules, and reduces City flows to the Alafia River. TECO and SWFWMD will fund the construction of pipes and pumps that will carry the water to the power plant. The waste water transmission system, estimated to cost $60 million, is scheduled for completion in 2012.

- **English Oaks:** The southwest portion of the wastewater service territory is deficient in collection or pipeline capacity. The City is actively constructing major force mains and pump lift stations. Due to the transmission line availability delay, growth in this area was also delayed.

**TABLE IV-6 \nWASTEWATER RE-USE RELATED PROJECTS**

<table>
<thead>
<tr>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>TECO Wastewater Reuse</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$60,000,000*</td>
</tr>
<tr>
<td>English Oaks Force Mains</td>
<td>$1,500,000</td>
<td>$1,500,000</td>
<td>$2,000,000</td>
<td>$8,000,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note: Per the agreement with TECO this project is funded by TECO and SWFWMD.

Source: COL Water Department, 2010.

To meet State and Water Management District requirements to identify and plan for water supply alternatives to future ground water withdrawal, the City of Lakeland is continuously considering the feasibility and practicality of other potential alternative water supply projects and conservation programs, including but not limited to, the following projects:

- **Auburndale Reuse Cooperative:** The City of Auburndale plans to expand its wastewater treatment capacity by 1 – 3 MGD, but is interested in a beneficial use instead of land application via a spray field located north of the city. The Williams
Holding Company is developing a large mixed-use development of regional impact and has donated land for the new FPU/I-4 campus which will develop independently but adjacent to the DRI. The Williams Company has proposed accommodating Auburndale’s reuse for its irrigation demands. Since Auburndale’s service territory is immediately adjacent to Lakeland’s City Limits in which the William’s property and FPU is positioned, Auburndale may provide bulk reuse water directly to FPU. However, implementation will depend on economic feasibility and approval from FDEP and SWFWMD.

Table IV-7 outlines the proposed scheduling and estimated cost of each of the alternative water supply projects.

<table>
<thead>
<tr>
<th>PROJECT</th>
<th>ESTIMATED IMPLEMENTATION DATE</th>
<th>ESTIMATED COST</th>
<th>STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auburndale Reuse Tie-in</td>
<td>2013-2020</td>
<td>$200,000</td>
<td>Allowed per Williams DRI &amp; FPU agreements with COL</td>
</tr>
</tbody>
</table>

Source: COL Water Utilities Department, 2010.

This project is described in more detail in TSD IV-Four (Response letter to SWFWMD RWSP), found in the Technical Support Document. However, the Auburndale Re-use project would, if it occurred, be a direct purchase relationship with Williams/the user, not requiring City participation.

The final component to the 10-Year Water Supply Plan is capital investment in conservation projects. The following are capital projects planned to implement conservation programs:

- **Low Flow Shower Head/Aerator Replacement Program:** The City’s Water Department provides low flow shower head/aerators to residents that voluntarily bring their conventional shower heads and aerators to the Lakeland Electric and Utility building in exchange. This program is estimated to cost approximately $5,000 and is paid for through operations and maintenance funds.

- **Park Central Irrigation System:** The City’s Parks and Recreation continues to convert all park facility irrigation systems to time-controlled irrigation to minimize water consumption.

- **SmartGrid Project:** The City’s electric utility, Lakeland Electric, is implementing the installation of SmartGrid technology to replace its manual electric meter reading process. The system is being designed to accommodate the inclusion of water meter readings also. Although the City Commission only adopted the project funding for Lakeland Electric which included a federal grant, Water Utilities will deploy SmartGrid system-compatible water meters over time as funds are budgeted. Instead of only one water meter reading per month, hourly readings will be acquired.
through the new system. This will allow the Water Utility to provide conservation-related services to both the Utility and its customers, including features such as:

- quicker detection of private plumbing leaks
- identifying improperly set irrigation timers
- inactive account water consumption are byproducts of the SmartGrid system

Table IV-8 outlines the programmed and estimated funding of each of the City’s water conservation programs.

### TABLE IV-8
CONSERVATION PROGRAMS FUNDING

<table>
<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Flow Shower Head/Aerator Replacement Program</td>
<td>5,000</td>
<td>5,000</td>
<td>5,000</td>
<td>5,000</td>
<td>5,000</td>
<td>5,000</td>
<td>5,000</td>
<td>5,000</td>
<td>5,000</td>
<td>5,000</td>
</tr>
<tr>
<td>Park Central Irrigation System Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>50,000</td>
<td></td>
</tr>
<tr>
<td>SmartGrid Project</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
</tr>
<tr>
<td>TOTAL</td>
<td>5,000</td>
<td>5,000</td>
<td>5,000</td>
<td>5,000</td>
<td>5,000</td>
<td>5,000</td>
<td>55,000</td>
<td>5,000</td>
<td>5,000</td>
<td>5,000</td>
</tr>
</tbody>
</table>

*Note: TBD – To Be Determined

**Source:** COL Water Utilities Dept.; Parks Dept., 2010

Overall, limited options for alternative water supply exist within the Central Florida inland region and particularly within the Polk County area and Lakeland. As a non-coastal area, desalination of ocean or salt water is not an option. Aquifer storage recovery, ASR, as a water supply technique involves storage of potable or treated effluent water types underground. This technique is still somewhat experimental and often cost-prohibitive and may be subject to some environmental concern.

Treated wastewater, or effluent, is limited as an alternative for Lakeland due to substantial commitment of that effluent flow to the Lakeland Electric power plant system (see Table IV-9.) The primary option to re-use water for power plant cooling is groundwater; therefore, employing treated or reclaimed water as a substitute is, in the City’s opinion, a very valid water conservation strategy. The Hines Energy complex in south Polk County has historically sought reuse water from several municipalities in the area for this same reason.

Lakeland Electric is the primary source for electrical power supply for all of the City and Metro Lakeland which includes portions of unincorporated Polk County, and provides some power to a larger, regional municipal grid system so the local reuse water that cools the power plant is utilized to help meet local and regional energy demands. Illustration IV-4 and Table IV-10 (below) demonstrate the Lakeland Electric service area and the projected
population for the same. Other effluent flows are sent to the City’s artificial wetlands located off of S.R. 60, south of Lakeland, which discharges into the Alafia River system if not diverted to the TECO power plant. That discharge augments the flows/volumes of the Alafia, which is used by Tampa Bay Water Authority as one of its potable water sources. Therefore, the City’s reuse water serves a larger regional water need already.

### TABLE IV-9
**LAKELAND EFFLUENT USES**

<table>
<thead>
<tr>
<th>MONTH</th>
<th>REUSE WATER TO MCINTOSH POWER PLANT</th>
<th>TREATED WW SENT TO WETLANDS</th>
<th>WETLANDS EFFLUENT DISPOSAL TO ALAFIA RIVER</th>
</tr>
</thead>
<tbody>
<tr>
<td>WWTP</td>
<td>Glendale WWTP Monthly AVG DAY</td>
<td>Glendale WWTP Discharge Intertie TOTAL</td>
<td>TOTAL</td>
</tr>
<tr>
<td></td>
<td>(MG) (MG) (MG) (MGD)</td>
<td>(MG) (MGD) (MG) (MGD)</td>
<td>(MG) (MGD) (MG) (MGD)</td>
</tr>
<tr>
<td>Oct-06</td>
<td>72.85 98.45 171.30 5.53</td>
<td>204.82 6.607 3.57 0.12</td>
<td>208.39 6.72 0.00 31 0.00</td>
</tr>
<tr>
<td>Nov-06</td>
<td>36.14 94.97 131.11 4.37</td>
<td>211.38 7.046 21.62 0.72</td>
<td>233.00 7.77 0.00 30 0.00</td>
</tr>
<tr>
<td>Dec-06</td>
<td>39.87 96.84 136.71 4.41</td>
<td>232.93 7.514 24.78 0.80</td>
<td>257.71 8.31 0.00 31 0.00</td>
</tr>
<tr>
<td>Jan-07</td>
<td>39.45 108.26 147.71 4.76</td>
<td>236.00 7.613 21.58 0.70</td>
<td>257.58 8.31 0.00 31 0.00</td>
</tr>
<tr>
<td>Feb-07</td>
<td>55.62 94.27 149.89 5.35</td>
<td>212.97 7.606 19.30 0.69</td>
<td>232.27 8.30 320.54 28 11.45</td>
</tr>
<tr>
<td>Mar-07</td>
<td>82.61 90.06 172.67 5.57</td>
<td>197.22 6.362 9.48 0.31</td>
<td>206.70 6.67 420.73 31 13.57</td>
</tr>
<tr>
<td>Apr-07</td>
<td>56.51 54.50 111.01 3.70</td>
<td>233.94 7.798 0.00 0.00</td>
<td>233.94 7.80 0.00 30 0.00</td>
</tr>
<tr>
<td>May-07</td>
<td>37.50 74.80 112.30 3.62</td>
<td>228.50 7.371 0.12 0.00</td>
<td>228.62 7.37 0.00 31 0.00</td>
</tr>
<tr>
<td>Jun-07</td>
<td>90.45 98.56 189.01 6.30</td>
<td>178.23 5.941 6.63 0.22</td>
<td>184.86 6.16 0.00 30 0.00</td>
</tr>
<tr>
<td>Jul-07</td>
<td>107.34 100.88 208.22 6.72</td>
<td>222.28 7.371 22.97 0.74</td>
<td>189.63 6.12 0.00 31 0.00</td>
</tr>
<tr>
<td>Aug-07</td>
<td>123.35 100.71 224.06 7.23</td>
<td>174.69 5.635 10.16 0.33</td>
<td>184.85 5.96 141.52 31 4.57</td>
</tr>
<tr>
<td>Sep-07</td>
<td>112.24 100.61 212.85 7.10</td>
<td>188.70 6.290 23.09 0.77</td>
<td>211.79 7.06 78.36 30 2.61</td>
</tr>
<tr>
<td>FY Totals</td>
<td>853.93 1,112.91 1,966.84 5.39</td>
<td>2,466.04 6.756 163.30 0.45</td>
<td>2,629.34 7.20 961.15 365 2.63</td>
</tr>
</tbody>
</table>

*Source: COL Water Utilities Department, 2007.*
The chief alternative or option for the City of Lakeland in regard to water supply is that of additional water conservation measures, rules and programs. Please see the discussion of the City’s Water Conservation Plan as found in the Conservation Element of the City’s Comprehensive Plan and in its Technical Support Document, TSD VI-Two.

The City and/or Water Utility participates in “intergovernmental coordination” dealing with water supply and resource issues. It is part of the Heartland Alliance, a non-authority made up of entities within Polk, Highlands, Hardee, and Desoto Counties. A study was performed on behalf of this alliance to identify future water demands and possible resources to meet those demands. The Utility has a presence at the Polk County Water Policy Advisory Committee meetings as well as the Public Supply Advisory Committee of the Southwest Florida Water Management District. A water official regularly attends the Basin Board meetings of the Water Management District.

The Governor has requested the three water management districts which control the Central Florida region begin to collectively organize their regulations to address the growth and future water demands of the Central Florida area. The Central Florida Coordination Area (CFCA) has been identified by these Water Management Districts. They began the process of developing proposed rules which would restrict access to groundwater for demands past the year 2013. To date, water users within Polk County and a small portion of Lake County are the only ones within the SWFWMD proposed to come under CFCA jurisdiction. However, as part of drafting the proposed rules, it has been determined that existing areas in Polk County within the Southern Water Use Caution Area (SWUCA) would not be subject to the CFCA rules.

### TABLE IV-10
LAKELAND ELECTRIC SERVICE AREA
2020 PROJECTED POPULATION

<table>
<thead>
<tr>
<th>YEAR</th>
<th>POPULATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>258,681</td>
</tr>
<tr>
<td>2008</td>
<td>262,085</td>
</tr>
<tr>
<td>2009</td>
<td>266,163</td>
</tr>
<tr>
<td>2010</td>
<td>270,292</td>
</tr>
<tr>
<td>2011</td>
<td>273,989</td>
</tr>
<tr>
<td>2012</td>
<td>277,585</td>
</tr>
<tr>
<td>2013</td>
<td>281,112</td>
</tr>
<tr>
<td>2014</td>
<td>284,750</td>
</tr>
<tr>
<td>2015</td>
<td>288,313</td>
</tr>
<tr>
<td>2016</td>
<td>291,563</td>
</tr>
<tr>
<td>2017</td>
<td>294,718</td>
</tr>
<tr>
<td>2018</td>
<td>297,875</td>
</tr>
<tr>
<td>2019</td>
<td>301,087</td>
</tr>
<tr>
<td>2020</td>
<td>304,326</td>
</tr>
</tbody>
</table>

Source: Lakeland Electric, 2006
WELLFIELD PROTECTION

The area around the Northwest Wellfield is highly urbanized. Due to this high level of urbanization and proximity to Interstate 4, establishing sufficient zones of protection to prevent future contamination has become increasingly difficult. While the City owns the land containing each of the wells, the surrounding site is part of a platted business park. The individual platted lots are approximately 350 feet in depth. The City has established in its land development regulations a 500-foot setback and a requirement for a monitoring plan for all businesses with restricted-use operating permits to operate within the protection zone. This has become the City’s primary tool for protection of the wellfield. The zones of protection for the Northwest Wellfield are shown in Illustration IV-5.

In early 1989, following completion of hydrological studies and SWFWMD approval of a water use permit, the City of Lakeland purchased an 883-acre tract located approximately one mile north of the intersection of Interstate 4 and State Road 33. The Northeast Wellfield site, depicted in Illustration IV-6, consists mostly of pasture and wetland areas. There are five wells at this site. Use of the Northeast Wellfield has required funding for transmission lines, pumps, and an off-site water treatment plant. This funding had been budgeted in the City’s capital improvements plan (CIP) of the Capital Improvements Element. This water treatment plant and wellfield is now constructed and operational. These new facilities cost a total of $31,000,000. The need for the Northeast Wellfield had been tempered over the last decade by water conservation/reduced pumpage as encouraged by regulations for the Southern Water Use Caution Area (SWUCA). Use of the Northeast Wellfield together with the Northwest Wellfield basically requires a cooperative effort to not exceed the requirements of the City’s combined water use permit for the two wellfields.

The addition of the Northeast Wellfield to the City's water supply system helps ensure that the water demands of the service area can be met for many years, and add a large measure of ensured reliability by acting as a back-up wellfield should the City need to reduce pumpage at the Northwest Wellfield or deal with any contamination issues. The NE Well Field is very rural compared to the NW Well Field which is located near a large urban population and businesses. In an era of threats of acts of bioterrorism, it is in the interest of the City’s approximate 52,000 customer accounts and more than 170,000 water service population to have more than one single area of aggregated water wells and more than one treatment facility. In addition, the rural nature of the site will help ensure that the wellfield is guarded against potential contaminants. A safe, reliable water supply is essential for service to the growing population in the water service area.
Chapter IV
Infrastructure Element: Potable Water
Chapter IV
Infrastructure Element: Potable Water
WASTEWATER

Wastewater is defined as the waste carried by water from domestic, commercial or industrial sources. Although some wastewater may be drained directly onto the ground (washing cars, pressure cleaning buildings, etc.), generally, wastewater must be treated before its release into the environment. Wastewater is treated in the Lakeland Planning Area by one of the sub-regional treatment plants, mid-size package treatment plants, or by individual on-site septic tanks.

EXISTING FACILITIES AND PROPORTIONAL SHARE

Per 2009 Wastewater Division records, about 2% of wastewater demand was attributable to residential and commercial users outside the City limits, while the remaining 98% of demand originated from within the City of Lakeland. While there is a significant population outside of the City, residential uses are not required to connect to the wastewater collection system. Service to the unincorporated area is not expected to significantly increase due to Polk County’s planned northwest regional wastewater plant and due to continued annexation by the City. Voluntary annexation agreements are required for all potential customers of the City wastewater system as part of the overall wastewater service agreement. Once the City limits become contiguous to the customer’s property, the City has the option of requiring the customer to annex into the City.

Public Facilities: The City of Lakeland is served by three sub-regional treatment plants for wastewater service: the Glendale Water Reclamation Facility, the Northside Wastewater Treatment Plant (WWTP) and the West Lakeland Pretreatment Plant. The Glendale Facility is located on Glendale St. and the Northside WWTP is located near the McIntosh Power Plant on the northeast side of Lake Parker. In addition, some septic systems continue to function in areas of Lakeland, including areas developed prior to the availability of centralized wastewater service. Illustration IV-7 depicts the 2009 existing wastewater facilities and service area locations.

Private Facilities: Private package treatment plants in the Lakeland Area have decreased over the last two decades. In 1991, there were 50 package treatment plants identified outside the City limits in the surrounding metro area. Today, there are approximately 26 still in operation. Some of the package wastewater treatment facilities still in operation serve shopping centers, subdivisions, and other mid-size developments. One reason package systems desire to connect to the City system is to avoid fines by the FDEP if the system is experiencing some type of failure. For residential subdivisions on package plant systems, the City has had a standard policy to not accept new customers from such systems unless, at a minimum: a) impact fees for those customers are paid, and b) sewer extensions from the plant to the City system and a pumping station are constructed at no cost to the City.

Service Area: As can be seen from Illustration IV-7, an expansion of the wastewater service area occurred prior to 2000 primarily to the west and north of the Lakeland Linder
Regional Airport and to the north and northeast of Lake Gibson. Although some of the wastewater service area is serving the unincorporated County in these areas, the expansion of the City limits has occurred in these same general directions due to industrial growth in the west Lakeland area and mixed types of growth in the north/northeast Lakeland area. The collection system was expanded to the southeast along the US Highway 98 South corridor approximately 10 years ago. The northeastern expansion to the FPU campus and Williams DRI was completed in 2008. Most recently, an expansion to the southwest of Lakeland Linder Airport to serve the English Oaks and other developments in the area is underway and expected to be complete by the end of 2013.

The wastewater service planning area in Illustration IV-7 appears to be well outside the actual service areas on the east and the northwest. However, the planning area boundary actually comprises the utility planning area boundary for both water and wastewater services. It is a negotiated boundary contained in an interlocal agreement executed in April 1993 with Polk County (refer to Illustration VIII-4 in the Intergovernmental Coordination Element).

While a few of the major trunk lines for the Glendale Facility are shown on the service area map, most distribution lines are not shown to reduce clutter. Wastewater Division staff report as of the end of 2009 that approximately 315 miles of gravity sewer (between 6 and 48 inches) and 146 miles of force main (between 4 and 24 inches) comprise the Lakeland collection system. Located throughout the wastewater service area there are 150 wastewater pump stations operated and maintained by the City’s Wastewater Division. The Glendale WWTP is linked by pipeline to an artificial wetlands site which treats effluent from the wastewater plant. This wetlands site is located on the north side of S.R. 60, east of Mulberry.

**Plant Capacity:** The City’s wastewater treatment plants have the following capacities: the Glendale facility has a permitted capacity of 13.7 million gallons per day (MGD) annual average daily flow (AADF). The Northside Treatment Plant is permitted for up to 8.0 MGD, AADF. As of July 2007, the annual average daily flows for the Glendale and Northside treatment plants were 7.13 MGD and 3.28 MGD respectively. The recent construction of the West Lakeland pre-treatment facility, completed in November 2009, resulted in reduced loading of the Glendale facility in turn freeing up capacity for future demand. The pre-treatment facility has a design capacity of 1.5 MGD. The City’s waste water facility capacity is expected to handle the anticipated growth in service demands through at least 2020.

Trunk capacities will depend on the actual rate and location of new development and redevelopment. The capacity at the Glendale facility is capable of handling higher flows resulting from infiltration during unusually wet years, such as the 3rd quarter of 1994 through the 3rd quarter of 1996 when an average of 2 MGD or more of infiltration was added to base sewer flow. In addition, the City’s sewer rehabilitation program has been accelerated to better control infiltration (of stormwater) into lines and manholes.
There has been some redirection of efforts away from remediation of infiltration (leakage through defects below the water table) towards reducing inflow (direct openings to flood water on the surface). The intent is to reduce the sudden spikes in flow which occur during and immediately after heavy rain storms. These spikes overwhelmed the system during the hurricane events of 2004.

**Artificial Wetlands Capacity:** The City’s Artificial Wetlands facility located east of Mulberry, south of Lakeland, and north of SR 60, began receiving treated effluent in 1987. The Wetlands are currently rated 20 MGD, AADF, and are permitted on a common NSPES permit with the Glendale Plant. Annual average flow to the Wetlands is about 8 MGD and ranges between 6 and 11 MGD. The operating permit (together with the Glendale Plant) was renewed by the State in November 2004; the Wetlands are projected to have sufficient capacity through at least 2018.

### FACILITY PERFORMANCE

The 2007 Chastain-Skillman’s Capacity Analysis report on the City’s wastewater facilities listed the estimated 2010 population residency within the wastewater planning service area as 158,771 persons, of which 118,623 are connected to the utility. The estimated 14.46 MGD total collection system flow indicates approximately a 131 gpd/capita use. The physical plants themselves are in excellent condition, both having undergone expansions that will take the expected life of the facilities out another 40 or more years (20 years for certain high speed equipment).

The data in Table IV-11, indicates that the overall performance of the Glendale Water Reclamation Facility and the Wetlands Effluent Treatment facility is very good. Performance indicators for the Northside Wastewater Treatment Plant, given in Table IV-12, also show positive performance in terms of staying within current design capacities as well as with the expanded capacity, once permitted.
### TABLE IV-11
GLENDALE AND WETLANDS EFFLUENT TREATMENT FACILITIES

<table>
<thead>
<tr>
<th>INFLUENT FLOW</th>
<th>CONCENTRATION (MG/L)</th>
<th>POUNDS (LBS/DAY)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MGD</td>
<td>CBOD&lt;sub&gt;5&lt;/sub&gt;</td>
</tr>
<tr>
<td>Annual Avg. 9/06-8/07</td>
<td>7.16</td>
<td>33,304</td>
</tr>
<tr>
<td>9/06-8/07</td>
<td>7.56</td>
<td>99.4%</td>
</tr>
<tr>
<td>Max Month</td>
<td>9.65</td>
<td>33,108</td>
</tr>
<tr>
<td>Max Day</td>
<td>14.00</td>
<td>33,231</td>
</tr>
<tr>
<td>Max H</td>
<td>14.00</td>
<td>33,231</td>
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</tbody>
</table>

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<thead>
<tr>
<th>PLANT EFFLUENT</th>
<th>Removal</th>
<th>196</th>
<th>184</th>
<th>311</th>
<th>118</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Removal</td>
<td>99.4%</td>
<td>98.9%</td>
<td>89.4%</td>
<td>87.2%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WETLAND EFFLUENT</th>
<th>Concentration</th>
<th>Pounds</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CBOD&lt;sub&gt;5&lt;/sub&gt;</td>
<td>TSS</td>
</tr>
<tr>
<td>Overall Removal</td>
<td>33,231</td>
<td>17,047</td>
</tr>
<tr>
<td>% Overall Removal</td>
<td>89.2%</td>
<td>99.1%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Permit Limitations</th>
<th>CBOD&lt;sub&gt;5&lt;/sub&gt;</th>
<th>TSS</th>
<th>TN</th>
<th>TP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>5.00</td>
<td>5.00</td>
<td>3.00</td>
<td>N/A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PLANT DESIGN CAPACITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Avg. 9/06-8/07</td>
</tr>
<tr>
<td>9/06-8/07</td>
</tr>
<tr>
<td>Max Month</td>
</tr>
<tr>
<td>Max Day</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PLANT EFFLUENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Removal</td>
</tr>
<tr>
<td>% Removal</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PLANT DESIGN CAPACITY (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Avg (solids)</td>
</tr>
<tr>
<td>Annual Avg (liquids)</td>
</tr>
<tr>
<td>Max Month</td>
</tr>
<tr>
<td>Peak Hr</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>% of Design Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Avg.</td>
</tr>
<tr>
<td>Max. Month</td>
</tr>
</tbody>
</table>

Source: City of Lakeland Wastewater Division, 2007

### TABLE IV-12
NORTHSIDE TREATMENT FACILITY

<table>
<thead>
<tr>
<th>INFLUENT FLOW</th>
<th>CONCENTRATION (MG/L)</th>
<th>POUNDS (LBS/DAY)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MGD</td>
<td>CBOD&lt;sub&gt;5&lt;/sub&gt;</td>
</tr>
<tr>
<td>Annual Avg. 9/06-8/07</td>
<td>3.28</td>
<td>7,521</td>
</tr>
<tr>
<td>9/06-8/07</td>
<td>3.56</td>
<td>40,930</td>
</tr>
<tr>
<td>Max Month</td>
<td>3.57</td>
<td>44,478</td>
</tr>
<tr>
<td>Max Day</td>
<td>NA</td>
<td>33,231</td>
</tr>
<tr>
<td>Max H</td>
<td>14.00</td>
<td>33,231</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PLANT EFFLUENT</th>
<th>Removal</th>
<th>34</th>
<th>55</th>
<th>62</th>
<th>34</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Removal</td>
<td>99.5%</td>
<td>99.1%</td>
<td>94.6%</td>
<td>87.2%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PLANT DESIGN CAPACITY (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Avg (solids)</td>
</tr>
<tr>
<td>Annual Avg (liquids)</td>
</tr>
<tr>
<td>Max Month</td>
</tr>
<tr>
<td>Peak Hr</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>% of Design Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Avg.</td>
</tr>
<tr>
<td>Max. Month</td>
</tr>
<tr>
<td>Annual Avg.</td>
</tr>
</tbody>
</table>

Source: City of Lakeland Wastewater Division, 2007.

The indicators given in Tables IV-11 and IV-12 above are defined as follows:

- **CBOD** = Carbonaceous Biological Oxygen Demand
- **TSS** = Total Suspended Solids
- **TN** = Total Nitrogen
- **TP** = Total Phosphorus

Chapter IV
Infrastructure Element: Wastewater
LINE CAPACITY LIMITATIONS

Table IV-13 lists segments of the wastewater system which could reach full capacity by year 2020. Peak volume flow, the parameter which determines the capacity of sewers, has decreased rather than increased over the past 10 years, a consequence of significant sewer rehabilitation and conservation efforts. Five segments, about 4% of the Western Trunk, will continue to be closely monitored for actual peak demand and to re-estimate Western Trunk system capacity. These segments could require capacity augmentation prior to 2020.

The Eastern Trunk is projected to have adequate capacity through the year 2020. The Northside sewers (Socrum Loop, Griffin Road 24” gravity trunk, and the 18”/21” Lakeland Hills gravity trunk) continue to have reserve capacity. The West Lake Parker Drive gravity sewer, smaller than a trunk, is affected by infiltration. While some infiltration has been eliminated, more must be eliminated, or upsizing could become necessary before 2020. With the upgrade of the Lake Gibson station, the US 98 system appears to have sufficient reserve capacity absent unforeseen annexation in the area.

<table>
<thead>
<tr>
<th>TABLE IV-13</th>
<th>WASTEWATER FACILITIES WITH POTENTIAL CAPACITY LIMITATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUMP STATIONS</td>
<td>FORCE MAINS</td>
</tr>
<tr>
<td>US 98 N</td>
<td>Western Trunk (portions)</td>
</tr>
<tr>
<td>Eastside Village</td>
<td>West Lake Parker Drive</td>
</tr>
<tr>
<td>Drane Field Road</td>
<td></td>
</tr>
<tr>
<td>Hwy 98 South</td>
<td></td>
</tr>
<tr>
<td>SR 33</td>
<td></td>
</tr>
</tbody>
</table>

Source: City of Lakeland Wastewater Division, 2007

The Tradewinds pump was rebuilt as a triplex station, with initially only two pumps. It currently has substantial reserve capacity. In the event City wastewater service is ultimately extended to the neighboring Skyview Utility, it may become necessary to install the third pump into the station.

During the prior planning period, larger replacement force mains have been provided for Lakeland Harbor, County Line Industrial, Griffin Road and Lakeland Highlands Road. A second phase of the Lakeland Highlands force main expansion is currently in progress. A major force main replacement is in progress along Drane Field Road and the Polk Parkway. This multi-year project was approximately half completed by 2010, with a likely completion of 2011 or 2012. This project will greatly increase system capacity for the southwest portion of the City. The Eastside Village force main has reserve capacity, but is located in fringe areas which could experience unpredictable growth and so will be monitored. With anticipation of continued growth along the Hwy 98 South corridor and east of SR 33, the City initiated a study (in 2010) to determine the future needs for expanded transmission facilities in these areas. Existing City policy requires new development to fund expansions.
and extensions of the wastewater collection system directly necessitated by their currently planned development.

Three identified high-growth areas are actively being provided with long-range wastewater transmission facilities. The local developments will be required to provide collection and local transmission pipelines. The facilities serving the Williams DRI & Florida Polytechnic have been completed north along SR 33 and then south into the Williams DRI. A series of projects known as English Oaks I, II & III are scheduled for completion by the end of 2013 to serve the areas south and west of the Lakeland Linder Airport. Upsizing and relocation of the US 98 South force main was under construction as of early 2010.

### EFFLUENT REUSE

As of 2007 the Lakeland Electric McIntosh Power Plant utilizes an average of 8.4 MGD of City wastewater effluent for cooling water. The remaining effluents are directed to the City’s artificial wetlands site located on S.R. 60. Effluent reuse for cooling water is expected to reach up to 10 MGD by 2020. Table IV-14 accounts for the City’s effluent uses in 2007. In March 2009, the City entered into a 30-year agreement with the Tampa Electric Company (TECO) to utilize the City’s treated wastewater from the artificial wetlands to TECO’s power generation facilities in southwest Polk County to meet increased demand for water related to the cooling process. TECO will lay pipelines and connect Lakeland’s wastewater transmission system to TECO’s facilities at an estimated cost of $60 million. The project is expected to be complete by 2013. This agreement mutually benefits both parties by allowing TECO to meet its water needs and freeing up otherwise allocated groundwater supplies to meet the area’s future demands.

<table>
<thead>
<tr>
<th>TABLE IV-14</th>
<th>LAKELAND EFFLUENT USES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MONTH</strong></td>
<td><strong>Glendale WWTP</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Glendale</strong></td>
</tr>
<tr>
<td>Oct-05</td>
<td>66.18</td>
</tr>
<tr>
<td>Nov-05</td>
<td>50.89</td>
</tr>
<tr>
<td>Dec-05</td>
<td>57.82</td>
</tr>
<tr>
<td>Jan-06</td>
<td>50.22</td>
</tr>
<tr>
<td>Feb-06</td>
<td>28.96</td>
</tr>
<tr>
<td>Mar-06</td>
<td>40.92</td>
</tr>
<tr>
<td>Apr-06</td>
<td>58.11</td>
</tr>
<tr>
<td>May-06</td>
<td>64.22</td>
</tr>
<tr>
<td>Jun-06</td>
<td>80.25</td>
</tr>
<tr>
<td>Jul-06</td>
<td>109.62</td>
</tr>
<tr>
<td>Aug-06</td>
<td>115.50</td>
</tr>
<tr>
<td>Sep-06</td>
<td>95.90</td>
</tr>
<tr>
<td>FY TOTALS</td>
<td>770.79</td>
</tr>
</tbody>
</table>

*Source:* City of Lakeland Water Department, 2007
ANALYSIS OF SOILS FOR USE OF SEPTIC SYSTEMS

Soils are part of a natural system which are not expected to have significantly changed from the time of the adopted Comprehensive Plan (see Illustration IV-8). Where development has occurred in the City, centralized wastewater service is usually a requirement; the City does not issue permits for septic systems or package plants. The Health Department does allow use of septic systems where wastewater service is “unavailable”/too far away and soil conditions are suitable for the septic system. Some septic systems have been added through annexation of areas developed in the County but, according to Wastewater Division staff, these are widely scattered. Septic systems which have been annexed to date have generally operated well due to their location in areas which include well- to moderately well-drained soils. While a few of these septic systems have been removed on an individual system basis and connected to centralized sewer service, such connections are neither easy nor inexpensive. General location map Illustration IV-9 depicts the location of septic systems in the City. A detailed analysis of the suitability of the soil groups for septic systems was included in the original 1991 Comprehensive Plan and is now found in TSD IV-Three: Septic Systems in the Technical Support Document.

ADOPTED LEVEL OF SERVICE

The City of Lakeland will provide wastewater service at levels of service which comply with all standards of the U.S. Environmental Protection Agency (EPA) and Florida Department of Environmental Protection (FDEP). In addition, system-wide wastewater collection and treatment will be sufficient to provide a minimum of 128 gallons per capita per day.

FUTURE CONDITIONS

A top priority of the City of Lakeland is to provide customers within the corporate limits with adequate capacity to meet wastewater collection and treatment demand. Once the needs of City residents are met, surplus capacity is made available to unincorporated areas within the sewer service area. In order to ensure the availability of adequate collection and treatment capacity to meet demand, projections must be made of the future service area population.

In 2020, the City’s wastewater utility service area is anticipated to exceed an estimated total population of 204,874, however, only 153,110 persons are projected to be receiving wastewater service. Per capita collection and treatment demand is estimated at approximately 131 gpd for residential uses. For purposes of projecting future demand, the minimum level of service standard, which relates to the historical demand data, is multiplied by the projections for total population served. Table IV-15 outlines anticipated wastewater collection and treatment demand through 2020, excluding infiltration. The City provides priority service within its corporate limits and extends beyond those limits typically only as part of an annexation agreement. The per capita demand figure used in Table IV-15 allows for commercial development in conjunction with population growth from residential development.
TABLE IV-15
WASTEWATER COLLECTION AND TREATMENT NEEDS: 2010 – 2020

<table>
<thead>
<tr>
<th>YEAR</th>
<th>POPULATION SERVED</th>
<th>PER CAPITA DAILY DEMAND</th>
<th>TOTAL DAILY DEMAND</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>118,623</td>
<td>128 gallons</td>
<td>15,183,744</td>
</tr>
<tr>
<td>2015</td>
<td>143,853</td>
<td>128 gallons</td>
<td>18,413,184</td>
</tr>
<tr>
<td>2020</td>
<td>153,110</td>
<td>128 gallons</td>
<td>19,598,080</td>
</tr>
</tbody>
</table>

Source: City of Lakeland, Community Development Department & Wastewater Utility Division. 2007.
SOLID WASTE

BACKGROUND

Solid waste includes garbage, refuse, yard trash, clean debris, white goods, ashes, sludge or other discarded material which may be solid, liquid, semisolid or contained gaseous material. Hazardous waste is solid waste which, because of its quantity, concentration of physical, chemical or infectious characteristics may present a hazard to human health or the environment when improperly managed.

DISPOSAL METHODS

Disposal of wastes generated in the Lakeland Planning Area occurs in various ways. The City’s primary method is to haul wastes that are not recycled to the North Central Landfill, which is owned and operated by the Polk County Environmental Services Division. Burnable refuse, such as wood and tires, are sent to the Wheelabrator facility located adjacent to the County’s North Central landfill for waste-to-energy conversion. Polk County provides solid waste disposal for the entire county, including the municipalities. The County has determined that sufficient landfill space is available in the North Central Landfill to meet projected demand through 2020, with a Phase II already built and having capacity through 2050. The County’s Class III landfill (for construction debris and yard waste) has been closed and this division is now taking these wastes to their Class I landfill (although privately run construction and debris landfills also operate within the county.)

There have been no problems in terms of leachate contamination associated with the County landfills. As is true with all landfills, scavenging birds and odors are common; however, there is no residential development in the immediate proximity of any Polk County landfill. As a result, these are minimal problems. The siting of a new landfill is not necessary at this time as the existing facilities are adequate to accommodate projected demand through 2050.

In 2008, the City of Lakeland entered into an Interlocal agreement for a ten year period of which rates are not to increase over 10% in years three and five of this agreement; the 2010 rate is $29.33/ton and not to exceed approximately $35.50/ton.

EXISTING FACILITIES AND PROPORTIONAL CAPACITY

Public facilities: In 2009, the City of Lakeland Solid Waste Division used 15 rear packer trucks for 29 collection routes, handling residential collection three times per week (2 times/week for regular garbage and once/week for vegetative wastes which are composted). For commercial collection, the City had 10 front loader trucks for 8 collection routes. In 2009, the City had an annual average of 34,000 residential and approximately 3,000 commercial accounts for solid waste collection.

Most solid waste collected by the City is taken to the Polk County North Central Landfill located on C.R. 540. There is not an assigned capacity for each jurisdiction using the
County landfill. However, the existing County landfill is estimated to have adequate capacity to receive and handle solid wastes through at least the year 2020, with Phase II capacity through 2050.

**Private facilities:** The City Solid Waste Division provides all solid waste collection and disposal service for all areas inside the corporate limits, except in regards to roll-off service. Within the City limits, the City Solid Waste Division competes with approximately six other haulers permitted by the City Public Works. Currently, there are two major private haulers and a number of smaller haulers providing solid waste (haul) service in the Polk County area.

There is a landfill for construction and demolition debris, as well as wood debris, located near Bartow called the Cedar Trail Landfill, which could be utilized as a disposal site. Yard waste is also taken to Southern Softwoods, located east of Lakeland on Lasso Lane and recycled for wood waste (2010 charge was $33.00/load). Tires and most wood waste are taken to the Wheelabrator facility located north of the County landfill on C.R. 540, and used as a renewable fuel for power production (2010 charge was $70/ton).

**OTHER WASTES**

The City does not handle hazardous and/or special waste collection or disposal but does cooperate in advertising and helping to find a collection site for what is referred to as “Amnesty Day a.k.a. Hazardous Waste Day” collections where a local collection site is provided for a day for residents to bring residential household special wastes and/or hazardous wastes such as paint thinners and used oils. There is a central location for hazardous waste drop-off located at Polk County’s North Central Landfill complex; this collection/drop-off area is open year-round. The County does not, however, treat or dispose of hazardous wastes; these wastes are transported to official disposal sites located off site. Bio-hazardous (including infectious) wastes generated at the Lakeland Regional Medical Center (LRMC) are incinerated on site; the LRMC Facilities Engineering Department estimate that they burn approximately 1,317 tons per year of waste based on a 3-year average. At times of periodic maintenance or other interruptions in incineration the LRMC sends their bio-hazardous wastes to Stericycle. Stericycle is a privately operated autoclave site for bio-hazardous wastes located in the Eaton Park area outside of Lakeland.

In 2009 the City produced approximately 397 tons of sludge from its Northside Plant and 1,715 tons of sludge from the Glendale Plant. Wastewater treatment plant sludge from the City’s wastewater treatment plants is applied as permitted onto agricultural lands. As it relates to the digestion process of sludge, the City began a pilot project in April 2009 to utilize methane by-product emitted for energy production. This new process to utilize sludge by-product as fuel, referred to as the Calnetix Pilot Project, will take more time to evaluate its effectiveness, however, it promises to be an innovative and energy efficient re-use of waste residuals.
EXISTING CAPACITIES AND CURRENT DEMAND

In 2009, 92,002 tons of solid waste and recyclables were collected within Lakeland, which is an all-inclusive weight for residential and commercial municipal solid waste, yard waste and recycling. Total tonnage per day, including non-residential waste collected, was 252 tons. According to the Solid Waste Division’s records, even with the matrix of population increasing, overall tonnage (solid waste, recycling, and yard waste) collection levels are tracking a downward trend since the 2005, probably due to our national, state and local push for recycling and general support of green initiatives (see Table IV-16 below.)

<table>
<thead>
<tr>
<th>YEAR</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tons</td>
<td>80,020</td>
<td>82,150</td>
<td>88,540</td>
<td>92,983</td>
<td>100,183</td>
<td>106,471</td>
<td>101,053</td>
<td>99,689</td>
<td>96,708</td>
<td>92,002</td>
</tr>
<tr>
<td>Avg Tons Per Day</td>
<td>219</td>
<td>225</td>
<td>243</td>
<td>255</td>
<td>274</td>
<td>292</td>
<td>277</td>
<td>273</td>
<td>265</td>
<td>252</td>
</tr>
<tr>
<td>Population</td>
<td>78,452</td>
<td>82,706</td>
<td>85,512</td>
<td>88,741</td>
<td>89,731</td>
<td>90,851</td>
<td>91,623</td>
<td>93,428</td>
<td>93,508</td>
<td>94,163</td>
</tr>
<tr>
<td>Lbs/Per Capita</td>
<td>5.59</td>
<td>5.44</td>
<td>5.67</td>
<td>5.74</td>
<td>6.12</td>
<td>6.42</td>
<td>6.04</td>
<td>5.85</td>
<td>5.67</td>
<td>5.35</td>
</tr>
</tbody>
</table>

Source: Solid Waste Division, 2010.

As stated earlier, the existing Polk County North Central landfill has adequate capacity for service through the year 2050. In 2009, County data indicates that the North Central Landfill received 631,285 tons of waste or 2,070 tons/day for that year (305 operational days).

PERFORMANCE AND WASTE REDUCTION

Currently, the City’s collection of solid waste is handled by trucks which depreciate annually with replacement required and budgeted for every 7 years.

The City is looking to venture into residential automated collection. Automated garbage collection utilizes a mechanical arm on the collection vehicle, instead of workers lifting and emptying household waste containers. The City will supply one container at no cost to each residential household within the incorporated City limits. Residents can choose from three specially designed wheeled containers for garbage of either 96-, 64-, or 35-gallons. Prior to full implementation, the City will develop new routes that will allow garbage collection from every residential and commercial customer one day per week rather than two. Affected solid waste customers will be informed via several public education strategies about this change in collection frequency and will be assigned one day of the week on which they are to set their container for collection in the automated system. Due to the design of the containers, residents will find that they have less litter, odor and pest problems because lids always remain on the container. There is a potential cost savings to the City of Lakeland’s operations because automated collection is more efficient. Containers are convenient, maneuverable, easy to roll, and extremely durable. Solid waste personnel indicate that their research shows that where automation collection is already a reality, there are clean...
neighborhoods, satisfied customers, and a more efficient collection system with decreased personnel and fuel costs, which enhances the environment and saves everyone money.

The City is not bound by the State mandate to recycle a minimum of 30% of solid wastes collected; that mandate applies to Polk County. However, the City has historically recycled approximately 25% to 30% of the solid waste it collects. This is a good recycling performance relative to many other solid waste collection operations in Florida. Most of the City’s recyclable tonnage is comprised of yard wastes, which are renewable as a fuel. In addition, the City recycles or sells tires, scrap metal and cardboard.

Lakeland residents may use a maximum of thirty-two (32) gallons container(s) for any yard waste collection such as bagged or loose grass, leaves, or small branches, since this will continue to be picked up manually once a week. Anything larger is too heavy and causes increased injuries for the sanitation workers. The City Solid Waste Department will continue to schedule bulk junk and yard waste collection.

City residents are encouraged to take advantage of the current recycling options available to them to reduce the amount of garbage they need to place at the curb. The more each household recycles, the less garbage is produced. An additional garbage container can be made available for large families, but the City encourages recycling before adding containers. All containers remain the property of the City and are assigned to each residence by serial number. Residents must call the City Solid Waste Division to arrange for a second container for regular garbage if necessary. National surveys indicate the 96-gallon container is adequate for the average home of four (4) people. Each container will hold the equivalent of three (3) normal trash cans. The City’s objective is to utilize the above strategic efforts in order to encourage residents to reduce, reuse, and recycle. By utilizing the City recycling program, recycling decreases household waste, prolongs the life of landfills and helps the environment.
Stormwater is the water which runs off buildings, streets, and all other impervious and pervious surfaces during a rainfall event. Untreated stormwater runoff can transport pollutants to city lakes and streams. Stormwater runoff is now considered to be the most significant source of pollutant loading to surface waters.

Stormwater management refers to techniques for dealing with runoff in a manner that ensures adequate removal of pollutants and flood protection in an economical manner. These management techniques must generally ensure that the volume, rate, timing and pollutant load which exists after development or redevelopment of a site are similar to or better than the drainage characteristics which existed prior to development.

There are distinct land topographies in the Lakeland Planning Area which require different approaches to stormwater management. There is a high, sandy ridge running north and south through the center of the City dotted with several natural lakes. West of this ridge lies a flat terrain with a maze of streams and expansive floodplains. East of the ridge is a wide swath of formerly mined lands, much of which is unreclaimed, except for establishment over time of dense natural vegetation. Water filled mine pits are also characteristic of these mined-out areas. Illustration IV-10 depicts the four watersheds within the Lakeland Planning Area which give rise to rivers flowing eventually into the Gulf of Mexico.

Local Rainfall Per the Water Management District, the region and County averages, respectively, approximately 51 and 49 inches of rainfall in a year (1990-2009). According to rain gauge readings taken near the Lakeland Linder Airport, local yearly rainfall has averaged about 49 inches from 2005 to 2009. In planning for the capacity of stormwater facilities to handle rainfall, the standard of a 25-year storm is generally chosen for open basin systems and is used by the water management district. This storm can be described as the largest amount of rainfall that can be expected during any 25-year period. In Lakeland such a storm would result in about 7.5 inches of rain during a 24-hour period. Stormwater facilities should be designed to accommodate a storm of that level.

DRAINAGE SYSTEM
The two key aspects of the local drainage system are the natural drainage features and the man-made drainage system. Illustration IV-10 depicts the Lakeland Planning Area's natural drainage features. The lakes, rivers, and other surface waters in the city are an integral part of the larger regional drainage basins also depicted in Illustration IV-10. Man-made drainage improvements within Lakeland are largely a function of street and site improvements which connect to the existing system of channels, lakes and streams. The City drainage system, shown in Illustration IV-11, is maintained and operated by the Lakeland Public Works Department. The illustration incorporates the location of the storm sewer pipelines as located via the Division’s extensive survey map of stormwater facilities.
This survey will assist the City with the effort to maintain its National Pollution Discharge Elimination System (NPDES) permit.

**DRAINAGE REGULATION**

Stormwater control focuses on the temporary storage of water on-site. On-site detention areas are effective in controlling short, intense, local storm runoff and catch the initial pollutant wash. Detention strategies also help reduce downstream flooding and soil erosion, and help to recharge the groundwater aquifer. The City of Lakeland has had regulations requiring on-site stormwater detention and treatment since at least 1977. Following the adoption of the 1991 Comprehensive Plan, the City compiled and enhanced most existing development regulations into one ordinance, referred to as the *Land Development Regulations*.

Provisions in Article 34 of Lakeland’s land development regulations address aquifer recharge protection, surface water quality/stormwater management requirements, natural habitat protection, floodplain management, soil erosion control and standards for the review of development site plans in regard to the protection of natural resources. Most construction activity that results in an increase in impervious surface area requires prior submittal and approval of a stormwater management plan for the site. A pre-post match of peak rate, volume, and pollutant loads is required for new development and redevelopment. The City’s standards were historically more stringent than the current water management district requirements in that the district did not require a pre-post match for volume vs. rate. In an urban area where redevelopment is key to a healthy economy, the City’s drainage policies are crucial to prevent further degradation of our lakes or any new flooding problems. Developments in a floodplain area must first attempt to locate on the non-floodplain portion of the site. When a development must infringe on part of a 100 year floodplain, the flood water storage function and capacity must be compensated, usually somewhere else on site, according to City and Southwest Florida Water Management District and/or FDEP standards which address this issue; also, structures within a floodplain must be elevated per City regulations. If a site is totally within a 100 year floodplain, development should be prohibited except where it would result in a “taking” of private property unless it’s been permitted by the appropriate regulatory agencies (SWFWMD &/or FDEP.) New surface water and stormwater quality standards are being proposed by the federal government that could require significant increases in water treatment capabilities with associated new costs. As these new regulations become vetted, the City will need to monitor the impact on its lakes management and stormwater treatment projects, as well as examine its development regulations for any required changes.

**FLOOD AND SURFACE WATER QUALITY PROBLEMS**

The results of a 1988 study and generalized stormwater master plan completed by the firm of Dames and Moore in 1992 were somewhat problematic in regard to predicting flood problem areas. The City’s Public Works Department uses a work order system that tracks
current flood problem areas. Some of the worst areas as of 2010 included streets, intersections and/or segments of the streets as follows (the list will tend to vary each year):

**STREETS/ STREET SEGMENTS**
1. Robson Road, west of N. Florida Ave
2. Buckingham Avenue, north of Easton Drive
3. Gilmore Avenue, south of Memorial Blvd.
4. Elm Road

The City Public Works Department is largely responsible for correction of drainage problems. Corrective actions must be appropriately funded in the City’s 5-year Capital Budget Program.

Surface water quality problems are present in all City lakes. All of the lakes in Lakeland are over-enriched with nutrients, primarily nitrogen and phosphorus. This condition, termed eutrophy, results in reduced water clarity, persistent algal blooms, accelerated sedimentation/aging and imbalances in fish and wildlife populations. In Lakeland, eutrophy is due in part to the rich deposits of phosphorus naturally occurring in area soils. The problem is compounded by the discharge of untreated stormwater runoff to surface waters since this stormwater carries fertilizers, pesticides and other pollutants from yards and streets into the lakes.

Another source of nutrient loading to lakes is internal recycling from the lake sediments. Sediment dredging or chemical inactivation may be required in lakes with extensive deposits of organic sediments. Lake specific diagnostic studies, as scheduled in the City of Lakeland Comprehensive Lakes Management Plan, are needed to identify the sources of pollution and other management needs.

In 2009 federal courts ruled that the US Environmental Protection Agency (EPA) must establish limits to pollution of Florida’s lakes, rivers and bays as a result of the State’s failure to meet the 2004 deadline mandated by the Clean Water Act. The EPA is expected to develop methodologies for restricting the discharge of the violating pollutants such as phosphorous and nitrogen, originating from various sources including sewage, fertilizer and manure, between 2010 and 2011. Since the City’s lakes do not meet the goals and objectives of the Federal Clean Water Act, they are subject to future regulation by Federal and State government.

## STORMWATER PROJECTS

The natural surface water system that runs through Polk County includes Lakeland. It is not restricted by any political boundaries but is an integrated natural system influenced by the built environment including man-made stormwater systems. Thus, the City and the County can benefit from joint stormwater projects and should remain aware of each others stormwater/flood control projects. Heavy rains in the mid-1990’s led the Polk County Commission to begin an intensified effort to correct flooding in over 60 flood problem areas throughout the County. The effort includes continued maintenance of stormwater ditches to
retain their proper functioning. The County has implemented a series of regional flood control projects in chronically wet areas along Itchepushasses, Blackwater, Peace and Gator Creeks; these projects and/or the studies for them were jointly funded by the County and the Southwest Florida Water Management District.

In addition, Polk County has initiated studies and efforts in the Lakeland Urban Area. This includes stormwater studies and projects for the following:

1. **Lake Parker Drainage Area Study.** A study for Polk County was conducted by Keith & Schnars, consultant firm, to examine the outfall from Lake Bonny to Lake Parker and perform the drainage system analysis of the Lake Parker-Saddle Creek drainage system in the late 1990’s. Additionally, the Florida Department of Environmental Protection also contracted a study (with USF and BCI Engineers) to model drainage from the Tenoroc Recreation area (which is primarily unreclaimed mined lands) through the Saddle Creek Basin. The study evaluated the feasibility of reconnecting isolated unreclaimed mined lands to the Peace River System and includes modeling of the inflows from the Lake Parker sub-basin. According to the Lakes Management and Stormwater Division, phases I and II of Lake Tenoroc Area Lake Parker-Saddle Creek Drainage Project were completed in 2008 and subsequent phases were being permitted as of 2010.

2. **The County conducted a study to revise federal Flood Insurance Rate Maps (FIRMs) for an area near Scott Lake.** This was a jointly funded project with some funding by Alafia River Basin Board. All work was completed by April 2003.

Specific City projects for stormwater management include the following:

1. **Lake Hollingsworth Restoration:** The removal of 3.6 million cubic yards of organic deposits to restore lake bathymetry and improve water quality was completed 2001.

2. **Lake Hollingsworth Watershed Management Plan:** A plan to treat a significant portion of stormwater runoff entering Lake Hollingsworth. The following projects have been completed: Southern Landing stormwater treatment pond, wetland forest rehydration project adjacent to Buckingham Avenue, native vegetation replanting along the shoreline, and ongoing control of exotic plant species. The Westside Stormwater Treatment Project was completed in 2009.

3. **Comprehensive Lakes Management Plan:** Initially adopted in 1996, the 20-year plan identifies projects and costs for improving and protecting our lake resources to specifically address Federal Stormwater National Pollutant Discharge Elimination System (NPDES) and the State Total Maximum Daily Load (TMDL) programs. The plan served as the impetus for the City to approve the creation of a Stormwater Utility in 1999. An update to the plan, conducted in 2006, made the following findings and recommendations:
   - From 2000 to 2006 there has been an average of 16 water quality and 12 drainage capital improvement projects under way simultaneously;
• Replacement cost for the City’s aging stormwater infrastructure is estimated to be $248 million;
• The cost of complying with the TMDL program in Lakeland will exceed $100 million;
• Annual expenditures on stormwater management in the City will cost $18.5 million/year;
• Based on the Impaired Waters Rule, most surface water in the City of Lakeland are impaired for one or more pollutants;
• Incorporation of the areas identified in the City’s Annexation Plan would double the City’s cost for the TMDL program to over $200 million.
• Increase the stormwater fee from $2.00 to $4.00 in 2007 (completed);
• Add 2 additional street sweepers (completed);
• Allocate the remaining additional revenue for watershed management, water quality enhancement, and flood control projects (ongoing process);
• Conduct a street sweeping study to evaluate the existing program and identify ways to increase efficiency (in progress as of 2010);
• Perform an extensive evaluation of city codes and regulations that impact lake and natural resource protection. Incorporate incentive based, low impact development principles and standards into land development regulations and the comprehensive planning process wherever possible (subject to further study);
• Update and revise this plan every five years. This will correspond with the TMDL’s 5-year rotating basin plan. This will guide the City in regards to prioritizing CIP projects.

4. Pollution Control Device Program: A program to install pollutant removal devices in the existing city stormwater system beginning in 1999. Approximately 50 control devices were in operation and being actively maintained as of 2010; however the City is not pursuing expansion of this program.

5. Lake Parker Southwest Outfall Retrofit: Retrofitting a major stormwater outfall to Lake Parker by constructing a series of stormwater detention ponds within the southwest watershed of the Southwest Basin. Phase I construction was completed in 2008 and phase II scheduled to go under construction in mid-to-late 2010.

6. Street Sweeping: The City of Lakeland has four street sweepers. They remove 2,265 tons per year of sediments, trash, and leaves from the streets each year. Furthermore, this program reduces street stormwater runoff levels for heavy metals, nutrients, pesticides, and hydrocarbons. Without the street sweeping program, these materials and associated contaminates would be discharged into our lakes.

7. Public Education: The City is involved in public education projects to advise citizens on how they can help protect our lakes. This includes financial and technical support to the grassroots organization – Lakes Education/Action Drive (LE/AD). The public education effort has resulted in numerous activities such as lake displays,
stormwater inlet plaques, Lakes Appreciation Month events, neighborhood/lake cleanups, public service announcements, educational brochures and presentations to adult and school groups.

8. **Lake Parker Tributary Swamp**: Restoring the hydrology of a large forested swamp located northeast of Lake Parker. The restoration will revitalize the swamp while providing treatment to stormwater flowing into Lake Parker (this project was on hold as of early 2010.)
Chapter IV
Infrastructure Element: Stormwater
Subsurface formations containing water reservoirs are called aquifers. In the Lakeland area there is a system of aquifers below the ground which includes a surficial or shallow aquifer, intermediate aquifer system, and the upper and lower Floridan aquifers. Public water supplies are drawn from the Floridan aquifer which holds the largest quantity of fresh water. The amount of water potentially available is much less since a large volume is needed to maintain hydrologic pressure against saltwater intrusion. Where a subsurface stratum confines the aquifer, hydraulic pressure may exist. The level to which the water would rise without the confining layer is called the potentiometric level. The groundwater in the surficial aquifer is unconfined and is free to rise or fall. Because of this and its nearness to the ground surface, it is highly susceptible to contamination from the surface.

Land areas which absorb rainfall and percolate it downward into underground water systems are aquifer recharge areas. Illustration IV-12 describes the geographical character of aquifers and how it relates to the natural water cycle. The aquifer systems below the Lakeland area are recharged by natural rainfall at a rate of recharge which depends upon soil-type, thickness of confining layers and geologic features such as sinkholes. The areas of high recharge correspond to thinner areas in the confining layers or units overlain with highly porous soil, while very low recharge corresponds to thicker areas and/or clay and other less permeable soil types.

Rule 9J-5, Florida Administrative Code, requires identification and protection of areas of prime or high recharge as designated by the relevant water management district. To date, no areas of prime or high aquifer recharge have been designated by the Southwest Florida Water Management District (SWFWMD), which is the district for Lakeland. Polk County Natural Resources Division staff used a model developed by the St. John River Water Management District to map current recharge rates for all of Polk County. Lakeland and its surrounding area are shown on our excerpt of the County map, Illustration IV-13, Aquifer Recharge Rates. The Scott Lake area remains the area with the highest recharge rate while virtually all the rest of the City has rates below 10 inches per year. Since the SWFWMD has indicated that they intend to use methodology similar to Polk’s for the mapping of recharge areas in their district, this recharge rate information is the “best available data” for Lakeland.

Over time, surface water percolates downward through confining beds. In some thick layers, vertical transmission of water may take up to 85 years to reach the Floridan aquifer. In some areas of the Green Swamp, on the other hand, there are no confining layers and recharge occurs rapidly. The longer water is in the aquifer, the greater the concentration of dissolved minerals and other elements. The deeper that water is in the aquifer, the higher the concentration of dissolved elements. Therefore, freshwater north of Lakeland is generally of higher quality than that south of Lakeland.
The Floridan aquifer is exposed to a variety of contamination risks. The major sources of potential groundwater contamination include toxic agricultural chemicals, hazardous wastes, and landfill leachate. Surface contamination may reach the aquifer through conduits such as fractures, drain wells or sinkholes. Sinkholes are a source of potential contamination because of surface inflow into the holes. Illustration IV-14 shows alignments in Polk County where sinkholes have occurred. Within the Lakeland Planning Area there are two such sinkhole alignments. One alignment roughly parallels the CSX rail tracks from the northwest toward the southeast. The other alignment occurs through the Tenoroc State Reserve. In addition, since the aquifer is near the surface in the Green Swamp, any pollutants, with or without a sinkhole, are likely to leach into the aquifer. The continued use of septic tank systems in the Green Swamp may also translate into a potential contamination risk to the ground and surface waters that run through the swamp. It is critical that the Floridan aquifer be protected since it is the major source of potable water for the Lakeland water service area. Measures for protection include surface water quality improvement programs including drainage regulations, wellhead protection zones, and water conservation programs.

The land development regulations which were effective in early 1993 include a section that addresses wellhead and aquifer recharge protection. This section includes a list of prohibited uses and a list of restricted uses within the zones of protection of an identified high recharge area. Businesses which are located within the zone of protection and to which the restricted use provisions apply, must obtain restricted use permits. These permits require a management plan, which must be submitted to the City water department, and which in turn requires collection of quarterly data and annual inspections by City water officials. In addition, the section of the land development regulations which address stormwater management also help protect groundwater quality.
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ILLUSTRATION IV-12
AQUIFER SYSTEM

Protecting the water below

The hydrologic cycle - the constant cycle of evaporation, transpiration, condensation and precipitation - recharges the aquifer with water.

Evaporation: The heat of the sun causes water to change into vapor which rises into the atmosphere.

Condensation: Water vapor cools as it rises, forming tiny droplets.

Precipitation: The water droplets become heavy enough to fall back to Earth.

Transpiration: Water that is soaked up by plants and released into the air as vapor.

Natural recharge to the Floridian Aquifer. The aquifer is close to the surface in parts of Florida that lack a confining layer of clay, allowing for a high rate of recharge.

About 4 percent of the annual rainfall makes its way into the aquifer.

When water falls back to the ground as rain, whatever is not used up by plants and evaporation manages to seep through the ground and eventually into the Floridian Aquifer.

Most of West Central Florida gets its drinking water from the Floridian Aquifer, a porous layer of limestone saturated with freshwater. Here’s a look at how the water gets there, how it is tapped into and the impact we have on the environment when the water is removed faster than it can be replenished.

How a production well impacts the environment

When a production well starts pumping from the aquifer, it drives the water level down in the shape of a cone.

If wells are not close to each other their cone can overlap, resulting in the drawdown of the aquifer.

As more and more water is drawn down from the aquifer, surface water in wetlands and lakes is drawn down as well. If there is no confining layer this drawdown is greater and more rapid.

Source: Tampa Tribune, 03/31/1997.
Chapter IV
Infrastructure Element: Natural Groundwater Aquifer Recharge

ILLUSTRATION IV-13
AQUIFER RECHARGE RATES

Source: Polk County Natural Resources Division, 2001

Legend:
- A 0 - 2" / Year
- B 2 - 5" / Year
- C 5 - 10" / Year
- D > 10" / Year
- X Discharge area

Legend Image: lakeland-community-development.png
ILLUSTRATION IV-14

MAJOR LINEATIONS ALONG WHICH SINKHOLES HAVE OCCURRED IN POLK COUNTY

- LOCATION OF SINKHOLES
- ALIGNMENT OF SINKHOLES
- TOPOGRAPHIC CONTOURS--SHOWS ALTITUDE OF LAND SURFACE. CONTOUR INTERVAL 50 FEET. DATUM IS SEA LEVEL.


Source: U.S. Geological Survey Water-Resources Investigations Report 81-4125

Off of Lakeland Planning & Community Development Division.
As this element addresses legislative requirements for several infrastructure issues -- potable water, wastewater, solid waste, stormwater and natural groundwater aquifer recharge -- a discussion of issues and opportunities for each subject is addressed separately. There are numerous issues which must be considered in ensuring adequate infrastructure to meet the needs of the entire Lakeland Planning Area.

**WATER SUPPLY PROTECTION**

The City of Lakeland land development regulations require a 500 foot radial zone of protection around each wellhead within the City wellfields. The land development regulations list prohibited and restricted uses within the zone of protection. Businesses located in the zone of protection which handle or store materials that are restricted must submit a management plan to the City, collect data on a regular basis, and allow annual inspections by City water officials. In addition, the City’s land development regulations require stormwater management systems to address the volume and quality of detained water; this in turn affects the volume and quality of groundwater since stormwater eventually drains into the ground, recharging or renewing the water in the aquifer.

The location of the City’s Northwest wellfield and the T.B. Williams Water Treatment Plant is within the urban development area east of Kathleen Road and south of Exit 31 for Interstate 4, although 2 of the 13 wells are located west of Kathleen Road. A business park exists to the east of the water treatment plant. The surrounding area also contains some low density residential developments. It is in the City’s best interest to protect the wellfield through prudent land use planning for the area surrounding the wells. The future land use designation of the treatment plant area east of Kathleen is Interchange Activity Center and could allow uses such as retail, restaurant, motel, and employment center businesses as appropriate for an interchange location. The west side of Kathleen where two other wells are located is designated as Residential Medium which allows residential and a small percentage of small scale office or retail. However, it is very important to have a reliable back-up system in case of a failure or problem, including intrusion of contaminants at the Northwest wellfield. This is the key role of the Northeast Wellfield and the C. Wayne Combee Water Treatment Plant which was put into service in October 2005. The Northeast Wellfield, comprised of approximately 870 acres located north of Old Polk City Road, was acquired in 1989 for approximately $2,200,000 and was recently developed along with the construction of the C. Wayne Combee Water Treatment Plant, located four miles south on Old Combee Road. The City spent $3,300,000 on pipelines and $19,200,000 on the new water treatment plant.

Another cost of protecting the water supply is providing for a cross connection control program per State statutes. The City has had a program since 1977 although the scope has developed gradually over time to the present application. The utility must continue to address how to prevent water supply contamination through control over potential cross connections and backflows. For example, if water pressure suddenly dropped in the...
system, there is potential for backflow of contaminated water into pipelines from various sources such as mortuaries, dentist offices, fire sprinkler lines, and even irrigation systems. This backflow might contain biological and infectious contaminants and/or pesticides and other human health hazards. In our current program, all new commercial customers are required to install proper backflow preventer (BFP) assemblies per City specifications. If existing commercial customers with no BFP assemblies pull permits for remodeling endeavors, they must bring their facilities up to specifications. These BFP assemblies are generally installed at the meter (point of service) and are owned and maintained by the utility. City utility personnel are certified BFP testers and provide consistency in the annual testing, repair, and recordkeeping.

### WATER CONSERVATION

Conservation of water resources is important to ensure adequate future supplies and to stay within permitted water withdrawal parameters. The need for this strategy arises from increasing population growth. Much of the residential water use is attributable to the maintenance of landscaping, and residential appliances requiring water. The City has been working with the Water Management District to decrease this use. An opportunity to decrease the growth of individual water usage has been pursued chiefly by encouraging the modification of landscaping practices, adapting residential appliances and plumbing to low volume water techniques, and increasing public awareness of water shortages including restricted lawn irrigation periods. Watering restrictions introduced by the District have been in effect since 1988, when they were instituted on a temporary basis. Implementation of these watering restrictions by the City has had a dramatic effect on water use. In 2003, the Southwest Florida Water Management District adopted “Year-Round Water Conservation Measures”. This rule, contained in Chapter 40D-22, Florida Statutes, established normal water use as only twice-per-week lawn irrigation. A companion rule, Chapter 40D-21, “Water Shortage Plan”, addresses when and how additional restrictions may then be implemented, such as the once-per-week watering limit common in the last decade. Details of the city water conservation programs and initiatives may be found in the Conservation Element and in the City’s response to the SWFWMD’s Regional Water Supply Plan, TSD IV-Four (Response Letter to SWFWMD), found in the Technical Support Document.

The City of Lakeland adopted its first water conservation plan in 1987. This plan delineated demand and supply side conservation measures as outlined in the Conservation Element. In 1998, the City implemented an inverted block water rate structure with three tiers to further promote water conservation by those consuming 10,000 gallons or more each month. In order to continue to provide a basis for consistent and coordinated water conservation efforts, the Water Conservation Plan was updated in 2004. In 2006, the water rate structure changed from three tiers to four tiers with a considerable unit cost increase for users of over 19,000 gallons per month. An enhanced conservation program is proposed that would incorporate elements such as low-flow toilet rebates, customer irrigation education, irrigation enforcement, conservation kit handouts, and the Water CHAMP program. Water CHAMP stands for Water Conservation Hotel and Motel Program and is a Southwest Florida Water Management District initiative. The program encourages hotels...
and motels to offer extended-stay guest conservation options. Patrons may choose to have linens laundered every third day and towels laundered every other day as opposed to the normal every day change out. In addition to water savings, the facility will also save costs on electricity and/or natural gas as well as a labor savings. As available water supplies decrease state-wide, the conservation of existing water supplies will continue to be an important issue.

**EXPANSION OF WATER FACILITIES**

In December 2008 the City’s Water Use Permit was increased to an average daily quantity of 35.03 million gallons per day (MGD) with monthly peak of 42.04 MGD. This permit was issued contingent upon the agreement with the Tampa Electric Company (TECO) to provide City reclaimed water to offset TECO’s ground water withdrawal used in the power generation process.

The City’s efforts to promote water conservation strategies such as the inverted block rate structure use of rainfall indicators for sprinkler systems and xeriscaped plantings on City lands and parks, leak detection and inspection programs resulted in reduced per capita consumption trends of the 1990s and delayed the need to expand potable water facilities until 2003. The Northeast Wellfield and the C. Wayne Combee Water Treatment Plant were expanded between 2003 and 2005 to accommodate a higher water use permit quantity. Additionally, installation of large finished water transmission mains has taken place in the northeast area of the community along SR 33 and also extended across Interstate 4 to serve the Williams DRI as well as the new Florida Polytechnic University Campus. Despite the expanded facilities, the previously mentioned conservation strategies must continue since the City is part of the Southern Water Use Caution Area (SWUCA) defined by the Southwest Water Management District (SWFWMD) and formally adopted as of January 2003. Moreover, to ensure sufficient future water supplies several potential multi-city/county collaborations or alliances to develop future alternative water supplies are considered in the City’s water supply plan.

City water use forecasts for the entire water utility service area (which is beyond the corporate limits) indicate water demand within the current permit parameters (35.03 MGD) through 2020 planning horizon.

**WASTEWATER EFLLUENT REUSE**

As mentioned above and discussed in detail in the Conservation Element of this Plan, the City pursues both demand and supply-side conservation strategies to reduce overall water consumption and pumping. The City organizationally combined water and wastewater operations into one department in the fall of 1998. This was to ensure a higher level of coordination between the two services and address mutual issues of concern and opportunity. One of those issues is water conservation through reuse of available wastewater effluent. The treatment level of the effluent may become a significant issue during the planning period. Currently, the City annually uses on average 8.4 MGD of its
effluent for cooling water at Lakeland Electric’s McIntosh Power Plant. Historically the majority of Lakeland’s available wastewater has been used for power generation with the remaining effluent channeled to the City’s artificial wetlands site located on S.R. 60. The artificial wetlands have been permitted for receiving and treating up to 20 MGD. This capacity clearly addresses the effluent needs of the combined wastewater system capacity of the Glendale Facility (13.7 MGD) and the Northside Facility (8 MGD). Other options, such as supplying reuse water to an interconnect with Polk County or to industrial manufacturers, have been discussed but would require amounts of reclaimed water that are not yet available.

The City of Auburndale has approached the City of Lakeland and the Williams Holding Company to supply reuse to the proposed FPU campus located near Interstate-4. Auburndale could solve a disposal issue, Williams could assist both Cities in addressing their water issues and Lakeland could see a reduction in potable water used for irrigation. This effort began the summer of 2007 and is proceeding.

In 2009, the City enter into an agreement with the Tampa Electric Company (TECO) to divert the City’s surplus treated waste water from the artificial wetlands to TECO’s South Polk County Electric Generation Plant for cooling purposes. The use of the treated effluents will “free up” the potable ground water that TECO was previously permitted to withdraw for generator cooling which in turn can be allocated to serve future demand in Lakeland’s service area. The terms of the agreement are that TECO will be responsible for connecting to Lakeland’s wastewater system including the acquisition of easements and laying of the pipes. The project is estimated to cost $60 million and is scheduled for completion by 2012. The funding for this project is to be jointly funded by TECO and SWFWMD.

**INFLTRATION INTO WASTEWATER SYSTEM**

The capacity expansions of both of the City’s wastewater plants are expected to handle the anticipated growth in service demands for another 10 years subject to the augmentation of organic loading at the Glendale (formerly W. Carl Dicks) facility by 2008. The expansion of capacity at the Glendale facility also addresses any temporary higher flows resulting from infiltration during unusually wet years, such as in 2004. In addition, the City’s sewer rehabilitation program has been accelerated to better control infiltration (of stormwater) into lines and manholes.

A program that includes efforts to abate infiltration and to assess trunk sewer capacity was significantly expanded in 1995. The challenge is to complete this assessment for a system of about 311 miles of pipeline and over 6,200 manholes through which potential infiltration can occur. Illustration IV-15, entitled “Total System Flow”, shows the average flows and monthly rainfall from 1997 to 2007. The chart illustrates the significant effect of inflow during periods of exceptionally high rainfall. For example, during July-September of 2007, flows into the treatment plant averaged almost 2 MGD more than the previous quarter. Based on the observations in this chart, a redirection of efforts from abatement of infiltration (leakage below the water table) to reduction of inflow (direct collection of flood waters) was made as
a CMOM project. CMOM stands for Capacity, Management, Operation and Maintenance of the Wastewater Utility. Preliminary observations are indicating significant reductions are probable as more areas are inspected and mitigated.

In order to address the problem of infiltration into the wastewater system, the City significantly increased funding in fiscal year 1996 to accelerate wastewater line rehabilitation. Objectives of the accelerated wastewater line rehabilitation program were to inspect the pipeline by televising the entire gravity sewer system within 7 years, to log and prioritize sewer problems, to repair priority-one problems (e.g. where imminent cave-in of pipe is likely) in a timely manner, and to eliminate 0.5 MGD of infiltration by year 2000. The inspection is performed by a miniaturized robotic camera on treads or a skid, during which data is logged and later categorized and prioritized. While this program has been very effective in identifying problems, preventing imminent cave-ins and eliminating almost 0.5 MGD by fiscal year 1998, the number, and consequently the cost, of repairing priority-one problems was initially underestimated. Through inspections completed as of September, 2007, $13.2 million in future priority-one and priority-two work* have been identified, while the annual inspection and repair budget has increased from $700,000 to $900,000, and will gradually increase to $1,000,000 in October 2012; (*an example of priority-two work is repair for a pipe with a crack in it.)

The project has resulted in a declining Annual Average Daily Flow (AADF) at Glendale, in spite of increasing the customer base over the last ten years. In response to an EPA required CMOM audit, the City is now refocusing the project into shallower leaks which result in direct inflow to the system during rain events. The audit had to follow a structured outline which addressed various CMOM elements of the Utility’s operations. The assessment was contracted through an experienced firm which had previously provided accepted reports and documentation to the US EPA from other utilities.
ILLUSTRATION IV-15

TOTAL SYSTEM FLOW VS RAINFALL

Source: City of Lakeland Wastewater Division, 2007.
UTILITY SERVICE & URBAN GROWTH

As Lakeland and the surrounding urban area continues to grow in population and businesses, infrastructure needs of water and wastewater will continue to play a key role in where growth locates. The City has largely provided customers inside the City limits with wastewater service. For those customers located outside the City and willing to pay for connection to the City’s wastewater system, an annexation agreement is required for the property; once the property becomes contiguous with the corporate limits, the City has the option of requiring annexation.

The City of Lakeland has various Wastewater Service policies which discourage urban sprawl. One compact growth policy results from Lakeland having defined a “Wastewater Utility Service Area.” The lack of centralized wastewater service tends to limit the densities and intensities of growth outside of the service area. The delineated service area also serves as a tool in planning for the extension and sizing of wastewater lines. A second important City policy requires that new development pay for and construct wastewater line extensions necessary for the development. In addition, private lines can be designed to accommodate other future users through the City’s policy on oversizing wastewater lines that allows the City to contribute funding for oversizing privately-funded line extensions and later recoup those funds from future customers who connect to or “infill” along the line route. This policy accommodates development needs and longer-range City capacity needs, while avoiding an inefficient system of small, limited-capacity individual line extensions.

While customers who connect to Lakeland’s wastewater system normally pay for connection through either reimbursements by future tenants or through upfront capital costs plus impact fees, an exception to the City’s policy was made in a decision in 1994 when the Lakeland City Commission agreed to fund the cost for wastewater service line expansions to “high growth areas” targeted by the Lakeland Economic Development Council. Medium-sized wastewater trunklines were extended south on U.S. 98/Bartow Road to C.R. 540/Clubhouse Road in order to service Traviss Technical Center, the University of South Florida-PCC Campus, existing industry and future growth in the corridor. Another extension was made for the businesses at the Lakeland Linder Regional Airport’s Airside Center business park which provides substantial lease revenue to the City. Both of these lines will require upsizing in the future due to the growth in demand in these areas of the City and Polk County. A third extension was proposed for the area north of Interstate 4 along Griffin and Kathleen roads. No reimbursement was required from the private sector for these line extensions. The benefit of these extensions will be to infill areas already developed with future growth of compatible intensities and to discourage growth moving to isolated, less developed areas. This also maximizes existing infrastructure and public services provided in these areas.

The policy of service priority within the City and its urban development area, in conjunction with the absence of County wastewater service for County-approved development located outside of much of Lakeland, historically resulted in a proliferation of septic tank systems in those areas. This practice has been curbed in the last 10 years due to County wastewater
system availability near the City. However, by law, those businesses or residences using approved septic tank systems are not required to connect to a centralized sewer system unless it is available (within a ¼ mile or abutting the property, depending upon the situation). The City has been requested in a number of cases to consider servicing failing private development-installed wastewater package plant systems located in the County, including the Skyview development, Hidden Lakes Estates and others. These situations occur when the Department of Environmental Protection and/or the County Department of Health begin fining the owners of the private package system due to system failures and health violations. If the private owners do not respond or simply abandon the system, the residents are then faced with how to finance the connection to a centralized system. The risk of the failure of package treatment plants will continue to be an issue until the package systems are connected to regional wastewater systems.

The utility is now designing a major expansion to the area southwest of the Lakeland Linder Municipal Airport. Proposed growth and development in this southwest area of the City is much more than the existing collection system can handle. The Wastewater Utility has had to move up its schedule of capital improvements to the capacity and the range of its collection system. Projects titled English Oaks I, II, and III are being implemented. English Oaks I involved the installation of an additional pump station and the upgrading of some force mains and an existing pump station south and west of the airport. English Oaks II provided for a new pump station to be sited north and east of the airport on Drane Field Road in order to move the larger future waste stream that this growth will deliver. English Oaks III provides for the installation of a large diameter force main from the new English Oaks II pump station all the way to the Glendale WWTP; the route is generally the same as that of the Polk Parkway. Completion is not expected until toward the end of year 2013. The area’s increase in water and wastewater service demand may increase effluent available for reuse as well.

HAZARD MITIGATION

The County Local Mitigation Strategy (LMS) was adopted in 1999 and updated in 2009. The LMS is a multi-jurisdictional plan that assesses the vulnerability of the county and its jurisdictions to hazards and elaborates on the risk associated with each type of hazard. It evaluates local mitigation efforts that should be taken and their usefulness, as well as providing guidance for implementation at the jurisdictional level. Through adoption of this plan, the county and its jurisdictions are eligible for federal funds to carry out mitigation actions. Many federal grants available for hazard mitigation are targeted for retrofitting and reinforcing essential infrastructure to both prevent hazards such as stormwater facilities and to withstand hazards as with electrical service or potable water.

On a much larger scale and a longer term perspective Polk County and its 15 municipalities participated in a State pilot program to draft a county-wide Post Disaster Redevelopment Plan (PDRP). The PDRP was adopted in June 2009 and is posted on the County’s website. A post-disaster redevelopment plan (PDRP) is a requirement of all Florida coastal counties and municipalities, and is encouraged for inland communities. It identifies how a community
will redevelop and recover long-term after a disaster. As witnessed by the 2004 hurricane season and the post-Hurricane Katrina devastation of New Orleans, Louisiana, such a natural disaster could create significant challenges for infrastructure systems from electrical power distribution and transportation networks, to municipal potable water systems, to public school facilities. The PDRP considers the implications of a disaster of similar magnitude occurring in Polk County and what policies, regulations and other mechanisms would be required to recover and redevelop in the aftermath. Emphasis is placed on seizing opportunities for hazard mitigation and community improvement, in line with the goals of local comprehensive plans. Infrastructure is extensively considered and some recommendations are made regarding infrastructure restoration and mitigation, as well as for short-term recovery actions that affect long-term redevelopment. As urban growth continues, such preparation becomes essential in a region subject to severe weather conditions.

## SOLID WASTE COLLECTION

The City currently collects solid waste for all areas inside the city limits. As the City continues to grow, additional collector personnel and/or trucks will become necessary. To contain costs and subsequent rate increases the City will need to examine alternative methods of efficient collection. The City currently uses a three-man collection system (one driver and two collectors). Alternative collections using two-man semi-automated systems or one-man fully automated systems will be examined. Given the advent of separated recycling collections in addition to collection of yard wastes and collection of all other garbage, the City will periodically re-examine the costs and benefits of twice weekly collection of garbage.

The City presently does not provide roll-off services to city residents (i.e. to collect construction debris). These services are provided through private contract haulers. The City will examine the feasibility of providing roll-off collections to increase revenues, which in turn will contain overall solid waste rates. The addition of roll-off services will assist the city in providing increased efficiencies to yard waste and apartment complex collections.

## SOLID WASTE COLLECTION AND DISPOSAL

Significant changes in the City’s Solid Waste operations have hindered efforts to reduce waste. In 2003, the Lakeland Electric’s waste-to-energy burn facility was permanently taken off line due to the age of the incinerator resulting in inefficiencies, exorbitant maintenance costs, and concerns about air quality impacts. Consequently, the City’s capability to dispose of solid waste through waste-to-energy conversion was significantly diminished. The last year the incinerator was in operation, the City disposed of approximately 33% of the total annual tonnage collected via waste-to-energy conversion. Consequently, the City’s capability to dispose of solid waste through waste-to-energy conversion was significantly diminished. Five years after the closing of the City’s facility only about 15% of the total annual tonnage collected has been sent to third party companies such as Wheelibrator for waste-to-energy conversion. In 2008, Wheelibrator took approximately 15,000 tons of yard waste and discarded tires. Thus the City is no longer implementing or able to meet the 30% minimum of annual solid waste...
disposal via the Lakeland Electric refuse-derived fuel operation as stipulated in the previous Comprehensive Plan.

The City is considering automated collection for residential waste pick-up. Automated garbage collection utilizes a mechanical arm on the collection vehicle, instead of workers lifting and emptying household waste containers. Automation of collection is expected to offer residents reliable service, more efficient collection with decreased personnel and fuel costs, and potential for increased recycling. If implemented citywide, the City will supply one cart at no cost to each residential household within the incorporated City limits a specially designed wheeled container for garbage; either, 96-, 64-, or 35-gallon containers. Then instead of two pickups per week, residential garbage will be collected once each week. National surveys indicate the 96-gallon container is adequate for the average home of four (4) people. Each container will hold the equivalent of three (3) normal trash cans. However, the monthly charges to residents will be is lower for those who choose to use the smaller sized containers; this fee structure is intended to encourage residents to recycle more wastes. The refuse containers used for automated pick up are relatively easy to roll/maneuverable and extremely durable. All household garbage must be placed inside the container rather than in bags at the curb so that the operator can utilize the mechanical arm to lift the container and empty it. Automation should enhance neighborhood cleanliness by keeping refuse in a durable containers that protect the refuse from animals and heavy winds that might spread the refuse onto the streets.

Prior to full implementation, the City will develop new routes that aim to collect garbage from every residential and commercial container customer one day per week. Affected solid waste customers will be informed via several public education strategies about this change in collection frequency and will be assigned one day of the week on which they are to set their container out for collection using the automated system. Due to the design of the containers, residents are expected to experience less litter, odor and pest problems because the lids are attached and remain secured on the container. There is also a potential cost savings to the City of Lakeland’s operations because automated collection is more efficient using only a driver for normal routes rather than a crew of three and reduces city exposure to major health claims due to the strenuous nature of manual garbage collection.

SOLID WASTE RECYCLING PROGRAM

 Residents are encouraged to take advantage of the current recycling options available to them to reduce the amount of garbage they need to place at the curb. The more you recycle, the less garbage is produced. An additional normal refuse container can be made available for large families, but the City encourages recycling before adding containers. All containers remain the property of the City and are assigned to each residence by serial number. The City’s strategic efforts are intended to encourage residents to reduce, reuse, and recycle. Recycling decreases household waste, helps the environment, and can lead to lower solid waste bills by using the option of smaller regular refuse containers.
In February 2009, the Lakeland Vision Update culminated with the identification of 11 strategic community priorities and among them was the City’s environment as it relates to recycling. The Lakeland Vision Update established the following goal and strategies for recycling:

Recycling is easy, expected, and becomes part of the daily habits of all citizens throughout Lakeland, including schools, businesses and public spaces.

Strategies
1. Develop a comprehensive, city-wide recycling program to include schools, businesses, and public spaces.
2. Conduct a public education campaign to inform the public about recycling benefits and procedures.

The goal and strategies set forth the principles that this element should validate and support in order to create the community envisioned by the City’s residents and stakeholders.

A new project initiated in January 2010 was the downtown commercial Recycling program. This is a voluntary program for businesses in the downtown historic district to dispose their paper, plastic, aluminum, steel and glass in 96-gallon containers placed in designated alleyways. The City collects these recyclable materials once a week for processing. This project was a direct response to the Lakeland Visioning process and will be monitored for its success over time to determine if such commercial recycling efforts can be expanded throughout the City. The City will continue to seek innovative solutions and options.

EXISTING STORMWATER SYSTEM

The existing drainage system consists of various combinations of curbing, drains, ditches, culverts, outfalls and other structures which have historically relied upon the lake reservoir system for stormwater retention and storage. On-site retention has been required for new construction in order to maintain pre-development runoff amounts. Appropriate stormwater management practices can ensure no new flooding problems from development and redevelopment. In order to optimize management of stormwater in the City and coordinate the City’s systems with the larger urban area drainage characteristics, the City has compiled and must maintain detailed inventories, with data then entered into a database to allow for computer analysis. The necessary inventories and studies are costly. Follow-up actions to retrofit or upgrade the drainage system usually involve significant additional costs. Priorities for studies and follow-up actions must be coordinated with the capital improvements budget. In December of 1999, the City adopted a stormwater utility fee as a dedicated source of funding for drainage improvements and upkeep.
Lakeland has a lakes management program which has established data on various area lakes, and a 20-year Comprehensive Lakes Management Plan formulated in 1996 (see Conservation Element). The lakes management program and 20-year plan includes information on lake water levels, water quality, fisheries, recreation demand and how each lake fits into the overall drainage system. Since lakes were historically integrated into the urban drainage system, water quality is constantly degraded by urban stormwater runoff. In fact, most of the stormwater infrastructure in the City of Lakeland was constructed before any concerns about the effects of stormwater on lake water quality. Sites developed prior to the implementation of stormwater treatment regulations discharge untreated runoff directly into our lakes. To improve both water quality and wildlife resources, and to meet existing state and federal water quality standards, Lakeland will need to maintain a long-term commitment to retrofitting the stormwater systems in the city. Retrofits, however, are expensive; there are hundreds of pipes that discharge into our surface waters.

Projects that have been carried out by the Lakes Management Division typically target major improvements of water quality, through lake bottom dredging technology, and through retrofitting drainage patterns to pre-treat or divert polluted runoff prior to its entering the surface water with the intent of maximizing the investment in the surface water clean-up. These projects are primarily funded through the stormwater utility fund. State grants, taxes, and other capital projects revenue sources are all possible alternatives and/or supplements to help leverage dedicated funds. As intergovernmental coordination advances, the City has become involved in more City-County projects that impact the Lakeland Planning Area. This could include Basin Board funding, where regional surface water benefits are evidenced by such a joint project. Funding assistance provided by state and federal assistance programs should be utilized to the maximum extent possible. However, competition for these limited resources is intense, and therefore a local dedicated funding source such as the City’s stormwater utility fee is optimal.

NEW FEDERAL REQUIREMENTS

In 2009, a federal court ruled that the US Environmental Protection Agency (EPA) must set limits for pollution entering Florida’s lakes, rivers and bays consequent to the State Department of Environmental Protection’s inability to adopt sufficient standards as mandated by the federal Clean Water Act. The federal Clean Water Act requires all states to implement numeric nutrient criteria to limit nutrient pollution (i.e.: excess nitrogen and phosphorus levels in water bodies that can harm aquatic ecosystems and threaten public health). The EPA is expected to impose the State numeric nutrient criteria sometime between 2010 and 2011.

There is significant concern, as expressed by the State Department of Environmental Protection (DEP), that the criteria may be arbitrary. The DEP has stated that the proposed criteria will not reflect a true relationship between nutrient enrichment and the biological
health of Florida’s water bodies. Furthermore, as much as 80% of the State’s surface waters could be deemed impaired and may require billions of dollars of remediation to meet these arbitrary limits. Another concern is that the criteria may be applied as a “one-size-fits all” limit to urban centers, suburban areas, and rural hinterlands which could run counter to recent efforts to strategically focus growth in compact urban centers and corridors. The significant amounts of land required for traditional stormwater retention and treatment facilities such as swales and retention ponds makes development and redevelopment in urban areas more expensive and densely compact walkable communities less feasible.

### GREEN SWAMP AREA OF CRITICAL STATE CONCERN

The Green Swamp comprises approximately 6,985 acres in Polk County. In the 1990s the Lakeland city limits came to include a small portion (101 acres) of the Green Swamp in the northeast area of the City. The further annexation of 1,796 acres which expanded the total area of the Green Swamp within the City’s jurisdiction to 1,897 acres led to the subsequent adoption of policies and regulations for development in the Green Swamp in the *Lakeland Comprehensive Plan* and the *Land Development Regulations* in 2006. The annexation included the Northeast well field thereby allowing the City to have jurisdiction over that important resource. The Green Swamp carries the designation "Area of Critical State Concern" (ACSC) because of its important hydrologic resources. The Green Swamp is the headwaters of four major Florida rivers, functioning as a substantial natural storage area for flood waters and as an aquifer recharge area. The overall elevation of the Floridan aquifer above sea level provides water pressure which counters salt water intrusion and causes natural spring flow. Within the Green Swamp the aquifer is often close to the surface and therefore vulnerable to contamination. Development in the Swamp and just north of Lakeland includes residences, schools, an auto auction, a slaughterhouse, a former auto racetrack and various small industries. Polk County's Comprehensive Plan includes provisions to significantly restrict development in the ACSC in what is deemed the “Core Area” of the Swamp. Other restrictions apply to “Special Provision Areas,” such as near Polk City and U.S. 27; new development applications are most prevalent in the Special Provision Areas. Extension of sewer into these areas may address the septic system threat but also leads to the potential for higher intensities and densities of development. A careful balance between development rights and environmental concerns must be sought. Preserving the Green Swamp’s natural functions of flood control and aquifer recharge will benefit the City, the County and the region.
The following goal, objective and policy statements have been developed for the use of local policy makers in guiding and directing the decision making process as it relates to potable water, wastewater, solid waste, drainage and natural groundwater aquifer recharge systems. For purposes of definition, goals are generalized statements of a desired end state toward which objectives and policies are directed. Objectives provide the attainable and measurable ends toward which specific efforts are directed. Policy statements are the specific recommended actions that the City of Lakeland will follow in order to achieve the stated goals.

The goal, objective and policy statements in the Infrastructure Element of the Lakeland Comprehensive Plan are consistent with the requirements of Chapter 163, Florida Statutes and the other elements of this plan and with the goals and policies of the Central Florida Comprehensive Regional Policy Plan.

GOAL 1: Provide an adequate supply of high quality water to customers throughout the service area.

Objective 1.1: Upon plan adoption, achieve and maintain acceptable levels of service for water quality and availability.

Policy 1.1A: The City of Lakeland will plan for capital improvements for water facilities, in order of priority, 1) to correct existing facility deficiencies, 2) provide for future facility needs and 3) to replace existing facilities as required.

Policy 1.1B: The City of Lakeland will provide potable water at the following levels of service:

**LEVELS OF SERVICE**

(a) Quality
Compliance with all Florida Department of Environmental Protection (FDEP) and Federal Drinking Water Standards.

(b) Quantity
- System-wide water quantity will be sufficient to furnish a minimum of 150 gallons per capita per day, on an average annual basis, to address both residential (domestic) and commercial water supply needs;
- domestic service is targeted at approximately 130 gpd per capita;
- per capita consumption targets are given in Infrastructure Element Objective 1.3;
- minimum flow pressures are also established as follows:
  - 20 psi for fire flow events
  - 30 psi for peak demand periods
Policy 1.1C: Lakeland will adopt an ordinance meeting all FDEP requirements for a Cross Connection Control Program. This ordinance will replace the City’s existing policy for cross connection control. Funding for program implementation will be identified prior to ordinance adoption. Commencement of the program will be dependent upon FDEP deadlines and City budgetary resources.

Policy 1.1D: The City of Lakeland will enforce the minimum wellhead radial zone of protection as defined in the City’s land development regulations.

Objective 1.2: Upon plan adoption, prioritize and execute needed system improvements in a manner which protects existing investments, promotes orderly growth, and is consistent with the Capital Improvements Element and Capital Improvements Program of this plan.

Policy 1.2A: All improvements, expansions, replacements or increases in potable water capacity to existing facilities will meet established level of service standards.

Policy 1.2B: New urban development will only occur within areas where potable water services are available concurrent with development.

Policy 1.2C: The City of Lakeland will continue to require necessary on-site water system improvements to be completed at the expense of the property owner.

Policy 1.2D: Where service area agreements exist, the City of Lakeland will continue coordination efforts to ensure availability of service and ascertain any needed revisions of boundaries.

Policy 1.2E: The City of Lakeland will extend water service in a pattern consistent with the Future Land Use Map, the Future Land Use Element, and all policies of the comprehensive plan, adhering to a compact urban growth area, promoting infill development and discouraging urban sprawl. Water service will be given priority within the Urban Development Area depicted in the Future Land Use Element.

Policy 1.2F: Back-up power generators at the City’s water treatment plant shall be tested and maintained on a regular basis.

Objective 1.3: Continue promoting the conservation of potable water resources to achieve a reduction in actual daily per capita consumption. Using the methodology for the Southern Water Use Caution Area to calculate per capita consumption, the City will target a reduction in domestic per capita water consumption to 120 gpd by 2015, and approximately 110 gallons per capita per day (gpcd) by 2020. This target recognizes that the City’s per capita consumption in 1998 was approximately 125 gpd using SWUCA methodology.

Policy 1.3A: The City of Lakeland will reduce per capita consumption of potable water through implementation of the Conservation Element of this comprehensive plan.
**Policy 1.3B:** The City of Lakeland will support education and awareness of water use restrictions within the corporate limits during SWFWMD declared water shortage periods and provide enforcement of such restrictions wherever possible.

**Objective 1.4:** The City will utilize and maintain a Water Supply Facilities Work Plan as part of its Potable Water Sub-Element to address water supply facilities necessary to serve existing and future development within the City’s water utility service area for at least a ten year planning period.

**Policy 1.4A:** The Water Supply Facilities Work Plan will be consistent with the potable water level-of-service standards established in Policy 1.1B.

**Policy 1.4B:** The City’s Potable Water Sub-Element (Water Supply Facilities Work Plan) will be updated subsequent to the State required five year updates of the Southwest Florida Water Management District (SWFWMD) Regional Water Supply Plan.

**Policy 1.4C:** When updating the Water Supply Facilities Work Plan, the City will consider the feasibility of alternative sources of water in order to meet projected water demands.

**Policy 1.4D:** The City will utilize its Water Supply Facilities Work Plan to assist in prioritizing and coordinating the expansion and upgrade of facilities used to withdraw, transmit, treat, store and distribute potable water to meet future water demands.

**Policy 1.4E:** The City will maintain, at a minimum, a current 5-year schedule of capital improvements for the improvement, extension and/or increase in capacity of potable water facilities reflecting those projects in the corresponding five (5) years of the Water Supply Facilities Work Plan.

**Objective 1.5:** The City will identify sources of water that can be used to meet existing and future needs when maintaining and updating the Water Supply Facilities Work Plan.

**Policy 1.5A:** In conjunction with the SWFWMD and other local governments, the City will consider the development of efficient, cost-effective, and technically feasible water sources that will meet future demands without causing adverse impacts to water quality, wetlands and aquatic systems.

**Policy 1.5B:** The City will maximize the use of existing potable water facilities through the implementation of techniques that can enhance a source of supply, sustain water resources and related natural systems, and/or optimize water supply yield. The management techniques may include, but are not limited to, developing water reservoirs for reuse/reclaimed water, requiring alternative sources for meeting irrigation needs of new “Greenfield” developments, enhancing or adding water or reuse water system interconnects, and continuing to enhance all feasible methods of water conservation.
GOAL 2: The City of Lakeland will provide high quality and economical wastewater service while protecting the environment by preserving water quality.

Objective 2.1: The City of Lakeland will annually examine capital improvements priorities as funded in the Five-Year Capital Improvements Program in order to prevent deficiencies in Publicly Owned Treatment Works (POTW) capacities to meet projected demands within established service areas at adopted service levels.

Policy 2.1A: Customer charges and impact fees will support the rehabilitation, replacement, maintenance, and expansion needs of the wastewater system, consistent with the City's long-range wastewater planning.

Policy 2.1B: The orderly maintenance, expansion and extension of the POTW's will be prioritized and scheduled through the Five-Year Capital Improvements Program, and will be updated annually.

Policy 2.1C: The City will maintain an industrial pretreatment program in accordance with Florida Department of Environmental Protection guidelines. Through this program, Wastewater Discharge Permits will be required of Significant Industrial Users.

Policy 2.1D: The remaining phases of wastewater trunk line extensions identified in the 1995 Master Sewer Plan study will be completed within the 20-year planning period as it becomes financially and practically feasible.

Policy 2.1E: In conformance with the City's 20-year plan for the wastewater trunk line system, the City will prevent excessive infiltration and inflow of groundwater and stormwater into the wastewater collection system through reoccurring funds in 5-Year Capital Improvement Plan to support ongoing monitoring, repair, replacement and rehabilitation throughout the planning period.

Policy 2.1F: Routine inspection of the collection system will be performed by closed circuit television. Deficiencies identified will be prioritized and repaired on a priority basis. Emergency power generators for lift stations and treatment plants shall be tested and maintained on a regular basis also.

Policy 2.1G: The City of Lakeland will provide wastewater service at the following levels of service:

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<th>LEVELS OF SERVICE</th>
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<td>(a) Quality</td>
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<td>Compliance with all standards of the U.S. Environmental Protection Agency (EPA) and Florida Department of Environmental Protection (FDEP).</td>
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(b) **Quantity**
System-wide wastewater collection and treatment will be sufficient to provide a minimum of 128 gallons per capita per day on an average annual basis. Plant expansion shall be planned in accordance with F.A.C. 62-600.405.

**Objective 2.2:** Wastewater Service will be made available to new development in a manner to promote compact urban area growth, promoting infill development, and discouraging urban sprawl.

**Policy 2.2A:** The City’s Wastewater Division will coordinate wastewater service for new development with the City’s Community Development Department to ensure compliance with the Future Land Use and the Infrastructure Elements of the Comprehensive Plan. Wastewater service shall be primarily limited to the designated urban development area for Lakeland.

**Policy 2.2B:** Wastewater service will be offered to new development only when all concurrency mandated facilities can be provided concurrent with the new development.

**Policy 2.2C:** Wastewater service will not be provided within any area designated as a greenbelt in the Conservation Element of this plan. (See the Greenbelt illustration in the Conservation Element.)

**Policy 2.2D:** To promote compact urban area growth, virtually all wastewater line extensions for new development will be funded by development.

**Policy 2.2E:** All proposed development will be analyzed to determine the availability of adequate wastewater capacity and a development order or permit will not be issued unless sufficient capacity at acceptable service levels exists.

**Policy 2.2F:** The City will continue to equitably allocate the cost of new facilities between existing and new residents with on-site improvements made at the property owner's expense.

**Policy 2.2G:** Wastewater customers served by an existing package plant may be connected to the City POTW when impact fees are paid for each customer, wastewater line extensions to the City system are constructed by the applicant, and annexation agreement provisions are met.

**Objective 2.3:** Wastewater treatment by-products will be reclaimed or disposed of in an environmentally acceptable manner while maximizing resource recovery.

**Policy 2.3A:** The City’s Wastewater Division and Electric Utility will coordinate regarding potential for incineration of wastewater sludge such that, when and if it becomes feasible, the City will begin incineration of wastewater sludge at the McIntosh power plant.
Policy 2.3B: Wastewater effluent water will be reused as power plant cooling water and plant process water. As opportunities become feasible, effluent reuse at the power plant will be increased, and/or will be made available to other users of the effluent.

Policy 2.3C: Wastewater effluent from existing plants which is not reused will be disposed of by means of the City's artificial wetlands. The City will monitor the outflow from the effluent wetlands to assess any affect on State surface waters in compliance with all applicable State water quality rules.

GOAL 3: The City of Lakeland will manage solid waste in a sanitary, economic and environmentally safe manner.

Objective 3.1: Continue to ensure satisfactory and economical solid waste management for all City residents through the 2010-2020 planning period through adopted minimum levels of service standards.

Policy 3.1A: The City of Lakeland will maintain a self-supporting solid waste system within the municipal service area.

Policy 3.1B: Solid waste franchise areas will furnish solid waste services at the same cost and level of service as the City system.

Policy 3.1C: The City of Lakeland will provide solid waste service at the following levels of service:

**LEVELS OF SERVICE**

(a) **Quantity**
Provide adequate pickup and disposal service to accommodate a minimum of five pounds (5.4 lbs.) per capita per day. Intergovernmental coordination efforts with Polk County will include an annual report to the Polk County Environmental Services Director stating the City service area population and the anticipated annual tonnage of solid waste to be disposed of at the North Central Landfill.

(b) **Pickup**
Provide for a minimum of twice weekly residential garbage and containerized trash pickup for conventional garbage truck collection and once weekly where automated garbage truck collection is implemented, with collection of recyclables and yard/bulk trash and tree trimmings at a minimum of once a week.

Policy 3.1D: The City of Lakeland will maintain a five-year Capital Improvements Program updated annually which will, in order of priority, 1) correct system deficiencies, 2) provide for the extension of, or increase, the capacity of facilities to meet future needs, and 3) provide for the replacement of equipment and facilities in a timely manner.
**Policy 3.1E:** The City of Lakeland will ensure the proper disposal of wastewater sludge in accordance with the Wastewater section of this plan.

**Policy 3.1F:** The City will continue to pursue economically feasible opportunities to increase the total annual tonnage diverted through its curbside recycling program.

**Objective 3.2:** Reduce the amount of solid waste disposed of in landfills in compliance with the Florida Solid-Waste Management Act and applicable State mandates.

**Policy 3.2A:** Solid waste going to landfills will be reduced, in order of priority, by 1) recycling of materials, 2) tree and yard trash composting, and 3) through public-private partnership opportunities.

**Policy 3.2B:** Hazardous wastes will be managed separately from the City and franchise solid waste collection systems. The City will continue to support the annual County Amnesty Day program for collection of hazardous wastes from small-volume generation.

**Policy 3.2C:** The City of Lakeland will support Polk County efforts to recycle solid waste material sent to the County landfill through curbside recycling, waste incineration and diversion of vegetative wastes and construction debris.

**Policy 3.2D:** The City will pursue pilot programs to automate garbage pickup and reduce overall waste while increasing recycling via billing policies associated with the automation effort.

**Policy 3.2E:** The City will continue to examine new means of re-use and recycling of solid waste, and/or the reduction of waste sent to a traditional landfill facility.

**GOAL 4:** The City of Lakeland will manage and protect natural surface water functions to minimize adverse impacts.

**Objective 4.1:** Maintain a database on all existing and newly constructed drainage systems in the City.

**Policy 4.1A:** The City of Lakeland will study and document water quantities and associated drainage structures and facilities.

**Policy 4.1B:** The City of Lakeland will continue to monitor water quality for City lakes and surface waters associated with natural drainage features.

**Policy 4.1C:** The City of Lakeland will continue to coordinate with Polk County in maintaining and updating the City database for surface waters and drainage characteristics.
**Objective 4.2:** Continue to ensure the provision of drainage and stormwater retention to minimize flooding and water quality degradation.

**Policy 4.2A:** The Lakeland Stormwater Management Database will be used by the City to determine priorities for upgrading existing drainage facilities to adopted levels of service.

**Policy 4.2B:** All applicable Federal, State, regional and local regulations pertaining to flood control and water quality preservation will continue to be met in public and private project design.

**Policy 4.2C:** The City will continue to coordinate stormwater projects with adjacent local government comprehensive plans and public or private agency plans to achieve a compatible and integrated approach to stormwater management.

**Policy 4.2D:** The City of Lakeland will use the following minimum level of service standards when evaluating the stormwater protection ability of all existing and any proposed development:

(a) All development is required to manage runoff from the 25-year frequency, 24 hour duration design storm event on-site so that post-development runoff rates, volumes and pollutant loads do not exceed predevelopment conditions.

(b) All development must utilize SWFWMD’s latest stormwater-management, engineering design, and construction standards for on-site stormwater management systems.

(c) All development must utilize acceptable erosion and sediment controls during construction.

(d) All development must provide periodic inspection and maintenance of on-site stormwater management systems and provide evidence of such inspection and maintenance as a condition of system permit renewal.

(e) All stormwater treatment and disposal facilities must meet the water quality standards established in the Florida Administrative Code. Specifically, all stormwater discharge facilities must be designed so that the receiving water body is not degraded below the minimum conditions necessary to ensure suitability for its classification. Any exemptions, exceptions or thresholds found in Chapters 17-25 or 17-40, Florida Administrative Code are not applicable as a deviation from these locally established standards.

**Policy 4.2E:** All new development and redevelopment must adhere to adopted levels of service for stormwater management.

**Policy 4.2F:** Priorities for upgrading existing drainage facilities will continue to be scheduled in the Capital Improvements Element of this plan and updated annually.
**Policy 4.2G:** Rivers, lakes, floodplains and wetlands will be shown on the future land use map series.

**Policy 4.2H:** Protection of property and infrastructure from flood damage will be accomplished during the site plan review process by enforcing pertinent FEMA, State and local government regulations, including the City’s land development regulations.

**Policy 4.2I:** Lakeland will continue implementation of its 20-year Lakes Management Plan as funding is available, to ensure surface water quality improvements are made to protect and enhance local lakes and habitats for lake-dependent plant and animal species. Retrofitting old drainage systems and maintaining existing and new drainage systems shall be part of the City’s strategy to improve and/or protect surface water quality.

**Policy 4.2J:** The City will utilize revenues from the adopted stormwater utility fee as one source of funding for stormwater improvements and maintenance.

**Objective 4.3:** Ensure that development approved in flood-prone areas is consistent with the functions of natural systems.

**Policy 4.3A:** The City of Lakeland will protect natural drainage systems through provisions of the Future Land Use Element of this plan and implementation of land development regulations. The regulations require development in the FEMA 100-year flood hazard zone to be constructed so that the lowest finished floor elevation is at least one foot above the base flood elevation (BFE) as established by the FEMA Flood Insurance Rate Maps, or as per City regulations, whichever is more stringent.

(a) Dredging and filling of lands within floodplains will be restricted so as to preserve the natural function of the 100-year floodplain. All proposed development or redevelopment shall be located primarily on the non-floodplain portion of the site and the City shall use gross density provisions given in the Future Land Use Element to encourage development or redevelopment to be clustered on the upland portion(s) of the property.

(b) For proposed development or redevelopment areas that lie within the 100-year floodplain, residential structures shall be required to be elevated and non-residential structures shall be required to be either elevated or flood-proofed. Elevations shall be at least 1 foot above the BFE.

(c) Floodplain dredge and fill activity shall require adequate compensation for stormwater management in accordance with City engineering standards and applicable standards of the Southwest Florida Water Management District and the Florida Department of Environmental Protection.

(d) No development activity shall be allowed that will raise the 100-year base flood elevation.
(e) No hazardous materials or waste shall be stored within the 100-year floodplain.

(f) Development of property that is entirely within the 100-year floodplain shall be prohibited except where such would result in a “taking” of private property or where already permitted by the appropriate regulatory agency (SWFWMD or FDEP) and consistent with all City development regulations.

(g) Within the Green Swamp Area of Critical State Concern, no new lots shall be created which are entirely within a 100-year floodplain area unless such would result in a taking of private property. In the remainder of the City, lots within the 100 year floodplain shall be discouraged through provisions which allow clustering of lots on the upland portion of a site and reduced lot sizes.

**Policy 4.3B:** For the area of the City which extends into the Green Swamp Area of Critical State Concern, development regulations will continue to meet or exceed State requirements.

**Policy 4.3C:** The City of Lakeland will continue to enforce land development regulations which protect property and infrastructure from flood hazards through the maintenance of natural drainage features.

**GOAL 5:** The City of Lakeland will protect and enhance the function of natural groundwater aquifer recharge areas.

**Objective 5.1:** Continue to enforce standards and criteria within local land development regulations which protect groundwater aquifer recharge areas and wellfields from activities adversely impacting groundwater quality consistent with the policies set forth in the Conservation Element of this comprehensive plan.

**Policy 5.1A:** Upon identification of high or prime recharge areas by the Southwest Florida Water Management District, the City will adopt land development regulations which list uses incompatible for location in those areas including setting specific standards for stormwater management in high or prime recharge areas.

**Policy 5.1B:** The City of Lakeland will coordinate with the SWFWMD to maintain minimal surface water levels during dry years.

**Policy 5.1C:** The City of Lakeland will protect wellfields through the continued enforcement of land development regulations which establish specific prohibitions, restrictions, standards and criteria for any proposed development which could potentially contaminate the water supply. The specific minimum zone of protection is found in Article 34 of the land development regulations. All determinations concerning wellfields and wellfield protection will be consistent with the policies set forth in the Conservation Element of this comprehensive plan.
**Policy 5.1D:** The City will continue to prohibit stormwater discharge directly or indirectly into any geological feature possessing unrestricted connection to the aquifer system, and to require that fill material used for sinkhole cavities be free of listed contaminants as per Article 34 of the City’s land development regulations.

**Policy 5.1E:** The City of Lakeland will continue to meet all limiting conditions of the SWFWMD Water Use Permit.

**Policy 5.1F:** The City of Lakeland's wellfield protection program will be coordinated with the regulatory and land use regulations of Polk County, to the maximum extent feasible.

**Policy 5.1G:** The City of Lakeland will consider incentive based regulatory provisions to encourage low impact development practices that emphasize conservation and use of natural features of a site to maximize on-site stormwater filtration and improve stormwater quality. These standards may include, but are not limited to, reducing impervious areas, use of alternative permeable surfaces for parking, use of bio-swales, rainwater harvesting via rain barrels and/or cisterns, and “green” or vegetated roofs.