

**2.9 General Infrastructure Element
Data and Analysis
2010 – 2020 Campus Master Plan Update**

STORMWATER ANALYSIS

a) A facility capacity analysis, by geographic service area, indicating capacity surpluses and deficiencies for:

- 1) Existing conditions, based on the facility design capacity and the current demand on the facility capacity:

The University is divided into four major drainage basins (Basins 1 through 4). Each of these basins is further divided into sub-basins as shown in Figure 9-1. The master plan and subsequent stormwater permit were generated in the early 1990s, based on projected development within the campus. Modifications have been made to the master permit as a result of changes in the projected growth and development of the campus.

The University currently maintains a master stormwater permit from the St. Johns River Water Management District (SJRWMD). This master permit allows for development within designated stormwater basins as it relates to an approved additional impervious area within each basin. Currently, the permitted impervious impacts are monitored by University staff and an independent consultant to insure that the capacities listed in the permit are not exceeded. The University will maintain a current record in plan and table format of existing stormwater facilities and the current permitted impacts. These documents would be made available to any staff, consultant or regulatory agency, as requested, to review existing conditions and plan for future development. Attached is a current table (March 2007) showing the drainage sub-basins and the available impervious area in each sub-basin that is still available for development. This information, along with plan data, is maintained by the University's civil engineer, and is updated as new developments impact the current data.

Per recommendation of SJRWMD and public input, the University has reviewed existing development on campus and has updated the amount of impervious area coverage on campus. The required changes to the

SJRWMD permit will be implemented through a permit modification to the Master Permit.

- 2) The end of the planning time frame, based on the projected demand at current level of service standards for the facility, projected student populations and land use distributions, and any available existing surplus facility capacity.
- b) The general performance of existing stormwater management facilities, evaluating the adequacy of the current level of service provided by the facility, the general condition and expected life of the facility, and the impact of the facility upon adjacent natural resources:

The current stormwater system is functioning in accordance with the existing master permit. Stormwater quality treatment shall be on a basin-by-basin basis. Basin stormwater ponds will provide treatment per the following: greater of (a) 2.5" times the area of impervious surface; or (b) the calculated first 1" of runoff for the basin. Post development stormwater discharge from the campus shall be less than the predevelopment discharge rate for the 25 year / 24 hour storm event as determined per the approved SJRWMD Master Stormwater Plan. Since the campus is located within the Econlockhatchee River Basin, the post development peak rate of discharge shall also be less than or equal to the mean annual 24 hours storm event that occurred at the time of the initial SJRWMD permit. Currently, several major construction projects are in-progress which are permitted under the master stormwater system. These projects will impact data on the attached table and will require additional reviews of future developmental impacts not discussed in this report.

The existing stormwater system is in good condition. The life expectancy of the structural elements of the stormwater system is expected to exceed 25 years. Routine maintenance of stormwater facilities is required to meet this life span.

The discharge points for this master system were selected based on pre-developed conditions in an effort to minimize impacts to adjacent natural resources. The University has made extensive efforts to reduce impacts to adjacent resources, including reducing the allowable impervious area of any sub-basin to levels below permitting thresholds, maintaining and enhancing existing wetlands systems by incorporating them into the master drainage

system, and restricting post development discharge rates to pre-1985 rates, while providing water quality control.

- c) An analysis of the problems and opportunities for stormwater management facility expansion or replacement to meet projected needs of the University.

The University may need to modify the existing master permit to accommodate for future expansion in several sub-basins. The modifications may include the transfer of available impervious areas from one sub-basin to another. The water management district has been receptive to this transfer, provided the final outfall conditions remains the same and additional treatment is provided in higher pollutant-loading areas.

- d) Analysis of existing regulations and programs which govern land use and development of natural stormwater management features, including the strengths and deficiencies of those programs and regulations in maintaining the functions of natural stormwater management features.

The existing stormwater permit (MSSW) from SJRWMD was modified in 2004 under ERP number 4-095-20026-29, which was subsequently modified in December 2004 under ERP number 4-094-200-26-31; January 2005 under ERP number 4-095-20026-39; and July 2007 under ERP number 4-095-20026-66 to accommodate proposed construction not anticipated in the original application. Due to changes in SJRWMD regulations, the March 2004 modification included changing the MSSW permit to an Environmental Resource Permit (ERP). The entire process for the modification took approximately nine (9) months. One outcome of the revised March 2004 permit was that SJRWMD will no longer accept letter modifications for individual projects on campus, and all projects are now required to obtain a General ERP.

Current regulations require stormwater runoff to be “treated” prior to discharging into any natural wetland or water body. The University has maintained a stormwater management facility which accommodates these requirements and exceeds SJRWMD criteria for preservation. The stormwater system was also designed to maintain pre-permitted drainage patterns, providing natural hydration to each wetland system, therefore supporting appropriate biological functions. Because the biological function of the existing wetlands was considered in the original permitting design, the University should also consider habitat enhancements for these wetlands and

other transitional (buffers) areas. These enhancements may potentially be done as a part of an academic study program.

UCF STORMWATER MASTER PLAN IMPERVIOUS AREA STATUS REPORT

Date: 3/12/2009

Overall Plan Status:

Basin (1)	Drainage Area (2)	Existing Imperv. Area (3)	Impervious Area This Submittal (4)	Total Imperv. Area Allowed (5)	Remaining Imperv. Area Allowed (6)
<u>I.D.</u>	<u>(AC)</u>	<u>(AC)</u>	<u>(AC)</u>	<u>(AC)</u>	<u>(AC)</u>
1-B	1.45	0.44		0.44	0.00
1-C	0.61	0.00		0.00	0.00
1-D	64.74	24.63		29.82	5.19
1-F	15.81	5.99		7.92	1.93
1-G	57.82	0.00		0.00	0.00
2-B	2.81	1.80		1.80	0.00
2-C	0.57	0.00		0.00	0.00
2-D	23.24	0.00		0.00	0.00
2-E	23.57	0.00		0.00	0.00
2-H	164.52	72.75		74.00	1.25
2-H3	32.53	0.00		16.50	16.50
2-Z	50.62	0.00		0.00	0.00
3-A & 3-Aa	130.04	38.79		51.00	12.21
3-Z	13.95	0.00		0.00	0.00
4-B(Pond)				34.13	
4-B(provided in 4-R)				3.02	
4-B Totals	65.34	35.65		37.15	1.50
4-F	35.24	20.51	0.04	26.51	6.06
4-L	122.86	48.79	0.01	53.09	4.29
4-M	12.97	8.17		8.17	0.00
4-R	115.84	30.53		56.00	25.47
4-S	4.83	2.07		2.34	0.27
4-Z	221.69	6.32		0.00	(6.32)
4Z-a	5.67	1.95		3.05	1.10
FDOT	2.50	1.20		1.20	0.00
TOTALS	1169.22	299.59	0.05	366.07	69.45

Completed ponds permitted and or proposed to be entirely constructed:

Ponds 1-F, 2-H, 4-B, 4-M, 4-S & 3-A have been completely constructed. Impervious areas may be constructed up to the amount noted, without additional permitting.

Portions of Ponds Permitted and Completed or Under Construction:

Ponds 4-L and 4-R have been partially constructed. The area of each pond and impervious area allowed prior to additional expansion or permitting is as follows:

Pond ID	Existing Pond Permitted Maximum Imp. Area (ft)	Existing Imp. Area Constructed (ac)	Imp. Area This Submittal (ac)	Revised Imp. Area (ac)	Future Imp. Area Allowed prior to Lake expansion (ac)
1-D	26.25	24.63	0.00	24.63	1.62
2-H3	0.00	0.00		0.00	0.00
4-M	5.52	8.20	0.00	8.20	
4-R	43.83	30.53	0.00	30.53	0.00
4-B(provided in 4-R)	3.02	2.13	0.00	2.13	
4-R Totals	46.85	32.66		32.66	14.19

Note: Existing impervious under basin 4R includes excess impervious area built in basin 4-B

NOTES:

- (1) Basin I.D. as indicated in the Approved stormwater master plan permit dated 3/9/04
- (2) Proposed drainage area as indicated in Approved stormwater master plan permit dated 3/9/04
- (3) Indicates the permitted impervious area (as of June 2004) which exist within each basin.
- (4) Impervious area proposed (not to exceed values in Approved stormwater master plan permit dated 3/9/04)
- (5) Total impervious area allowed for basin based on the stormwater master plan pond design.
- (6) Remaining impervious area allowed within basin based on the 2010 stormwater pond design.
- (7) Pond 4-M is proposed to be expanded with this application to meet SJRWMD regulations.

PREPARED BY HARRIS CIVIL ENGINEERS

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POTABLE WATER ANALYSIS

a) A facility capacity analysis, by geographic service area, indicating surpluses and deficiencies for:

1. Existing conditions, based on the facility design capacity and the current demand on facility capacity.

UCF operates and maintains its own potable water distribution system that serves most of the main campus. There are four wells that pump water from the Floridian aquifer to a storage tank at the utility plant. Each well has a capacity of approximately 500 gpm. The design capacity of this system is approximately 1,500 gpm based on using three of the four wells during normal operating conditions. The system uses a series of high service water pumps and an above ground storage tank to maintain consistent pressure and provide fire flows when necessary.

UCF upgraded its potable water distribution system by installing 16 inch looped water mains in 2000-2002. This improved the capacity of the system to meet fire- and potable-demands. Also, the upgrade included connecting to the Orange County Utilities system for water supply that feeds the Academic Villages and the Recreation & Wellness Center (buildings # 88 and 101-115). These buildings are supplied potable water via an OCU 24" main on the south of the campus. Appropriate pressure is supplied by the OCU system and is augmented by the booster pump station (building # 307) that contains 4 high volume pumps, a generator, and automated controllers. A corrosion control system was eliminated in 2002, along with the gaseous chlorine injection system used for disinfection. It was replaced with a liquid sodium hypochloride injection system and therefore eliminated the need for a corrosion control system.

2. The end of the planning time frame, based on the projected demand at the current level of service standards for the facility, projected student populations and land use distributions, and any available existing surplus facility capacity.

St. Johns River Water Management District has issued a Consumptive Use Permit (3202) based on current and projected demands for water through 2013. The permit will expire October 14, 2013.

At the end of the planning time frame, the irrigation water demand from the potable system should be negligible. UCF is in the process of removing irrigation water from this system and providing reuse water from the Iron Bridge Waste Water Treatment Plant for all the irrigation needs on campus. The removal of this demand from the potable system will create the excess capacity within the already upgraded system to provide domestic and fire flow demands for expansions shown in this planning period or until the University receives its entire potable water from OCU.

By year 2010, the projected water demand, based on student populations, is as follows:

40,800 on-campus students x 5 gal/day per student = 204,000 gpd

7,200 off-campus students x 85 gal/day per student = 612,000 gpd

TOTAL DEMAND IN YEAR 2010 = 816,000 gpd

The UCF water plant has a daily capacity of approximately 1,500 gpm x 1,440 min./day = 2,160,000 gpd. Because of the magnitude of this distribution system and the fact that irrigation water should be removed by year 2010, a peak factor of close to three times the actual daily use is sufficient for the period being evaluated.

Seminole County provided a portion of the funding used to construct the necessary apparatus to increase the on-campus capacity of effluent water to two million gallons per day. This has decreased the potable water demand for irrigation, while increasing the potable water availability to the campus.

- b) The general performance of existing potable water facilities, evaluating the adequacy of the current level of service provided by the facility, the general condition and expected life of the facility, and the impact of the facility upon adjacent natural resources.

Existing potable water facilities will be more than sufficient until 2015 or until the University obtains its potable supply from OCU. The UCF water plant was constructed in 1968 but has received periodic upgrades since then. A project to upsize the water feed lines from the wells was completed in 2002. The booster station (bldg. 307) was constructed in 2001 and should not need

significant repair or upgrades throughout the planning period. When practical, as new construction expands the existing distribution facility, water main dead ends should be extended to a second tie-in point to provide two directions of service for any given point in the system.

In addition, the existing system consists primarily of PVC piping which has a life span in excess of 50 years. Isolated, older sections of piping will require replacement within the study period; however, the location and extent of replacement will need to be studied in more detail based on maintenance records.

- c) An analysis of the problems and opportunities for potable water facility expansion or replacement to meet projected needs of the University.

Potable water facility expansion or replacement should be considered with each new building constructed. Potable water supplies remain generally available on the main UCF campus through the 2010-2015 planning period. However, some areas of campus still do not have water piping in the immediate vicinity. Also, some future buildings will likely require more water volumes at higher pressures than is currently available. Engineering studies on the campus as a whole, and on project-specific water requirements, should continue. For building construction of three (3) stories or more, the need for additional booster pumps may be required to meet the necessary fire flows.

- d) A description of the campus underground hydrology, including its potential for use as a potable water source:

The drinking water for the UCF campus originates from the vast Floridian aquifer, which supplies about 60 percent of Florida's drinking water. This source of drinking water is common within the Central Florida area. This source will be able to provide the required water needs during this study period.

In addition, UCF, as a part of the past upgrade, tied the existing distribution system into an offsite water main. This tie-in provides the additional water needed for water supply to Academic Villages, Recreation & Wellness, and the Multi Cultural building. Currently it is a backup for emergency fire fighting if campus water drops below 25 psi. This additional source of potable water will

reduce the University's dependence on campus well water as the only source for drinking water.

- e) An analysis of existing local, state and federal regulations governing potable water systems:

The current drinking water system is regulated by the Florida Department of Environmental Protection under Chapter 175 of the Florida Administrative Code and Section 403 of the Florida Statutes. The state regulations are in addition to the federal "Safe Drinking Water Act," which establishes national standards for drinking water.

The water treatment plant operator at UCF is certified by the state. In addition, the Department of Environmental Protection oversees and regulates the water treatment facility. DEP requires that UCF send in a monthly report which details daily chlorine residuals at the plant and remote areas, number of gallons produced, and bacteriological results of well's and building's water samples.

As additions are made to the water distribution system, permits are required from the Florida Department of Environmental Protection. These permits insure that the new distribution piping meets current regulations regarding quality construction, water and long term maintenance. The University has been routinely acquiring these permits as needed.

SANITARY SEWER SYSTEM ANALYSIS

- a) A facility capacity analysis, by geographic service area, indicating surpluses and deficiencies.
- 1) The University pumps all campus effluent to the Iron Bridge Waste Water Treatment Plant. This allows the University to increase the available wastewater capacity without additional expenditures. The Master Lift Station has the capacity of 1.728 mgpd.
 - 2) Existing lift stations will need to be analyzed as projects are implemented to determine the need to upgrade the pumps within the system. These stations may also be upgraded during routine maintenance procedures in

order to increase efficiency and expand available capacity within the existing system.

a) GENERAL PERFORMANCE

The existing gravity and pumping systems are functioning as designed. Both systems appear to be in good condition and only periodic maintenance is anticipated based on current flows.

b) PROBLEMS AND OPPORTUNITIES

The lift station servicing the Arena area has been upgraded as a result of the growth in this vicinity. The wet well for this station was oversized to accommodate larger pumps required for this growth. Individual projects should analyze their impact on the system to determine the need to upgrade both gravity and pump station systems.

Additional pump stations and gravity sewer systems will be required for future growth, particularly in areas where there currently doesn't exist any such system. This would include the northwest corner of campus and the northeast corner, east of the Arena. These systems can be designed and installed on a project by project basis.

c) STATE AND FEDERAL REGULATIONS

The wastewater collection and transmission system is currently regulated by the Florida Department of Environmental Protection. On-site septic systems are regulated by the Florida Department of Community Affairs (through local Health Departments). Authority is granted these agencies by Chapter 17 of the Florida Administrative Code. The University is currently in compliance with all applicable codes under these agencies review.

SOLID WASTE ANALYSIS

a) A facility capacity analysis, by geographic service area, indicating surpluses and deficiencies for:

1) Existing conditions, based on the facility design capacity and the current demand on facility capacity.

The University provides for the collection of solid waste through service areas and solid waste dumpsters. Servicing of the dumpster system is through a private vendor under a continuing contract renewable at the discretion of the University.

The University also maintains a series of dumpsters designated for recycled materials. These materials include paper, glass, metals and plastics. Typically these dumpsters are co-mingled with standard trash dumpsters.

Virtually all of the University's solid waste is disposed of at the Orange County Landfill. This is a class 1 landfill which uses the "high-rise" method of layering the refuse material above the groundwater table. This landfill services Orange County and some smaller municipalities outside the county.

2) The end of the planning time frame, based the projected demand at the current level of service standards for the facility, projected student populations and land use distributions, and any available existing surplus facility capacity.

The size and location of waste disposal facilities will be determined on individual project requirements. These requirements should be then incorporated into the master collection and disposal program under the existing contract. There is no limit on the amount of refuse going to the landfill since the producer pays as they generate the waste.

b) The general performance of existing solid waste collection and disposal facilities, evaluating the adequacy of the current level of service provided by the facility, the general condition and expected life of the facility, and the impact of the facility upon adjacent natural resources.

Current waste collection sites on campus are removed, to the extent possible, from pedestrian traffic and visual contact. Collection sites are typically screened or removed from view for aesthetic purposes. Vehicular access to

the collection sites should be multipurpose in that additional parking, deliveries and emergency access and storage areas are incorporated along this route.

The system of using outside vendors has been satisfactory over the previous five years and is meeting current expansion needs. The continued out-servicing of this contract for waste collection appears to be in the University's best interest

- c) An analysis of the problems and opportunities for solid waste collection and disposal facility expansion or replacement to meet projected needs of the University.

As the University grows, the solid waste collection system needs to be studied further to identify areas of opportunity to combine facility locations and thus reduce the overall number of collection sites on campus. In addition, as a possible research program for recycled waste, the University should encourage the available academic community to study possible recycle and resource recovery systems, such as composting and material sorting, to reduce offsite disposal volume and costs associated with this disposal method.

- d) An analysis of existing local, state and federal regulations governing waste disposal systems.

UCF currently contracts with a third party to collect and dispose of waste generated by the University. This contract addresses the need for the vendor to dispose of these materials in accordance with current laws. Hazardous wastes generated by the University are collected and disposed of under separate contracts specifically for the removal of this material.

UCF also has in place a recycling program in accordance with state and federal laws mandating such programs. The recyclable materials include paper, plastic, glass and metals. Special dumpsters also recycle cardboard materials for off-site disposal.

- e) An assessment of opportunities or available and practical technologies for the reduction, recycling and re-use of solid waste generated by the University.

Investigation of emerging technologies to address this issue is encouraged.

With the rapid expansion of computer network systems, the use of electronic data transmission and storage should significantly reduce the amount of solid paper waste on campus. The University should study opportunities to reduce other forms of waste generation through the use of current technologies.

- f) An analysis of the terms of any agreements for the collection and/or disposal of University-generated solid waste, including allocated capacity and duration of service.

Identify any future limitations on University development resulting from these factors.

The existing contracts provide the University with collection, transmission and disposal of solid waste. The contract allows the University to renew or terminate based on satisfactory performance of the vendor. As recycling of new waste products becomes available to the public, the University will want to re-negotiate the existing contract or include these items in future contracts.