9.
GENERAL INFRASTRUCTURE
DATA & ANALYSIS

I. Introduction

The general infrastructure data and analysis section of the master plan applies to the University's main campus and satellite properties. This section provides background information on the University's existing infrastructure and provides information on projected improvements that will be necessary in light of future building projects. Sub-elements included within this section are stormwater, potable water, wastewater and solid waste. Additionally, reclaimed water usage is addressed in both the potable water section and in the wastewater section. The University's commitment to using reclaimed water for outside irrigation serves as a major component of the main campus' sustainable water conservation practices. Facilities Services is responsible for permitting, maintenance and expansion of general infrastructure on the main campus, East Campus and Libraries Remote Services site. The remaining satellite properties are handled individually with each unit handling their own infrastructure permits, maintenance and improvements.

Facilities Services obtains permits for stormwater and consumptive use of water (potable and reuse) from the St. Johns River Water Management District (SJRWMD). The consumptive use permit covers both the secondary use of potable water (drinking water) that the University receives from Gainesville Regional Utilities (GRU) and covers the University's wells. GRU includes and accounts for the University's potable water use in its permit with the SJRWMD. Wastewater is treated in on-campus facilities and handled under a permit from the Florida Department of Environmental Protection. The University's main campus solid waste is transported to Alachua County, which in turn transfers the non-recycled waste to the New River landfill in Duval County. Recycled waste accounts for an average of approximately 52% of the total waste generated on campus. University personnel are exploring ways to increase this percentage on an on-going basis.

II. Stormwater Sub-Element

Regulatory Framework

A. Federal – Environmental Protection Agency – Clean Water Act

The Federal Clean Water Act of 1972, 33 U.S.C., created much of the basis for today's environmental regulatory framework for development. This legislation gives the U.S. Environmental Protection Authority (EPA) the responsibility for setting national water quality standards to protect public health and welfare, while giving states the job of determining how best to meet those standards. In Florida, the Florida Department of Environmental Protection and Florida's five water management districts administer the implementation and enforcement of the Act, with some oversight maintained by the EPA. By addressing both point (discharges from industry and sewage facilities) and non-point source (runoff from farms, forests, urban areas, and natural sources, such as decaying organic matter and nutrients in soil) pollution these agencies both monitor water quality and implement rules that will improve waters determined to be impaired.

Under the Clean Water Act (CWA), states are required to develop lists of pollutant-impaired waters. As described in subsection 303(d) of the CWA, impaired waters are those that do not meet water quality standards that states have set for them. For those waterbodies that are listed, the states must develop Total Maximum Daily Loads (TMDLs) of pollutants.

Another related program created by the CWA is found in section 402, which gives the EPA the ability to regulate the discharge of pollutants into the nation's rivers, streams, and lakes through the National Pollutant Discharge Elimination System (NPDES). Any organization, company, or entity discharging water into a receiving body of water in the U.S. must apply for and receive an NPDES permit.

The NPDES program was set up into two phases. Phase I relied on permit coverage to address storm water runoff from: (1) "medium" and "large" municipal separate storm sewer systems (MS4s) generally serving populations of 100,000 or greater, (2) construction activity if disturbing 5 acres of land or greater, and (3) ten categories of industrial activity. The Phase II program expands the Phase I program by requiring additional operators of MS4s in urbanized areas and operators of small construction sites, through the use of NPDES permits, to implement programs and practices to control polluted storm water runoff. Phase II is intended to further reduce adverse impacts to water quality and aquatic habitat by instituting the use of controls on the unregulated sources of storm water discharges that have the greatest likelihood of causing continued environmental degradation. The Minimum Control Measures that need to be addressed in Phase II are: Public Education and Outreach, Public Participation / Involvement, Illicit Discharge Detection and Elimination, Construction Site Runoff Control, Post-Construction Runoff Control and Pollution Prevention / Good Housekeeping.

In summary, the two areas discussed above dovetail in that the TMDL program helps the NPDES program to further reduce the pollution in streams that do not meet water quality standards by assigning a pollutant load to the stream. Both non-point and point sources are evaluated to determine their input and cumulative impact on the total pollutant load. Measures are then taken to meet this load through remediation of existing facilities and sometimes more stringent requirements on new development.

B. State – Department of Environmental Protection

A number of State laws govern environmental protection, and specifically water quality, within the State of Florida. Most of these laws are administered by the Florida Department of Environmental Protection, with some delegation of responsibilities given to water management districts and local governments.

The 1999 Florida Watershed Restoration Act authorizes the Florida Department of Environmental Protection to create the 303(d) list, which is based on the state's 305(b) Water Quality Assessment Report. These reports are required to be updated every two years. The "305(b) report" uses a watershed approach to evaluate the state's surface waters and ground waters. This report and list identify "impaired" water segments, with the four most common water quality concerns: coliforms, nutrients, turbidity, and oxygen demanding substances. Listed water segments are candidates for more detailed assessments of water quality and, where necessary, the development and implementation of a TMDL. TMDLs take into account the water quality of an entire water body or watershed and assess all the pollutant loadings into that watershed, rather than simply considering whether each individual discharge meets its permit requirements. The management strategies that emerge from the TMDL process encompass approaches such as regulatory measures, best management practices, land acquisition, infrastructure funding, and pollutant trading. They also include an overall monitoring plan to test their effectiveness.

Historically the 305(b) report and 303(d) list have been managed and reported as separate documents. However, in 2002 the EPA recognized that water quality monitoring and data analysis (under 305(b)) are the foundation of water resource management decisions (using 303(d)). Thus, EPA and its partners have developed a consolidated 305(b)/303(d) assessment approach called, "Consolidated Assessment and Listing Methodology" (CALM), which aims to help states improve the accuracy and completeness of 303(d) lists and 305(b) report. The State of Florida Surface Water Designated Uses is found in Florida Administrative Code Chapter 62-302 Surface Water Quality Standards (https://floridadep.gov/sites/default/files/Coded_62-302_072616.pdf) and includes the following.

Designated Uses

- Class I – Potable Water Supplies
- Class II – Shellfish Propagation or Harvesting
- Class III – Recreation, Propagation and Maintenance of a Healthy, Well-Balanced Population of Fish and Wildlife
- Class III-Limited – Fish Consumption; Recreation or Limited Recreation; and/or Propagation and Maintenance of a Limited Population of Fish and Wildlife. Class III-Limited waters are restricted to waters with human-induced physical or habitat conditions that prevent attainment of Class III uses and do not include waterbodies that were created for mitigation purposes. "Limited recreation" means opportunities for recreation in the water are reduced due to physical conditions. "Limited population of fish and wildlife" means the aquatic biological community does not fully resemble that of a natural system in the types, tolerance and diversity of species present. Class III-Limited waters are restricted to:

  (a) Wholly artificial waterbodies that were constructed consistent with regulatory requirements under Part I or Part IV of Chapter 373, Part I or Part III of Chapter 378, or Part V of Chapter 403, F.S.; or

  (b) Altered waterbodies that were dredged or filled prior to November 28, 1975. For purposes of this section, "altered waterbodies" are those portions of natural surface waters that were dredged or filled prior to November 28, 1975, to such an extent that they exhibit separate and distinct hydrologic and environmental conditions from any waters to which they are connected.
- Class IV – Agricultural Water Supplies
- Class V – Navigation, Utility and Industrial Use

The University's Facilities Services division is following the requirements of the Phase II NPDES permit listed above in its permit with the DEP.

C. Regional – Water Management Districts

Stormwater management on the main campus is administered in accordance with a master stormwater permit issued by the St. Johns River Water Management District (SJRWMD). The master permit is valid through 2022 and covers the Lake Alice Watershed, two stream drainage basins and a group of ten closed depression basins. Under the permit, the University is authorized to proceed with construction up to a given amount of impervious surface within the Lake Alice watershed and within eight of the depression basins. Additionally, within these basins the University is allowed to subtract existing pervious surface from the equation. The last permit renewal in 2010 allows the University to increase impervious surfaces within the Lake Alice Watershed by an additional 169 acres without additional stormwater facilities being built. Since 2015 an additional 12.3 acres of impervious have been built leaving 152.7 acres. The permit does not cover added stormwater from offsite sources in the City of Gainesville, nor from roads maintained by the Department of Transportation. Construction within either of the stream basins

(Hogtown and Bivens/Tumblin), remaining depression basins or on any of the University's satellite properties requires a separate permit from the appropriate Water Management District. These permits will be pursued as needed for future construction activities. Projects that impact wetlands or flood plains must be submitted to SJRWMD for review, including those that would normally fall within the Lake Alice Watershed.

The stormwater permit does not exempt the University from any required federal, state, local or special district authorizations prior to the start of any activity approved by the permit. The legal authority and criteria addressing stormwater requirements for development are codified in the Florida Administrative Code for each Water Management District (SJRWMD – 40C or Suwannee River Water Management District-40B). These regulations provide for flood protection, maintenance of water quality, and protection of existing natural areas.

IV. Hydrologic Overview

The University of Florida's hydrology is unique from much of the State of Florida in that runoff from storm events, irrigation and surficial aquifer seepage all empty into depressions that ultimately recharge the Floridan aquifer. This is in contrast to the more typical view of Florida hydrology, which is generally characterized by surface water that runs into larger bodies of water that in turn flow to the ocean, or by areas of porous soils that allow water to recharge directly to an aquifer. The watersheds of the University are along the Cody Scarp. This scarp marks a geologic transition zone where the clays of the Northern Highlands physiographic province give way to karst prone limestones and sands of the Gulf Coastal Lowlands. Lands to the west of campus (transition area grading to Gulf Coastal Lowlands) are generally characterized as a mixture of sand and unconsolidated clays that allow for the easy downward movement of water to the Floridan aquifer, with very little in the way of surface water drainage features. Meanwhile, lands to the north and east of campus consist of remnants of the Northern Highlands province, which are characterized as poorly drained (low aquifer recharge). These lands have significant surface water drainage where water, instead of recharging the aquifer, makes its way via a series of creeks and rivers into the St. Johns River and, ultimately, the Atlantic Ocean. The University is in the transition zone between these provinces in a zone called a stream to sink watershed. As the name implies, stream to sink watersheds are where surface water flows down gradient and ultimately ends up in a depression or sinkhole. In the University's case the majority of surface water ends up in one of three depressions or sinkholes – Bivens Arm (Alachua Sink), Sugarfoot Prairie (Haile Sink) or Lake Alice (drainage wells – formerly it drained into sinkholes).

This sub-element looks at current issues on campus, identifies the latest research on Best Management Practices and provides an overview of opportunities for improvements in campus water quality. The balance that must be addressed in the competing needs of compact urban development and water quality and quantity treatment are not easily solved and will require much give and take from everyone involved. Questions of form and function, cost-benefit analysis and differing views of aesthetics will be key factors in the stormwater debate and are issues that this sub-element strives to address.

A. Watersheds

Four watersheds divide stormwater drainage flows on the University of Florida campus: the Lake Alice watershed, the Hogtown Creek watershed, the Tumblin Creek watershed, and depression basins numbers UF-1 through UF-3, UF-5 through UF-9 and UF-11, 12 and 14.

The acreages of these watersheds, which include areas beyond the campus boundaries, are as follows:

Lake Alice	1,140 acres
Hogtown Creek	189 acres
Tumblin Creek	424 acres
Depression Basins	497 acres

Lake Alice Watershed. The Lake Alice watershed (basin) covers about 80% of campus, with approximately 1,140 acres of the basin on campus and an additional 381 acres contributing from off campus. Stormwater and surficial aquifer seepage from creeks are the major contributors to the lake, which is the ultimate surface destination of water within the watershed. Historical accounts of Lake Alice show a lively past within the internal campus discourse, where different views on how to manage the lake and watershed have held sway over the years. The first accounts of controversy appear around 1946 –1947 when treated effluent was diverted from a sinkhole, Sweet Sink, adjacent to the sewage treatment plant, to Lake Alice. This sinkhole, according to historical accounts, was the outlet for high water in the basin. The basis for the diversion from the sinkhole was that effluent discharges entering the sink were showing up in the city's public supply water system. This diversion of water to the lake led to a major increase in the water entering the lake and to flooding of traditionally non-flood prone areas. The flooding was further compounded by increases in impervious surface, irrigation and cooling waters. Historically, Lake Alice was augmented by well water used for air-conditioning that discharged large amounts of water into Lake Alice. Over the years these non-beneficial uses of water have been taken off line. Many solutions were contemplated, with a final decision reached to allow Lake Alice to hold more water, while also installing two drainage wells that drain when water levels reach a certain elevation within the lake.

During the era of direct treated effluent discharges to the lake, concern was expressed by many campus professionals on the increased nutrient content. It was observed that these nutrients were leading to increased aquatic plant growth and accelerated eutrophication processes within the lake. To deal with the engulfing plant growth of water hyacinths, parrotfeather and coontail, the University had an ongoing maintenance removal program. Eventually, years later and after much discussion from campus personnel about the impacts that effluent discharges were having on the lake, the Department of Environmental Protection required the University to remove direct wastewater discharges to the lake in 1994.

The Lake Alice Watershed is a closed system that drains to Lake Alice, which is located within the boundaries of the University campus. Some runoff is conveyed into the basin from off-campus areas of the city to the north and east of the campus. The watershed is mostly developed with a network of culverts, ponds, and channels collecting stormwater runoff from various sub-basins within the watershed and conveying it to Lake Alice. The natural conveyance system includes a creek, which was dug as a drainage canal in the 1950s, running along the northern perimeter of the Health Science Center/Shands Hospital flowing westward into Lake Alice. This creek conveys runoff to Lake Alice from sub-basins east of SW 13th Street beginning near Sorority Row Park and west of SW 13th Street on campus around the "Broward Beach" area. Adjacent to the Reitz Student Union another creek flows southwesterly into a ravine toward Hume Pond and then into Lake Alice. Smaller conveyances originate adjacent to Fraternity Row, Graham Woods/Pond and the College of Law. To the south of Lake Alice, there are creeks conveying runoff to the lake from private off-campus apartment complexes along Archer Road and SW 23rd Drive, running through IFAS facility areas and another beginning within the agricultural lands between Archer Road and Mowry Road. Being a closed drainage basin, Lake Alice basin has no external drainage outlet. To alleviate flooding, there are gravity injection wells to discharge into the groundwater aquifer at the lake's west end. In times of low water levels, the University can divert de-chlorinated reclaimed water to the lake in order to maintain water levels.

The following information on Lake Alice is taken directly from a report entitled 2004 Hurricane Impacts on Lake Alice Watershed that was prepared By James P. Heaney, Ruben Kertesz, Daniel Reisinger, Michael Zelazo, and Scott Knight in the Department of Environmental Engineering Sciences (for citations listed below, please refer directly to the report).

Lake Alice is predominantly a creature of human activity during the past century. It has gone from being a small 1 ha sinkhole to its present state as a 33 ha open water/marsh system. The recent history of Lake Alice is summarized below. Lake Alice has grown in size as a result of a combination of greatly increased inflows from stormwater runoff, sewage, and cooling water, diking the lake to increase its storage capacity, and installation of drainage wells to regulate the outflow rate.

- *Early 1900s- A 1 ha farm pond was named Lake Alice for the daughter of the farmer who owned the land (Karraker 1953). Untreated wastewater was cesspooled or discharged into a marshy area west of the UF campus, presumably Lake Alice (Loftin 1910).*
- *1925-UF bought this land for an agricultural experiment station and the area around the lake was designated as a wildlife sanctuary (Korhnak 1996).*
- *1926-UF constructed a primary wastewater treatment plant with a capacity of 260 m^3/day. This plant provided service for about 1,000 people. Unchlorinated effluent was discharged to a creek that drains to Lake Alice (Guard 1932).*
- *1937-An aerial photo indicated a 4 ha lake fed by runoff from a marshy creek that would have included sewage effluent (Karraker 1953).*
- *1947-Effluent from the new wastewater treatment plant (WWTP) was discharged to a sinkhole instead of going into Lake Alice (Korhnak 1996).*
- *1948-An earthen dam was constructed at the west end of the lake for flood control and to protect aquatic birds and their nesting habitat (Davis 1972). This dam expanded the area of the lake to 8 ha.*
- *Early 1950s-The area of the lake expanded to 15 ha and flooding killed many of the trees in low lying hammock areas (Karraker 1953).*
- *1959-Two injection wells were constructed to control the lake levels (CH2MHILL 1989).*
- *1961-Aerial photo shows Lake Alice at an area of 22 ha due to added discharge of about 38,000 m^3/day from UF Heating Plant No. 2 east of Lake Alice. A discharge canal was constructed to direct this flow to Lake Alice.*
- *1964-The sinkhole that received wastewater treatment plant (WWTP) effluent was sealed off and the 6,400 m^3/day of effluent was discharged to Lake Alice (CH2M HILL 1989).*
- *1968-The combination of WWTP effluent and cooling water discharges to Lake Alice increased its surface area to 33 ha.*
- *1968-Dense hyacinth infestation was observed. A fence was constructed perpendicular to the east-west flow to control the water hyacinths. Mechanical and biological controls were introduced to control the problem (Vega 1978).*

- *1971- Lake Alice received 3,800 to 7,600 m^3/day of sewage effluent and 38,000 to 45,600 m^3/day of cooling water (Brezonik and Shannon 1971).*
- *1976-The effluent from Heating Plant #2 was diverted from Lake Alice.*
- *1994-UF's advanced water reclamation plant (WRP) began operation in November. The north injection well was sealed off from Lake Alice and the effluent from the new WRP was discharged directly to this injection well.*
- *2004- Discharge of about 3,800 m^3/day of cooling water from the Reitz Union to Lake Alice was discontinued.*

The minimum elevation of the lake is 57.5 feet MSL. At elevation 66.7 feet, the lake has a surface area of 9 ha. If the depth exceeds elevation 66.7 feet, water begins to accumulate in the marsh. At a present normal elevation of 68.7 feet, the lake has a maximum depth of about 11 feet. At the same elevation, about 2/3 of its volume is in the lake while nearly 2/3 of its surface area is in the marsh. The estimated 100 year flood elevation is 72.4 feet MSL.

The stage-area-volume relationship for Lake Alice may have changed over the years. The lake has received heavy loads of suspended solids and vegetative material that settles to the bottom. Thus, one would expect that less volume is available for a given stage due to sedimentation.

Hume Pond – where water from Reitz Ravine Creek, Graham and Green Ponds Converge.

Hogtown Creek Watershed. The Hogtown Creek Watershed covers the majority of incorporated City of Gainesville, however only 315 acres out of the 13,440 acre watershed are present on the UF main campus. Hogtown Creek, the primary drainage conveyer in the watershed, drains into a depression named Sugarfoot Prairie and ultimately into Haile sink. The two areas on campus that drain into Hogtown Creek are Elizabeth Creek that runs through the University Arboretum and the President's home, and the lands on the western side of campus that drain into the Hogtown Creek Woods area along SW 34th Street.

This watershed, as with much of Gainesville, was urbanized before the era of stormwater management and specifically on-site retention and detention. As a result, the creeks in this watershed suffer from high velocities during storm events, which cause in-stream erosion and lead to down-stream sedimentation that elevates the floodplain, potentially flooding structures. Unlike the Lake Alice watershed, new development within this watershed must be permitted individually with the SJRWMD, which will require the use of on-site retention or detention. Additionally, the University is looking for ways to cooperate with the City to incorporate new stormwater techniques to help ameliorate the downstream impacts of previous development by incorporation of Low Impact Development techniques where feasible.

The Hogtown Creek Watershed is a depression basin that occasionally experiences moderate flooding in off-campus areas north-west of the University campus. The University has agreed to implement City of Gainesville runoff standards for development along the western edge of campus lying within this watershed to help reduce pre-existing flooding problems adjacent to campus. UF development lying within the Hogtown Creek watershed includes the Harn Museum of Art and Performing Arts Center, Maguire Village and University Village South residential complex, a portion of the Facilities Services complex, Orthopaedic Center, UF Hotel and Conference Center, park and ride lot, and the Animal Research Facility west of SW 34th Street. Retention facilities have been provided for the Harn Museum, Orthopedic Center, Telecommunications Building and parking facilities at the Performing Arts Center. The drainage conveyance system for the remaining development conveys runoff to the Florida Department of Transportation (FDOT) drainage facilities within the SW 34th Street (State Road 121) right-of-way. The FDOT system flows northward along the roadway and then west into the Sugarfoot Prairie wetland portion of Hogtown Creek.

In 2014, FDEP set a TMDL for the creek based on impairment due to high levels of fecal coliform bacteria exceeding the state criterion

Bivens Arm/Tumblin Creek Watershed. Bivens Arm Lake is the receiving body of this 2,200 acre watershed, 456 acres of which are on campus. The main tributary to Bivens Arm Lake is Tumblin Creek, which runs through the University's developmental research school P.K. Yonge. In 1965 the State of Florida designated the lake area as a wildlife sanctuary. This creek empties into a large bottomland hardwood forest near US 441 on the northeast rim of the lake. Before being channelized to accelerate upstream drainage, this wetland forest provided water quality treatment through vegetative uptake of nutrients and metals. Other more intermittent tributaries are present to the north of the lake adjacent to the College of Veterinary Medicine facilities and to the west by the University's agriculture and livestock research areas. Bivens Arm, like Lake Alice, suffers from eutrophication primarily from anthropomorphic sources upstream.

Tumblin Creek, flows southwesterly into Bivens Arm Lake. University sub-basins within the Tumblin Creek watershed are sparsely developed with much of the land either undeveloped or dedicated to agricultural academics. For this reason, fewer drainage improvements exist in this watershed. The College of Veterinary Medicine and the P.K. Yonge Laboratory School have been equipped with drainage systems to convey runoff to Tumblin Creek and Bivens Arm, respectively.

In 2012, the Florida Department of Environmental Protection proposed water quality nutrient standards for Bivens Arm. These standards state that Bivens Arm is considered a clear, high alkalinity lake according to long-term data from LakeWatch. Both Total Phosphorus and Total Nitrogen exceed these new standards in the lake. Additionally, in 2009, FDEP verified Bivens Arm on the 303d list as impaired for nutrients, dissolved oxygen, and turbidity. Major sources of phosphorus and nitrogen in the watershed include fertilizers in stormwater runoff. Another source of phosphorus are the naturally occurring phosphatic minerals in the Hawthorn Group formations that are transported during stormflow in the Tumblin Creek watershed.

In 2014, FDEP finalized the TMDL for Tumblin/Bivens (Orange Creek Basin Management Action Plan" stating that it was impaired due to high levels of fecal coliform bacteria exceeding the state criterion. "A large part of the urban area (downtown) of Gainesville is currently in the planning stages for redevelopment in the Innovation Square District. The downtown contains the older parts of Gainesville, a good portion of which was developed before stormwater management rules were adopted and where stormwater retrofitting is desirable. Redevelopment is most extensive in the Tumblin Creek watershed. The expected benefit of the redevelopment process is the use of structural BMPs and low impact development (LID) techniques to reduce both fecal coliform levels and nutrient levels that will directly benefit Tumblin Creek and Bivens Arm. "

"Given the often non-uniform distribution and erratic behavior of fecal coliform bacteria in the environment, the detailed quantification of load reductions, as would be calculated for nutrient loadings from the watershed, is not currently possible. The goal of fecal coliform TMDLs is to achieve counts of fecal coliform bacteria that do not exceed criteria specified in Chapter 62-302, F.A.C. for frequency and magnitude of bacteria counts. An indicator of progress made in obtaining this goal is a reduction in the frequency of exceedances and reduction in the number of counts. The noted improvements in water quality indicate that efforts to control fecal coliforms bacteria are providing beneficial results." Details about how the water quality assessments were conducted are in the Orange Creek Basin Action Plan Five Year Water Quality Review (http://publicfiles.dep.state.fl.us/DEAR/BMAP/OrangeCreek/2014_BMAP/).

Potential sources of fecal coliform bacteria detected in the streams may originate from many different places, including failing septic systems, leaks and overflows from sanitary sewer systems, illicit discharges of sanitary waste, runoff from the improper disposal of waste material, stormwater from developed areas, domestic pet waste, homeless populations, and wildlife populations. The secondary growth of fecal coliform bacteria in stormwater systems and creek sediments may also contribute to persistent elevated fecal coliform levels.

According to the Orange Creek Basin Action Plan, one project that the City of Gainesville is leading in coordination with the University is to create a Tumblin Creek Regional Stormwater Treatment Facility. "In 1964, a 1,000-foot creek section was channelized and the adjacent wetland cleared and filled with the spoil from the creek excavation. Construction of this spoil pile removed natural sheet flow of Tumblin Creek to a large portion of the forested wetlands that are on the UF campus (Bivens Rim Forest Conservation Area). In effect, the quantity of stormwater treatment provided by this area has been greatly reduced. The project proposes to construct a large concrete sediment trap located a few hundred feet downstream of the US 441 underpass of

Tumblin Creek. The structure will have the capacity to hold several hundred tons of sediment which will be removed periodically. Immediately downstream of the sediment basin will be a trash trap that will stop and gather floating debris to allow for easy removal during maintenance." (Orange Creek Basin Action Plan).

Depression Watersheds (Basins). In the University's Stormwater Management Master Plan a number of smaller watersheds or basins are defined as depression basins. A depression basin occurs when all surrounding land flows into a depression. In karst areas (sinkhole areas) these depressions often have an outlet in the form of a sinkhole that drains into an aquifer. However, when groundwater levels are high enough, sinkholes stop being drains and instead act like plugs or, in some cases, even as discharge points for the aquifer. When this happens the entire depression basin may fill up creating unexpected flooding. If enough water makes it into the system, water will eventually start flowing into an adjacent basin and ultimately into the Hogtown Creek Basin through the University Golf Course.

In reality, all of the University's watersheds are depression basins, since they all flow into depressions or sinkholes. The Bivens Arm / Tumblin Creek watershed is the only University basin that outlets to an area that can contribute to water that has the potential to make it to the ocean totally via surface waters, but this only occurs during exceedingly heavy rainfall years, when the potentio-metric surface of Floridan aquifer is also close to the surface.

The depression basins are a group of closed basins with no drainage outlet, lying between the Lake Alice, Hogtown Creek and Bivens Arm watersheds. Development within these basins includes the cultural complex, various Surge Area buildings, the Poultry and Swine Units, the USDA Herbicide area, some portions of the Facilities Services complex, and the University Golf Course.

Sinks, Ponds, Lakes and Creeks. While there are numerous small lakes and creeks on campus, only a few are named. The following list of named waterbodies are present on or adjacent to the main campus - Ocala Pond, Gator Pond, Dairy Pond, Green Pond, Lake Alice, Bivens Arm Lake, Sweet Pond / Sink, SEEP (Stormwater Enhancement Ecological Project), Presidents Pond, Hume Pond, Golf Course Pond, Deer Pond. The only named creeks on campus are Elizabeth, a tributary of Hogtown Creek, and Tumblin that runs through P.K. Yonge and into Bivens Arm.

All water bodies play a role in stormwater storage and conveyance. On campus, many ponds and sinks work as storage systems that accept stormwater runoff up to a predetermined elevation where an outlet structure has been placed. When water reaches the specified elevation it will begin to flow into one of these outlets that in turn flow into the University's stormwater system. Meanwhile, creeks act as surface stormwater systems in that they convey stormwater to base elevations within the basin. Additionally, many of the stormwater pipes are routed to drain into the creeks, in many cases contributing significant amounts of the creek's flow.

Satellite Properties. The Santa Fe River Basin to the west and the Orange Creek Basin to the east are the primary watersheds where the University's satellite properties are found. The satellite properties of Millhopper Unit, Dairy Unit, Boston Farm/Santa Fe River Ranch and the northern half of the Fairbanks area Beef Unit all lie within the Santa Fe River Basin, which is regulated by the Suwannee River Water Management District. The remaining properties of Austin Cary, Newnans Lake, Lake Wauburg, Wall Farm, Treeo Center, WUFT, WRUF, East Campus, Remote Libraries and the southern half of the Beef Unit are within the Orange Creek Basin and under the jurisdictional boundary of the St. Johns River Water Management District. All development on these properties must seek permitting authorization from the appropriate water management district.

Lake Wauburg
In 2014, FDEP set a TMDL for Lake Wauburg due to impairment from excessive nitrogen and phosphorus "Lake Wauburg has been hypereutrophic since at least 1990, based on TN, TP, and chlorophyll-a data. A Trophic State Index (TSI) uses nutrient and chlorophyll-a data to present a composite of the lakes nutrient condition. From 1990 to 2011, the mean annual TSI was 72.3 and classified as poor water quality. The seasonal average TSI for Lake Wauberg has been increasing since the late 1990s." (Orange Creek Basin Action Plan).

Also stated in the FDEP Orange Creek Basin Management Action Plan of 2014("The Lake Wauburg watershed is largely undeveloped and bordered by limited rural residential development that relies on onsite sewage treatment and disposal systems (OSTDS) for wastewater management, a University owned recreation area near the lake, and Paynes Prairie State Preserve. The lake is located in close proximity to U.S. Highway 441. To achieve the TMDLs for Lake Wauburg, loadings of TP and TN must be reduced by 50% and 51%, respectively."

According to FDEP, "the management of OSTDS and fertilizer use are the primary controllable factors for nutrient load reduction in the Lake Wauberg watershed. FDOH in Alachua County evaluated the OSTDS located on residential properties surrounding Lake Wauburg during the first Basin Management Action Plan (BMAP) cycle. UF upgraded both the north and south shore OSTDS locations in 1998. It is estimated that the complete removal of all OSTDS input to Lake Wauberg will only result in a 32% reduction in TN and TP. UF does not fertilize the landscape around the lake (personal communication, Bill James, 2011). Other potential sources of nutrient loading to Lake Wauberg are atmospheric deposition, phosphatic-rich clays of the Hawthorn Group, and wildlife." (Orange Creek Basin Action Plan).

FDEP states that given the limited options for improvement from anthromorphic causes that it may be more appropriate to manage the nutrient concentrations within the lake rather than reduce loadings from the watershed as the management strategy for achieving the TMDLs. Additionally, since the watershed is largely undeveloped and the Hawthorn Group is in contact with the lake bottom, reevaluation of the TMDLs may be appropriate.

B. Water Quality – Clean Water Campaign

The University is actively engaged in water quality monitoring and improvement through its efforts with the Clean Water Campaign, which is partially funded by Facilities Services. The campaign focuses on education and outreach, which also helps the University fulfill some of its obligations under the National Pollutant Discharge Elimination System. The University's NPDES permit was approved in November 2017. In the permit, the University has committed to the following activities to reduce pollution impacts on stormwater over the first five-year period of the permit:

- Public Education and Outreach on Stormwater Impacts
- Public Involvement/Public Participation
- Illicit Discharge Detection and Elimination

- Construction Site Stormwater Runoff Control
- Pollution Prevention/Good Housekeeping for Municipal Operations

Clean Water Campaign staff and volunteers from the Wetland's Club collect water samples every month from 20 sites throughout campus. Water is tested for 12 parameters including temperature, dissolved oxygen, pH, conductivity, total dissolved solids, total suspended solids, nitrogen and phosphorus.

V. Stormwater Issues

A. Identified Issues with Stormwater and an Urban Campus

A philosophical issue has arisen with the implementation of the NPDES program as applied in Urban Areas. In general, the most effective stormwater treatment techniques come from traditional stormwater systems that retain as much water as is being displaced by new impervious surface. Therefore, these systems are large in area and require a great deal of additional land to treat runoff. This factor contrasts with the documented benefits of compact urban development (shorter distances for utilities, mass transit, walk-ability, fire and police protection, school busing – neighborhood schools and other energy related sustainability factors). Thus, redevelopment and infill projects face a difficult task meeting today's stormwater requirements. A recent publication from the Smart Growth Network, Getting to Smart Growth II, has documented this problem under the heading "Encourage Infill by Adopting Innovative Stormwater Regulations and Practices". The following passage from this publication further defines the problem.

> Development activities, both during construction and after a project has been built, are cited as factors that worsen the effects of stormwater runoff. Sediment from construction sites and debris and chemicals are carried to streams during heavy rainfalls. As more land in a watershed is built on, less rainfall soaks into the ground, increasing the amount of runoff that eventually makes its way to receiving waters. While localities still invest in storm drains, stormwater sewer systems, and large containment areas, many also require developers to take measures with their projects to control stormwater.
>
> Stormwater retention ponds and infiltration areas are common practices that are written into local regulations. However, developers in urban areas are finding that requirements stipulating that stormwater be managed on the project site are a barrier to redevelopment and construction of infill and more compact projects.
>
> Land for onsite stormwater management is often not available or is prohibitively expensive. In addition, codes that limit the amount of impervious surface that can be built on a site discourage both development in urban areas and compact development. Inflexible stormwater regulations applied in urban areas can have the unintended effect of worsening water quality by forcing development to undeveloped fringe areas.

> Fortunately, there are innovative options that foster redevelopment and control stormwater. In 2002, the city of San Diego adopted a policy of allowing infill redevelopers to share in the cost of stormwater abatement in lieu of onsite mitigation. Instead of requiring treatment of each individual project, the Standard Urban Stormwater Mitigation Plan allows developers to contribute to stormwater mitigation that serves the entire drainage basin. Engineers estimate that individual development projects can achieve savings of up to $40,000 by participating in a shared stormwater control program. The Low Impact Development Center, a nonprofit organization dedicated to protecting water resources through site-design techniques, is sponsoring research on low-impact development techniques that require less space.
>
> One technique is the use of soil amendments that allow compact landscaping to absorb and hold stormwater without causing flooding or damage to adjacent buildings.
>
> Local jurisdictions are learning about different ways to satisfy stormwater and drainage issues associated with development and are exploring offsite mitigation possibilities. The possibility of offsite mitigation makes smaller infill projects more feasible and provides an opportunity to locate mitigation facilities in a way that can serve multiple projects. In return for offsite mitigation, jurisdictions could increase allowable densities in downtown and designated areas. In such a case, the municipality would become accountable for maintaining water quality in that particular basin.

However, some of the solutions identified above may not be sufficient to offset stormwater impacts in smaller closed, urban, basins similar to those found in Gainesville and on campus. Thus, trade-offs in water quality standards and open space may need to be modified, if the inefficient suburban model is to be avoided.

VI. UF – City of Gainesville Agreement on Stormwater

In 2008 the University generated a report in cooperation with the City of Gainesville Public Works Department, "A Comparison of the University of Florida's Stormwater Discharge into the City of Gainesville, in relation to the City of Gainesville's Stormwater Discharge into the University." This report mapped out the amount of impervious run-off routing into the City's stormwater system from the University and the amount of City impervious run-off routing into UF maintained facilities.

The primary drainage basin for the University is the Lake Alice Basin/Watershed. This basin also receives water from the University Heights neighborhood around Norman Hall. Much of this area was developed prior to modern stormwater regulation and, thus, lacks the water quality/quantity treatment that is required to help meet pre-development run-off patterns.

The University Main Campus also discharges to the basins of Tumblin Creek/Bivens Rim Basin/Watershed and the Hogtown Creek Basin/Watershed, which are both part of City systems.

New development in these two watersheds follow the City's and water management district's stormwater requirements for onsite storage.

Over the years the City and the University have been working to determine the amount of stormwater that is being discharged into their respective entities' basins and/or conveyance systems by the other. The need for a joint analysis was recognized in the Campus Development Agreement executed by the City of Gainesville and University of Florida in October 2015. Section 9.1 of the agreement includes the following language:

> *City and University agree that all other University main campus properties that may discharge untreated stormwater into the City's stormwater system are offset by stormwater that discharges into the University's Lake Alice stormwater system from lands within the City's jurisdiction.*

Based on the results of the study agreed to by both the City and the University, it appears that the City and University contribute similar amounts of untreated stormwater into each other's respective systems/basins. As such, the University and City have agreed that by following the results of the study/report it is understood that the University shall not be contributing additional stormwater burdens upon the City in the main campus areas identified in the Report as it continues to meet its future needs.

VII. Stormwater Best Management Practices (BMPs)

As with most urban watersheds, erosion, sedimentation and nutrient loading are the primary water quality concerns that are common to many of the University's waterbodies. In most development scenarios in Florida the regulatory framework allows for either on-site retention / detention on a site by site basis or for off-site regional collection. The regional collection system usually is in the form of a stormwater utility, where a large retention / detention area is created and many projects buy credits into this facility. This later scenario is, in effect, how Lake Alice is treated under the SJRWMD permit. As mentioned previously, the current permit with the SJRWMD allows the University to increase impervious surfaces within the watershed by an additional 152.7 acres (as of 1/1/2019) without additional stormwater facilities being built. While this allows the University to maintain a compact core of buildings without large areas dedicated to stormwater treatment, it also leads to an exacerbation of creek erosion and downstream sedimentation to a system that already has some documented problems. Thus, even though the SJRWMD's permit does not require additional stormwater treatment until the threshold is tripped, degradation to these conveyance systems would be reduced if retention / detention and other runoff management techniques were accommodated within the watershed wherever possible.

A. Low Impact Development

In order to reduce stormwater runoff and improve water quality, new technologies have been incorporated into building sites that detain and slowly percolate water. Additionally, areas being retrofitted could be looked at as opportunities to incorporate stormwater treatment into landscaping, contouring and paving. Many of the ideas being studied come from the field of Low Impact Development (LID). This field of research looks at incremental ways to incorporate stormwater retention into building and landscaping, depressions, and multifunctional design. As such, LID overlaps with many of the concepts that are also coming out of the US Green Building Council's LEED (Leadership in Energy and Environmental Design) certification process and the

University's commitment to sustainability. Some examples of LID include: alternative semi-porous surfaces, reduction of impervious surface – narrow roads, surface roughness technology, rain barrels / cisterns, catch basins / seepage pits, sidewalk storage, vegetative swales, buffer strips, infiltration swales, trenches, elimination of curb and gutter, curb cuts, shoulder vegetation , maximization of sheet flow, maintenance of natural drainage patterns, reforestation, pollution prevention, bio-retention / rain gardens, strategic grading, conservation, flatter wider swales, amended soils, long flow paths, tree / shrub /flower bed depression, turf depression, landscape island storage, rooftop detention / retention, disconnected impervious surface, parking lot / street storage, smaller culverts, pipes and inlets.

Low Impact Development Effectiveness Chart

LID Practice	Lower Post Development CN	Increased Time of Concentration	Retention	Detention
Grade slope		X		
Increase roughness		X		
Grassy Swales		X		X
Vegetative filter strips	X	X	X	
Disconnected impervious surface	X	X		
Reduce curb and gutter	X	X		
Rooftop storage		X	X	X
Bioretention	X	X	X	
Revegetation	X	X	X	

The above chart illustrates the reduction in stormwater that can be achieved from different LID approaches (CN = runoff curve number). From - Coffman, Larry. 2000. Low-Impact Development Design Strategies, An Integrated Design Approach. EPA 841-B-00-003. Prince George's County, Maryland. Department of Environmental Resources, Programs and Planning Division.

A number of projects on campus have incorporated LID techniques since the 2005 plan and each major project has been asked to look for opportunities to include these techniques. A few of the projects include bio-retention facilities that capture and treat stormwater before it leaves the site. At both Hough Hall and SW Recreation Center these facilities have been successfully installed (See following photos).

Hough Hall bio-retention stormwater treatment.

Bio-retention (rain garden) stormwater treatment at the Southwest Recreation Center.

The O'Connell Center parking lot is an example of LID – curb cuts into grass swale with elevated drain to retain some water - accommodates and treats run-off.

B. Traditional Stormwater Utility with an Ecological Twist

Another approach that uses the traditional stormwater pond design, but with an ecological design twist, is a possibility in developing areas of campus. This approach to stormwater retention can be found currently at the Stormwater Ecological Enhancement Project (SEEP), adjacent to the Performing Arts parking lot and the Natural Areas Teaching Lab (NATL) Conservation Area. The retention pond was originally constructed in 1988 as a typical wet retention pond with a flat bottom and no attention paid to plant species diversity. In 1995, an initiative to redesign the basin into a more ecologically sensitive manor that befitted its placement next to the NATL was initiated. This redesign's primary goal, as articulated by its designers, was to increase the diversity of flooding depths and frequency of flooding that will occur, since this is the primary factor regulating species composition in a wetland. To do this, two depressions (one 4-feet, the other 5-feet deep), were dug at the southeastern end of the pond providing a deep, open-water habitat. At the north end a low-berm was constructed to temporarily impound 80% of the entering stormwater. This forebay provides the first phase of treatment and was planted with species known to take up heavy metals and remove nutrients. Water from the forebay is then slowly released, first flowing through an area planted to resemble a bottom-land hardwood swamp, moving into a shallow freshwater marsh and then entering the deep-water ponds. The basin was planted with species that resemble those found in wetlands of North Central Florida.

The expected benefits of this type of retention are species diversity, wildlife habitat, aesthetics, water quality, and research potential. All of these benefits have been proven to be correct at the SEEP, however one issue remains that has not been adequately studied. This issue is the potential effect that these ponds have on wildlife, particularly federally listed species. Since stormwater ponds are designed to treat the noxious constituents found in run-off, they are laden with metals, pesticides and fertilizers, all of which can prove harmful to wildlife. The main species of concern that use ponds for foraging are wading birds, such as the federally listed Wood Stork. At present little research has been conducted on what the long-term impacts are on these species from utilizing stormwater detention, roadside swales, and ecologically enhanced ponds. Arguments can be made that these species will utilize wet retention ponds regardless of whether they have been ecologically enhanced; however, it is equally likely that by enhancing them the probability of more productivity (more food) will encourage increased use. Thus, while it is hoped that these ponds are the panacea that is a win-win, additional research is needed.

Pre-SEEP (looking north) – Cattail dominated. SEEP (looking south) – Variety of plant species.

C. Agricultural Best Management Practices

Nutrient loading and soil erosion from agricultural lands are major causes of pollution to surface waters. This type of pollution can result in accelerated eutrophication (increase in mineral and organic nutrients combined with a decrease in dissolved oxygen, which creates an environment that favors plants and leads to algae blooms), sedimentation, destruction of fish and wildlife habitat, and decreased recreational and aesthetic values of surface waters. Numerous BMPs for the control of runoff and soil erosion are available. These practices can reduce contaminant transport to surface waters through both passive means, such as buffer strips, and physical structures, such as diversions. The following list of BMPs is a hybridized listing from a number of publications which include: Water Quality BMPs for Cow/Calf Operations, published by the Florida Cattlemen's Association, 1999, BMPs for Agrichemical Handling and Farm Equipment Maintenance, published by FDACS and FDEP, 1998, and other agricultural BMP websites.

Management practices designed to control runoff and soil erosion are:

- Permanent vegetative cover -establishment and maintenance of perennial vegetative cover to protect soil and water resources on land retired from agricultural production
- Conservation cropping sequence (rotation) - a sequence of crops to provide organic residue for erosion reduction
- Conservation tillage and residue management - tillage practices that leave residues from the previous crop on the soil surface
- Contour farming - tillage, planting, and cultivation on sloping land performed on the contour of the landscape perpendicular to the slope
- Strip cropping - farming operations with alternating strips of row crops, hay, or small grain
- Cover crops - ground-hugging crops planted after row crop removal to prevent soil erosion
- Buffer (filter) strips - strips or areas of close-growing vegetation (usually grass) for removing sediment, organic matter, and other pollutants from runoff and wastewater
- Mulching - use of residue from an off-site source for erosion prevention
- Fertilizer recommendations based on research and soil sampling
- Efficient manure management

Structures designed to control runoff and soil erosion include:

- Diversions - channeled ridges perpendicular to slopes
- Fences - barriers that enclose or divide land areas and prohibit stock access to critical streambank areas
- Grade stabilization structures - structures to stabilize slope gradients, control erosion, and prevent the formation of gullies
- Grass waterways - graded, vegetated channels for water runoff
- Ponds/sediment basins - structures to trap water and sediments
- Terraces - earthen embankments of channels and ridges, perpendicular to the slope, designed to intercept and transport runoff at non-erosive velocities.

VIII. Identified Priority Stormwater Projects

A. Erosion Control

The University of Florida's Facilities Services, contracted with Causseaux & Ellington, Inc. in 2005 to conduct a review of ten identified stormwater related problem areas. This review was to identify specific erosion problems on-site, recommend appropriate on-site control corrective measures, and provide a prioritization that could then be used for budget planning and funding purposes. The University of Florida staff identified the following ten locations as areas of special erosion concern: Dairy Pond Outfall, Museum Road Outfall between Jennings and Beaty, Graham Pond Outfall at Museum Road, University Avenue Outfall at President's House, Sorority Row Creek Near Lift Station, SW 13th Street Outfall Near Diamond Village, Pipe Outfalls South of MEB and West of Reitz Union, Pipe Outfalls North End of Fraternity Row, Pipe Outfalls South of Baseball Stadium, Lemerand Drive Wall at Mowry Road. The final report, Implementation of Erosion Control Measures was completed in June of 2005.

Summary of erosion control projects and their status

Most of the sites contained stream channels that were eroding and will continue to erode. The scope of this project included recommendations for stabilization in the vicinity of the outfall structures and for other site specific improvements. In general, structural improvements consisted of drop structures, headwalls, and wingwalls. This will aid in the design of the structure including the determination of the invert elevations. Rip-rap energy dissipators are the most effective and appropriate energy dissipators for the sites identified on campus and were used as the default corrective action for most of the drainage features. Erosion control measures were implemented for each drainage feature and the design was tailored to the site specific conditions.

	Improvement Location	Imminent Threat	Frequent Observation	Total Cost	Completed
1	Dairy Pond Outfall	N/A	N/A		Yes- 2007
2	Museum Road Outfall between Jennings and Beaty	Add wingwall,	Rip-rap	$ 38,000	No
3	Graham Pond Outfall at Museum Road		Add headwall and rip-rap	$ 40,000	No
4	University Avenue Outfall at President's House		Rip-rap	$ 20,000	Yes-2008
5	Sorority Row Creek Near Lift Station	Replace 2 headwalls /broken pipe/add rip-rap		$ 17,000	Yes-2008
6	SW 13th Street Outfall Near Diamond Village	Replace wingwall/ boundary survey	Rip-rap	$ 6,000	Yes- 2008
7	Pipe Outfalls South of MEB and West of Reitz Union	Repair Gabions	Repair 2 headwalls/pipe / rip-rap	$144,000	Yes-2009
8	Pipe Outfalls North End of Fraternity Row		Repair spillway/rip-rap	$ 20,000	No
9	Pipe Outfalls South of Baseball Stadium		drop structure/rip-rap	$ 40,000	No
10	Lemerand Drive Wall at Mowry Road	Repaired			Yes-2007



Reitz Ravine Creek before restoration


Reitz Ravine Creek after restoration


Lake Alice Creek before improvements


Lake Alice Creek after improvements

B. Other Potential Opportunities

There are a number of sites on campus where low impact development (LID) techniques could be put in place, as well as a few areas in the Lake Alice watershed that could accommodate traditional stormwater measures.

The Yulee Pit depression is one such site that may be suitable for inclusion as a stormwater facility in order to treat runoff from areas around Broward and Norman Halls. This area has the potential to serve for retention / detention for short periods or as a permanent pond that functions like most of the other ponds on campus. The current pit is used primarily as a sunning area in the fall and winter by residents of the adjacent dorms. This function could be maintained, but with the added ambiance of a nicely landscaped water feature. Issues such as size, design, and tree impacts would need to be addressed by committees of interested and knowledgeable faculty, staff and students.

Yulee Pit

Another area that could handle some water quality treatment facilities and retain its beauty and function is the Union Lawn that runs from Marston Science Library down to the Reitz Union. This area is a place that could incorporate LID techniques from rain gardens to merely elevating storm drains currently in place so that they temporarily retain water (see example photo of O'Connell Center lot in LID section).

Reitz Lawn

Drain at base of grass area –This area could detain water for short periods of time thereby allowing more water to percolate rather than directly contribute to the storm system.

Many of the University's other Urban Parks could also incorporate LID treatment techniques that would maintain the current use, function, and beauty, but with the added benefit of treating more campus stormwater. Implementation of these ideas should not be done in a vacuum and will require coordination and input from faculty, staff and students. Additionally, many of these projects could serve as the testing grounds for innovative ideas and documentation of their effectiveness. As such, they should be eligible for grant funds from the Environmental Protection Agency (319 Grants) and the Florida Department of Environmental Protection.

Reitz Union

Reitz Union storm drain – a slight depression and elevated storm drain would be a LID technique.

Other areas that should be explored are green roofs, roof drainage routed to landscaping instead of into the storm sewer and disconnected impervious pavement. Below are a few areas that could be retro-fitted to address these concerns. One is the pavement that runs from around McCarty Hall down by the Constans Theatre and then drains into Newins-Ziegler Sink and Green Pond.

Curb Cuts could be placed into the existing network with grass / flower beds lowered, and sidewalks could be graded so that they do not function like a drainage culvert system. A systematic redesign in conjunction with future building renovation in the area could eliminate a large amount of run-off at a relatively minimal expense.


McCarty / Constans
Much of the site could be graded to retain run-off, instead of releasing it.

Green space areas around buildings and in Urban Parks could have bio-retention / butterfly gardens placed in them or merely have storm water outlets raised a little to detain some water that would be allowed to slowly recharge the surficial aquifer, rather than routing it into the storm system. The cumulative benefits of these sites can provide opportunities for improving existing conditions while often providing amenities within the landscape. Unfortunately, it is hard to quantify how much water quality and quantity treatment that these small systems could provide, but in the urban framework of campus these sites provide opportunities for improving existing conditions.

IX. Potable Water Sub-Element

A. Main Campus

The University of Florida campus receives potable water from the Gainesville Regional Utilities (GRU) system, which is owned by the City of Gainesville. This relationship has existed since 1904, when the City lured the University away from Lake City with the promise of free water from Boulware Springs. In 1992, the City and former governing entity of the University system, Board of Regents, executed the Water Services Agreement to pay for the provision of water to the University. This agreement does not stipulate limits on the amount of potable water to be supplied to the University campus.

GRU's wellfield is located in northeast Alachua County and is called the Murphree Plant. This facility includes water production wells, water treatment facilities, water storage, high service pumping equipment, elevated storage tanks and distribution mains that feed the city and university. According to GRU, there is adequate capacity (with a surplus) projected for both the

City of Gainesville and the urban fringe (primarily sub-divisions west of Gainesville in Alachua County. The Murphree Plant is classified as a Community Water System (62-550.200 Florida Administrative Code (F.A.C.).

Potable, drinking, water is supplied by Gainesville Regional Utilities from 15 master metering stations around the campus perimeter to the UF owned and maintained water distribution system. In 1989 Hunter/ Reynolds Smith and Hill performed a water system evaluation study for fire demand and made various system addition and upgrade recommendations that were subsequently constructed by UF. Since that time (mid 1990's) very few large scale water main piping replacement or upgrade projects have been implemented. In 2013 a hydronic system computer model was developed to simulate the existing system for pressure and flow conditions and over the next few years studies will be run from the model to determine upgrade needs. GRU system pressure recorded in the northeast area of campus is limited to around 45 to 55 psi. This and degrading interior piping area has necessitated installing booster pumps for most of the buildings in this area of campus. Even with increased pumping, most buildings are having issues maintaining acceptable pressure and flow. To correct this situation large scale water main replacements and upgrades will be required in this area of campus. The southern and western areas of campus are at a lower elevation and pressures from GRU range in the 70 to 80 psi. Piping upgrade concerns in this area of campus are fewer other than those required due to age. This distribution system also provides water campus-wide for fire protection at hydrants, standpipes and building sprinklers.

GRU received a 20 year permit from the St. Johns River Water Management District in 2014 (expires in 2034). This permit included the University of Florida's potable water use for the duration of the permit and allocated the projected future use as seen in the table below.

University Potable Water Allocation via GRU Permit with SJRWMD

Years	UF Average Daily Use (MGD)		Years	UF Average Daily Use (MGD)	
2007	2.51	Actual	2021	2.84	Projected
2008	2.82	Actual	2022	2.84	Projected
2009	2.71	Actual	2023	2.84	Projected
2010	2.39	Actual	2024	2.84	Projected
2011	2.28	Actual	2025	2.84	Projected
2012	2.25	Actual	2026	2.84	Projected
2013	2.84	Projected	2027	2.84	Projected
2014	2.84	Projected	2028	2.86	Projected
2015	2.84	Projected	2029	2.89	Projected
2016	2.84	Projected	2030	2.91	Projected
2017	2.84	Projected	2031	2.93	Projected
2018	2.84	Projected	2032	2.95	Projected
2019	2.84	Projected	2033	2.97	Projected
2020	2.84	Projected			

The University completed its own analysis trend on water use (based on GRU metering and billing) and projected the actual increase that would result from the addition of new buildings being adding in the next 5 years. This analysis showed the University should have no problems staying within its permitted allocation. The following table shows the trends and projections.

Potable Water - Actual and Projected Use

Year	Water - Average Daily Flow in Gallons	Gampus GSF	Water GPD per GSF	Campus Population	Water GPD per capita
---ACTUAL---					
2014	2,268,000	21,978,761	0.103	68,393	33.16
2015	2,254,500	21,984,505	0.103	70,213	32.11
2016	2,268,000	22,285,708	0.102	71,974	31.51
2017	2,349,000	22,684,471	0.104	72,749	32.29
2018	2,335,500	22,701,278	0.103	72,019	32.43
2019	2,322,000	22,730,716	0.102	72,643	31.96
---ESTIMATED---					
2020	2,322,000	22,967,169	0.101	73,095	31.77
2021	2,322,000	23,203,622	0.100	73,547	31.57
2022	2,322,000	23,440,075	0.099	73,999	31.38
2023	2,349,000	23,676,528	0.099	74,451	31.55
2024	2,376,000	23,912,981	0.099	74,903	31.72
2025	2,403,000	24,149,434	0.100	75,355	31.89

The City of Gainesville's Comprehensive Plan sets a Level of Service (LOS) standard for an average of 147 gallons per capita a day for water use within the city. Currently, the University is using approximately 2.32 MGD with a per capita use of 32 gallons a day, well under the City's Peak and Average LOS standards as seen below.

The following LOS standards have been adopted by the City of Gainesville:

a. Maximum Day (Peak) Design Flow: 200 gallons per capita per day;

b. Storage Capacity: 1/2 of peak day volume in gallons. This requirement may be met by a combination of storage and auxiliary power;

c. Pressure: The system shall be designed for a minimum pressure of 40 psig under forecasted peak hourly demands to assure 20 psig under extreme and unforeseen conditions;

d. The City shall reserve potable water capacity for the annual water demand projected by the City for the University of Florida and the power plants.

e. The City LOS standard for water supply: Average Daily Flow: 147 gallons per capita per day.

The University also has a separate permit with the St. Johns River Water Management District for water use on campus. This permit covers the University's secondary use of water provided by GRU and the University's withdrawal of both ground and surface water withdrawals along with the usage of reclaimed water on the main campus. In 2009, the SJRWMD water use permit for all uses was extended until 2027.

The following water uses are covered under the individual permit: agriculture, livestock, cooling, household, recreation and urban landscape.

Pertinent SJRWMD Permit Conditions

10. Maximum annual groundwater withdrawals from the Floridan aquifer for urban landscape irrigation must not exceed 18.3 million gallons (0.05 million gallons per day (mgd) (average)).
11. Maximum annual groundwater withdrawals from the Floridan aquifer for agricultural type use must not exceed 36.7 million gallons (0.07 mgd (average)).
12. Maximum annual groundwater withdrawals from the Floridan aquifer for household type use must not exceed 2.4 million gallons (0.007 mgd (average)).
13. Maximum annual groundwater withdrawals from the Floridan aquifer for cooling and air conditioning must not exceed 28.0 million gallons (0.087 mgd (average)).
14. Maximum annual groundwater withdrawals from the Floridan aquifer for recreational irrigation must not exceed 1.3 million gallons (0.004 mgd (average)).
15. Maximum annual groundwater withdrawals from the Floridan aquifer for livestock watering must not exceed 0.75 million gallons (0.002 mgd (average)).
16. The annual allocation for reclaimed water from the University of Florida Water Reclamation Facility (UFWRF) for urban landscape irrigation is 152 million gallons (0.42 mgd (average)). Additional reclaimed water can be utilized if available.
17. The annual allocation for reclaimed water from the UFWRF for power generation is 305.0 million gallons (0.84 mgd (average)). Additional reclaimed water can be utilized if available.
18. The annual allocation for reclaimed water from the UFWRF for recreational irrigation is 17.3 million gallons (0.05 mgd (average)). Additional reclaimed water can be utilized if available.
19. The annual allocation for reclaimed water from the UFWRF for wetland enhancement is 18.3 million gallons (0.05 mgd (average)).
20. Maximum annual withdrawals from the Gainesville Regional Utilities (GRU) public water supply system for cooling and air conditioning must not exceed 225.0 million gallons (0.62 mgd (average)).
21. Maximum annual withdrawals from the GRU public water supply system for household type use must not exceed 803.3 million gallons (2.2 mgd (average)).
22. Maximum annual withdrawals from the GRU public water supply system for urban landscape irrigation must not exceed 8.76 million gallons (0.2 mgd (average)).

Table of ground water wells located on the main campus.

UF No.	SJRWMD ID	Well Name/Location	GRS Station No.	Casing Diameter (inches)	Well Depth (feet)	Status	Source
I-49	CA	New Organic Gardens	23336	4	175	Active	Floridan Aquifer
I-48	BN	Bivens Arm Agronomy Unit	23333	4	N/A	Active	Bivens Arm
E-7	V	Swine Unit	3502	4	80	Active	Floridan Aquifer
E-4	S	Coastal Engineering	3499	8	300	Active	Floridan Aquifer
E-3	R	Coastal Engineering	3498	6	300	Active	Floridan Aquifer
E-1	P	Swine Unit	3496	4	105	Active	Floridan Aquifer
C-14	L	Nuclear Reactor	3492	6	238	Active	Floridan Aquifer
C-12	J	Mechanical Engineering (Bldg 720)	3490	6	350	Active	Floridan Aquifer
I-50	CB	IFAS Arboretum No. 2	39066	4	140	Active	Floridan Aquifer
I-47	BR	PKY Baseball Field	3482	4	Unknown	Active	Floridan Aquifer
I-42	BO	IFAS Arboretum	3480	4	175	Active	Floridan Aquifer
I-46	BI	Fruit Orchard	478634	4	Unknown	Active	Floridan Aquifer
I-44	BH	Entomology/Nematology	3478	4	164	Active	Floridan Aquifer
I-43	BG	Florida Field	3477	5	308	Active	Floridan Aquifer
I-30	AV	Fifield (Bldg 263)	3465	4	120	Active	Floridan Aquifer
I-28	AT	Law School	3463	3	232	Active	Floridan Aquifer
I-25	AQ	Perry Field	39804	8	273	Active	Floridan Aquifer
I-19	AL	Energy Park	3455	10	167	Active	Floridan Aquifer
I-15	AI	Fruit Orchard	3452	8	Unknown	Active	Floridan Aquifer
I-11	AE	Hull & Bledsoe	3448	10	275	Active	Floridan Aquifer
I-6	AD	Dairy Pond	3447	10	450	Active	Floridan Aquifer
I-5	AC	Ocala Pond	3446	10	523	Active	Floridan Aquifer
I-4	AB	Gator Pond	3445	10	133	Active	Floridan Aquifer
C-11	I	Health Center Basement	3489	6	200	Inactive	Floridan Aquifer
--	--	New Baseball	490891	6	Unknown	Active	Floridan Aquifer
--	--	Relocated Baseball	490892	6	Unknown	Active	Floridan Aquifer

B. Water Conservation

The University demonstrates its commitment to water conservation on campus through the use of native and drought tolerant plants, low flow plumbing fixtures, limited irrigation and use of reclaimed water for outside irrigation.

The University primarily uses native or drought tolerant plants in all new and updated landscape plans, where reuse in unavailable. The underlying premise is that Florida Friendly native plants should be used wherever possible, since they are already well adapted to the area and have documented their ability to survive Florida' weather cycles that range from severe droughts to heavy rains. However, exceptions to this policy are made to maintain plant diversity on campus, so that Departments can use the main campus as an outdoor teaching lab where students can see a wide variety of plant material.

C. Satellite Properties

All of the University satellite properties are served by onsite potable water wells, except East Campus, Remote Library, Wall Farm and TREEO (Gainesville Regional Utilities) and the Dairy Unit (Alachua Municipal Water System). The WRUF Tower site is within the GRU service area, has service available, but does not create an onsite demand for potable water service.

The University has implemented an on-going program to upgrade the potable water distribution facilities on all satellite properties to better accommodate fire protection and pressure demands.

X. SANITARY SEWER SUB-ELEMENT

A. Wastewater Treatment Plant

Wastewater on the University main campus is processed using a 3 million gallons per day capacity, state of the art, facility that treats with a Krurger BioDenipho process. The effluent is suitable for use as reclaimed water and is used for irrigation on campus and at the Duke Energy co-generation plant, which is also located on campus. The plant includes features to foster academic use, including labs for teaching and research.

The University of Florida Water Reclamation Facility is a biological nitrogen and phosphorus removal, or BioDenipho plant. It has two anaerobic tanks, two oxidation ditches, series flow patterns and alternating ambient conditions within the oxidation ditches. The BioDenipho plant separates anoxic and aerobic processes with a clarifier and a return sludge pump system. A wastewater treatment plant employing the BioDenipho process resembles a conventional oxidation ditch treatment plant where aeration or oxygenation of mixed liquor takes place, a clarifier is used for settling the mixed liquor, and a return sludge pumping system is utilized.

The major components common to both conventional oxidation ditch and BioDenipho processes are a closed-loop reactor basin where aeration of mixed liquor takes place, a clarifier for settling the mixed liquor, and a return sludge pumping system. The feature distinguishing the BioDenipho plant is that the anaerobic tank is located prior to the oxidation ditches. The Water Reclamation Facility collection system receives most wastewater from housing and dorm areas (exceptions exist for Tanglewood and P.K. Yonge, which are served by Gainesville Regional Utilities), as well as academic and auxiliary buildings on the three square miles of the University of Florida main campus.

The priority for this facility is to first provide public access reuse of reclaimed water. The second option is to discharge reclaimed water to Underground Injection Well Facility U-001. The third option is reuse of reclaimed water via public access system of augmentation for lake level control of Lake Alice. The approved operating protocol provides details and procedures for system operation.

For disposal the University uses an existing 3.0 MGD monthly average daily flow (MADF) permitted capacity underground injection well system. The well consists of one 20 inch, Class V, Group 3 underground injection well (R2) cased to a depth of 243 feet below land surface, permitted under Department permit number FLA011322. The class V injection well discharges into Class G-II groundwater of the Floridan Aquifer at a depth between 243 and 304 feet below land surface. This injection of reclaimed water into Class G-II groundwater is in accordance with Rule 62-528 Part V, and 62-610.100(9)(f), F.A.C; it does not qualify as groundwater recharge.

Additionally, the University is uses an existing 0.96 MGD AADF permitted capacity slow-rate public access irrigation system, which allows for the discharge of reuse to a stormwater pond on the University of Florida Golf Course. Other reuse of reclaimed water is provided by pumping to the University of Florida public access reuse service area which includes recreational fields and a steam plant cogeneration system.

The sanitary sewer system serving the campus consists of numerous gravity collection pumping stations and an on-site wastewater treatment plant and effluent disposal system. The gravity collection piping ranges in size from 4-inch to 20-inch diameter, while force main piping ranges in size from 4-inch to 16-inch diameter. Pump stations range in size from 40 gallons per minute (gpm) to 1,850 gpm. Currently, the wastewater treatment plant (WWTP) treats an average flow of 2.1 million gallon per day (gpd). The WWTP is permitted to treat 3.1 million gallons per day (mgd) of wastewater. The current permit with the Department of Environmental Protection is in effect until December of 2020, when it will need to be renewed.

Facilities Services staff have projected future demand on the plant from the University's 10 year building list (See table below) and have shown that the plant is adequately sized to accommodate the anticipated building additions to the main campus.

Wastewater Treatment - Actual and Projected Use

Year	Gampus GSF	Campus Population	Wastewater Influent ADF in Gallons	Wastewater Influent GPD per GSF
ACTUAL				
2014	21,978,761	68,393	1,680,000.00	0.076
2015	21,984,505	70,213	1,670,000.00	0.076
2016	22,285,708	71,974	1,680,000.00	0.075
2017	22,684,471	72,749	1,740,000.00	0.077
2018	22,701,278	72,019	1,730,000.00	0.076
2019	22,730,716	72,643	1,720,000.00	0.076
ESTIMATED				
2020	22,967,169	73,095	1,720,000.00	0.075
2021	23,203,622	73,547	1,720,000.00	0.074
2022	23,440,075	73,999	1,720,000.00	0.073
2023	23,676,528	74,451	1,740,000.00	0.073
2024	23,912,981	74,903	1,760,000.00	0.074
2025	24,149,434	75,355	1,780,000.00	0.074

B. Reuse

The average daily amount of wastewater produced by the University is 2.0 mgd, which is treated at the 3.0 mgd capacity Water Reclamation Facility (UFWRF). The UFWRF treats wastewater to public access standards. Of the 2.0 mgd of reclaimed water generated by the UFWRF, UFWRF distributes approximately 0.512 mgd to on-campus sites for irrigation, 0.330 mgd to the UFF Golf Course for irrigation, 0.430 mgd to the Duke Energy's Co-generation plant for cooling purposes. Within the currently projected 5 year period, the average daily treatment amount of reclaimed water anticipated to be available is 2.0 mgd. The University of Florida currently irrigates approximately 90% of the irrigated areas on campus using reclaimed water (a high quality non-potable water supply that is not meant for potable [drinking] purposes) from the Water Reclamation Facility located on Gale Lemerand Drive. The remaining 10% are supplied from wells on campus or from domestic (drinking) water. As the University grows, there will be an increase in the amount of reclaimed water used for irrigation and cooling. Finally, the water levels in Lake Alice are allowed to fluctuate naturally, but not necessarily decline permanently. The lake will be augmented by highly treated plant effluent during periods of extreme drought to maintain a minimum level as prescribed in the treatment plant operational permit. The priority use of treated effluent is:

1. The priority for this facility is to first provide public access reuse of reclaimed water;
2. The second option is to discharge reclaimed water to Underground Injection Well Facility U-001; and
3. The third option is reuse of reclaimed water via public access system of augmentation for lake level control of Lake Alice

C. Satellite Properties

The sanitary sewer system serving the university-controlled satellite properties consists primarily of on-site wastewater treatment effluent disposal systems (septic tanks), with the TREEO Center being served by Gainesville Regional Utilities. Expansion of these systems will allow for future growth.

The performance of the existing sanitary sewer facilities on university-controlled satellite properties has been adequate according to their designed function. Improvements have been made in recent years to the Lake Wauburg system to upgrade and expand its capacity. All other systems appear to be operating effectively.

XI. Solid Waste Sub-Element

A. Waste Generation and Diversion

The following table presents high-level waste generation and diversion data for 2014 through 2019. [1] While the total University population has grown consistently over the last six years (11.6% growth), total waste generation has trended downward. The total tons landfilled annually has remained flat over the same period despite growth in the University population.

The percentage of waste diverted through various reuse, recycling, and composting programs has varied from year to year from a high of 67% in 2015 to a low of 45% in 2016 and 2017. However, it is important to note that the overall percent diverted is highly dependent on trends in construction and demolition (C&D) debris generation and diversion from major projects, which can vary significantly from year to year. When the impact of C&D diversion is removed, total diversion tonnages have trended upward since 2014, but have been relatively flat for all other materials combined over the last four years. Recent gains in the diversion of organics and the success of reuse programs have offset some corresponding decreases in masonry, woody waste, pallets, and electronic waste diversion. Diversion of paper, bottles and cans, and metals remain very steady year over year.

Year	Total Generation (tons)	Total Landfilled (tons)	Total Diverted (tons)	% Landfilled	% Diverted	University Enrollment	University Workforce	Total University Population	Lbs. Generated per Capita
2014	20,767.46	9,506.73	11,260.72	46%	54%	50,536	28,409	78,945	526
2015	32,886.35	10,928.11	21,958.24	33%	67%	53,519	29,596	83,115	791
2016	16,657.68	9,096.63	7,561.05	55%	45%	54,854	30,135	84,989	392
2017	16,922.24	9,387.64	7,534.60	55%	45%	55,862	31,062	86,924	389
2018	22,009.65	10,132.49	11,877.16	46%	54%	56,079	30,919	86,998	506
2019	19,015.25	9,642.43	9,372.82	51%	49%	56,567	31,514	88,081	432

B. Collection

The University of Florida, Facilities Services, Recycling and Solid Waste Management (RSWM) Department provides collection services for waste, recyclables, and compostable materials to a variety of internal and external customers. RSWM staff perform some of these services, while others are contracted out to a private hauler with contract administration and oversight provided by RSWM staff.

[1] These are the years for which we are able to provide this level of historical detail.

- Front-Load (dumpster) collection of Municipal Solid Waste (MSW), cardboard/paper, bottles and cans, food waste and paper towels, and woody waste. RSWM utilizes a fleet of four front-load refuse trucks and two carrier trucks to service a total of 396 permanent dumpsters. Fifty percent of the current front-load fleet is powered by compressed natural gas (CNG).
    - **MSW** - There 233 MSW dumpsters located throughout campus. These dumpsters are serviced via three collection routes - the North and South routes, which are run daily Monday through Friday, and the Saturday route, which is run every Saturday.
    - **Cardboard/Paper-** There are 134 permanent cardboard/paper dumpsters located throughout campus. These dumpsters are serviced via a single cardboard/paper route that is run twice weekly on Tuesdays and Thursdays.
    - **Bottles and Cans** - There are 9 permanent bottle and can dumpsters located throughout campus. These dumpsters are serviced via carrier truck as needed throughout the week.
    - **Food Waste and Paper Towels** - There are 9 permanent food waste/paper towel dumpsters located on campus. These dumpsters are serviced via a single organics route that is run three times weekly on Mondays, Wednesdays, and Fridays. This organics route also includes collection from organics carts throughout campus which is discussed below.
    - **Woody Waste** - There are 11 permanent woody waste dumpsters located on campus. These dumpsters are serviced via carrier truck as needed throughout the week.

- Cart-based collection of bottles and cans, food waste, paper towels and some office paper.
    - RSWM utilizes 95-gallon carts for back of house collection of bottles and cans and paper towels from campus buildings, and for on-call paper recycling needs.
    - Paper towel recovery from restrooms has been implemented in most Education and General (E&G) buildings on campus and was recently expanded to select on-campus Housing areas.
    - 65-gallon carts are utilized for pre-consumer food waste recovery in all Gator Dining locations, PK Yonge, Shands, participating sorority houses, and at Krishna Lunch. They are also used for post-consumer organics recovery at the O'Connell Center and an ongoing pilot in Reitz Union (#GatorsBeatWaste Station).

- Daily collection from approximately 450 exterior waste and recycling stations located throughout campus. Each station includes 2 to 3 material streams (waste, bottles and cans, and/or paper) depending on the specific needs at that location. There are no stand-alone outdoor waste bins on campus. In 2017, RSWM invested in 71 Big Belly solar compacting waste stations, which are strategically placed in areas that consistently generate high volumes of waste and recycling.

- RSWM staff also manage a wide variety of materials for diversion or disposal at the Facilities Services compound located off Radio Road. These materials include:
    - Scrap metal
    - Pallets
    - Woody waste

  - Masonry
  - Toner cartridges

RSWM currently contracts out the following waste and recycling collection services to a single, private hauler:

- Compactor services- UF RSWM owns 21 compactors that are utilized for waste and recycling collection throughout the University's main campus. Our contracted private hauler is responsible for all compactor pulls/replacements. Some compactors have assigned collection schedules, while others are serviced on an on-call basis. During 2018, there were a total 1,139 roll-off pulls across these 21 locations.
- Roll-off services - UF RSWM provides a variety of permanent and temporary roll-off services to its customers through our contracted private hauler. The hauler is responsible for all roll-off pulls/replacements and is responsible for providing most roll-off containers. All roll-offs are serviced on an on-call basis. UF currently utilizes 20 permanent roll-offs across campus for management of MSW, bottles and cans, C&D, and special wastes. RSWM also provides a variety of temporary roll-offs services through our contracted private hauler. Temporary roll-offs are most commonly requested and utilized for UF Housing move-in and move-out periods, home football games, and special projects.
- Front-load services for certain off-campus locations within Alachua County - RSWM contracts out certain off-campus front-load collections of MSW and cardboard. Our contracted private hauler provides both the dumpsters and collection services associated with these 15 off-campus locations.
- Woody waste loading and hauling - The contracted private hauler provides on-call roll-off services for woody waste generated by UF Facilities Services operations. This includes providing roll-offs, grappling services to load the roll-offs, hauling, and processing. Pulls occur on an as needed basis as communicated to the vendor by RSWM staff.
- Indoor office paper collection - The contracted private hauler provides weekly collection service to 642 indoor office paper bins. These 45-gallon, stationary bins are located across 182 campus buildings. Five hundred and sixty-three (563) of the bins are located on the University's main campus and seventy-nine (79) are in various off-campus locations within Gainesville. All bins are provided by RSWM.
- Bottle and can collection from certain sites - The contracted private hauler provides weekly collection service to 238 95-gallon carts used for bottle and can recycling. Two hundred and thirty-two (232) of the carts are located on the University's main campus or within 5 miles of the main campus (Sorority Row, PK Yonge Developmental Research School, Tanglewood Village, UF East Campus). Six (6) of the carts are located in various off-campus locations within Alachua County, FL. All carts are provided by RSWM.

C. Processing and Disposal

All MSW generated by the University is transported to the Alachua County Transfer Station at Leveda Brown Environmental Park (5515 NE 63rd Avenue, Gainesville, FL 32608) and ultimately disposed of at the New River Regional Landfill (24276 NE 157th Street, Raiford, FL 32083). The New River Regional Landfill, at its currently permitted design capacity and intake levels, has an expected life of 10 years. Phase I is expected to reach capacity in 2030. Phase II is proposed, but not yet permitted, which would extend the facility's life through 2039 based on the anticipated waste disposal projections.

All cardboard and office paper is processed by either the Alachua County Material Recovery Facility at Leveda Brown Environmental Park (5515 NE 63rd Avenue, Gainesville, FL 32608) or Recycling Services of America (2874 NE 1st Terrace, Gainesville, FL 32609).

All bottles and cans are processed at the Alachua County Material Recovery Facility at Leveda Brown Environmental Park.

All food waste and paper towels are composted by Watson C&D (12890 NE State Road 24, Archer, FL 32618).

All woody waste is processed by Gaston's Tree Debris Recycling (9333 NW 13th Street, Gainesville, FL 32653).

All C&D waste generated by UF Facilities Services is disposed of at either Watson C&D Landfill (12890 NE State Road 24, Archer, FL 32618) or Florence C&D Landfill (3222 SE Hawthorne Road, Gainesville, FL 32641).

C. Hazardous Wastes

Hazardous waste collection is administered by the University's Environmental Health and Safety Division (EH&S) and is collected and disposed using a combination of in-house and contracted resources. Used oil, oil filters and antifreeze are collected by vendors directly from the University's major generators. Incidental quantities of these products, along with chemical, radiological and other hazardous or controlled products are collected by EH&S staff and assembled at its Waste Management Facility on campus for processing, packaging and ultimate disposal via contracted disposal companies.

D. Satellite Properties

Off-campus facilities are served by independently contracted refuse services. Once solid waste is collected, it is transported to the Alachua County Transfer Station for ultimate disposal at the New River Solid Waste Association landfill in Raiford, Florida. In general, the performance of the existing solid waste collection and disposal facilities has been adequate to meet the needs of the University at the university-controlled satellite properties and is expected to be adequate for the next 10 years.