University of Mississippi Campus Water Footprint

Baseline Report

Prepared for The Office of Sustainability

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1.0 Introduction

A water footprint is the amount of water used for certain goods and services. It consists of direct and indirect uses (Water Footprint Network n.d.). Conducting a water footprint assessment can help a business, organization, manufacturer, or university understand the impact that its consumption has on freshwater sources and how efficient its water usage is. Therefore, a water footprint assessment of a college campus enables managers, administrators, engineers, and scientists to identify inefficiencies and implement solutions.

The University of Mississippi (UM) is a public university, with its main campus located in Oxford, Mississippi. The Oxford campus consists of nearly 20,000 students (UM 2017a) and 6,000 faculty and staff. With over 100 buildings in 700 acres of the core Oxford campus area, the water consumption is considerable. However, no water footprint analysis, encompassing direct water usage on campus, has been conducted to date. The volume of water used on the UM campus costs money and consumes natural resources. Natural resources involved in the consumption of water are the water itself, which comes from a local aquifer, fuel to generate electricity for operating water pumps, and chemicals used to treat the water. The University can save resources and money if it strives for diligent water sustainability. Rapid population growth adds further stress to water demand. Understanding trends will pave the way for effective solutions, such as reducing the risk of local aquifer overdraft, reducing energy consumption, reducing unnecessary treatment of drinking water and wastewater, using captured stormwater for beneficial uses, and reducing infrastructure damage and erosion from fast-moving stormwater runoff.

The goal of this Campus Water Footprint Report is to assess how water is utilized on the UM main campus through freshwater pumping, treatment, distribution, and usage; wastewater conveyance and treatment; and rainfall and stormwater management (Figure 1). With the information gained, this report looks to establish baseline water data and outline recommendations for cost-saving and resource-conserving alternatives.

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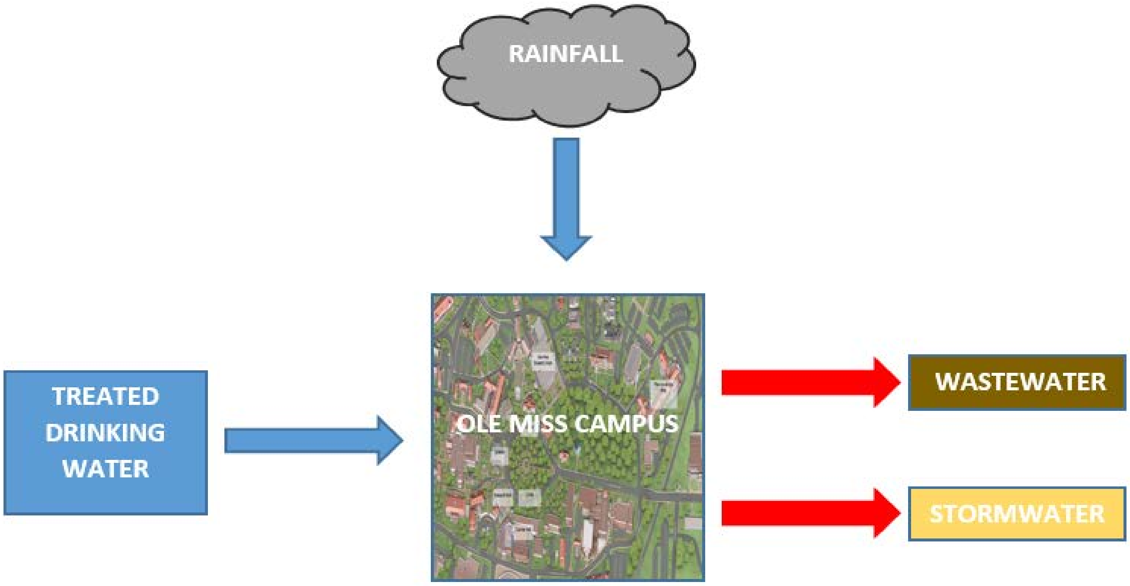

Figure 1. Schematic of water flows investigated for this report.

This report is organized into four topical sections: Potable Water (Section 2.0: on-campus and off-campus sources, use by Athletics, and hydration stations); Wastewater (Section 3.0: on-campus and off-campus); Stormwater (Section 4.0); and Goals to meet the AASHE STAR System (Section 5.0). All sections include background information, data collected, sources of data, and recommendations.

Note that the sources of information used in this report come from decentralized units throughout the campus and that information on water flows is not completely tracked by many of those units. What is reported here is a compilation of the existing information and serves as baseline data that can be compared with future data for making decisions on water management. This assessment has been researched and written by undergraduate students as a learning opportunity, under the guidance of a professor. Because this report shows baseline data, future assessments must be conducted and reported in order to analyze changes.

2.0 Potable Water

Potable water at UM consists of (1) on-campus wells that directly supply most of the campus and (2) City of Oxford water, also from wells, that supplies buildings off of the main campus.

On-campus well water is pumped, stored in water towers (Figure 2), treated to drinking quality, and distributed to buildings, athletic facilities, landscaping, and heating and cooling utilities. Therefore, potable water is not used just for drinking.

UM is unique among college campuses because it pumps and treats the majority of its own drinking water instead of purchasing it from a local city utility. Since UM pumps and treats most of its water, installing water meters in each building has not been a priority. Therefore, it is not possible to quantify a complete breakdown of water usage. However, many newer or high-usage buildings have been equipped with water meters, which allows us to gain some understanding of water usage. In addition, buildings on the edge of and outside of campus have water provided by the City of Oxford and are metered.

Figure 2. University of Mississippi water tower

2.1 Background on Potable Water Treatment and Distribution

Water that does not leave a taste or odor is defined as palatable, and water that is free of chemicals, microorganisms, and other contaminants is defined as potable. Consumers expect both potable and palatable water; in other words, safe and pleasant to drink. Four properties that define the quality of drinking water quality are: physical, chemical, microbiological, and radiological. Drinking water standards set by the U.S. Environmental Protection Agency (EPA) are followed by state public health departments to ensure that water is treated accordingly to meet requirements for those properties (Davis and Masten 2014).

The conventional urban water treatment process consists of pumping and collecting surface water (usually lakes or streams) or groundwater and adding a coagulant, which serves to combine particles into larger particles. Once this process has taken place, the large particles will settle and be removed in a sedimentation basin. To reduce the remaining turbidity, the water is then run through a sand filter. Then, the water is disinfected, usually using a chlorine-based chemical, to kill pathogenic microorganisms. At this stage, the water is ready to be distributed (Davis and Masten 2014).

In the Oxford regional area, water is pumped from the Meridian-upper Wilcox aquifer (USGS 2006). Deep aquifers, such as the Meridian-upper Wilcox, produce high-quality water because they are deep below contamination that can infiltrate from the ground surface. Because in such aquifers the risk of pathogens and other impurities is low, little treatment is required for drinking water at UM. After being drawn from the well, water is disinfected with chlorine and is pumped to the two UM water towers. These towers are tall enough to provide pressure to distribute water to a majority of the campus using only a few pump stations (Adkisson 2018). The City of Oxford treats its water in a similar way.

2.2 On-campus Usage

The treated water is distributed throughout the campus through multiple pump stations. Flow meters monitor how much water is being drawn from the wells and subsequently used. Figure 3 details the total amount of water pumped from UM wells per month in 2016.

Water pumped on campus is used not only for drinking purposes but is largely consumed by irrigation and mechanical systems heating and cooling water. In fact, on average, an estimated 300,000 gallons of water per day can be attributed to irrigation and mechanical systems. For perspective, high-volume months typically average around 1 million gallons per day (Adkisson 2018).

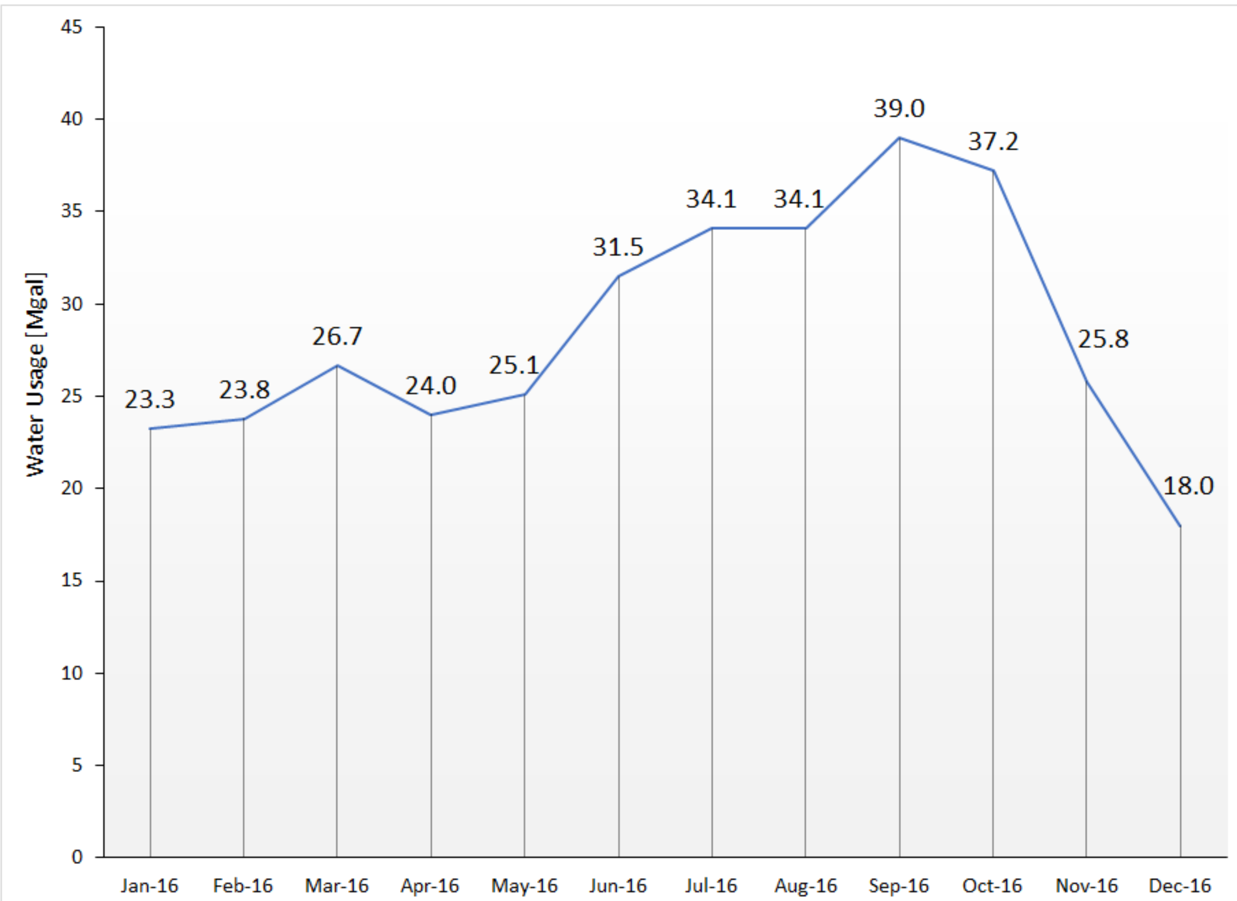

Figure 3. 2016 monthly volume of water pumped on campus. Mgal = million gallons (Source: Adkisson 2017)

The high monthly water withdrawals during the summer and early fall can be largely attributed to irrigation. The total amount of potable water pumped from UM wells in 2016 was 342.4 million gallons (Mgal).

Not all buildings on campus have water meters, so it is not possible to break down the water usage per building. However, some buildings are metered, and Figure 4 shows an annual breakdown for 2016 for those buildings.

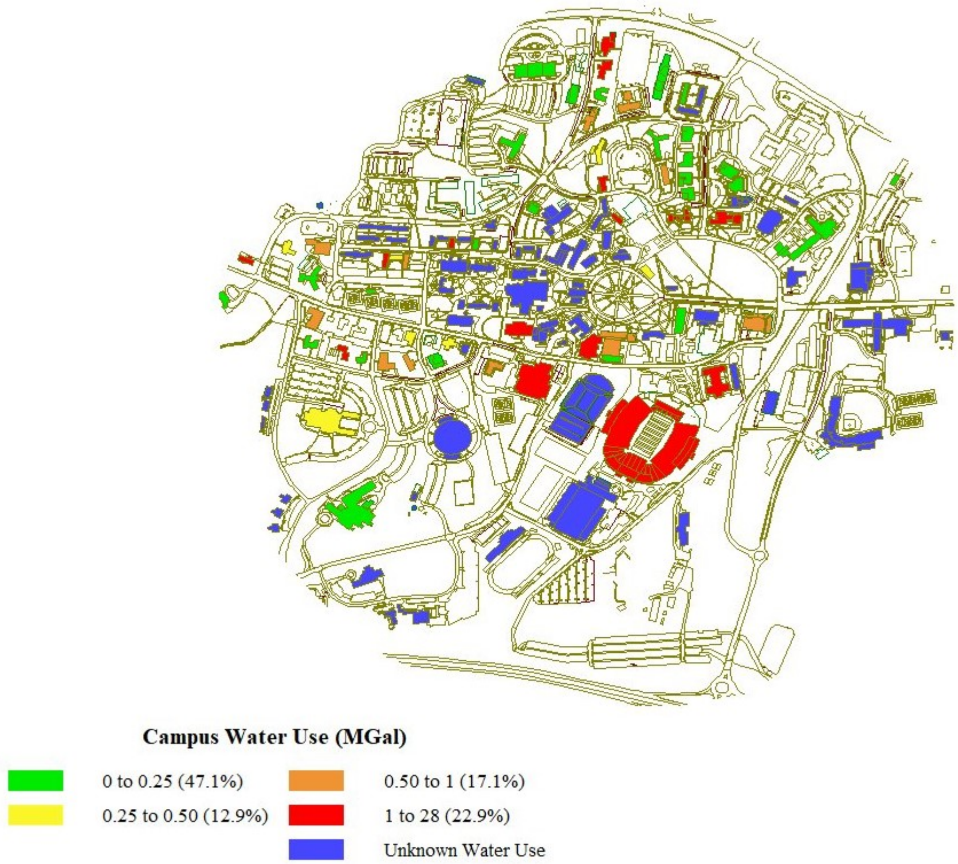

Figure 4: 2016 Total Water Usage of University of Mississippi Main Campus by Building. Numbers in parentheses are the percent of buildings metered. Note that for red buildings, the usage range is wide at 1 to 28 MGal for 2016. Blue buildings are not metered.

The University uses potable water to irrigate landscaping. Irrigation systems on campus vary in type, and the most modern is the Toro Sentinel irrigation system that tracks many areas on campus that are watered. The system uses radio transmitted signals to communicate to a computer and to turn the system on and off. The Sentinel system can also sense the amount of humidity and rain in the atmosphere to determine whether or not the sprinklers need to be run. As the system is continually updated, it has the ability to track the amount of water the system uses. The actual volume of water used by the Sentinel systems is unknown (Lazinsky 2018, UM, 2017b).

The University also uses potable water for the chilled water loop on campus. The chilled water loop is how the University buildings are kept cool and warm throughout the year. Water is pumped from the water tower into pipes that are then passed through either boilers or condensers to heat or cool buildings, respectively. The loop is an underground piping system throughout campus, and water runs continuously through it. Because the system is a closed loop, the water recirculates. However, make-up water from the campus water tower must be added to compensate for leaks. Also, depending on the weather conditions, the loop might lose head pressure due to the evaporation of water throughout the day, and the pipes must have a constant pressure for the system to work efficiently (Clark 2018). Make-up water is also used to keep the pressure constant. The volume of make-up water is not tracked but is estimated at 200,000 gallons per year (Adkisson 2018).

The cost to pump and treat drinking water for the campus can be estimated. Chemical treatment and electricity to pump the wells on campus are the two costs that were considered when generating Figure 5 of on-campus costs. In 2016, an estimated $54,000 was spent on treating and pumping water, not including labor, for a per gallon cost of $0.00016, or 0.016 cents/gallon.

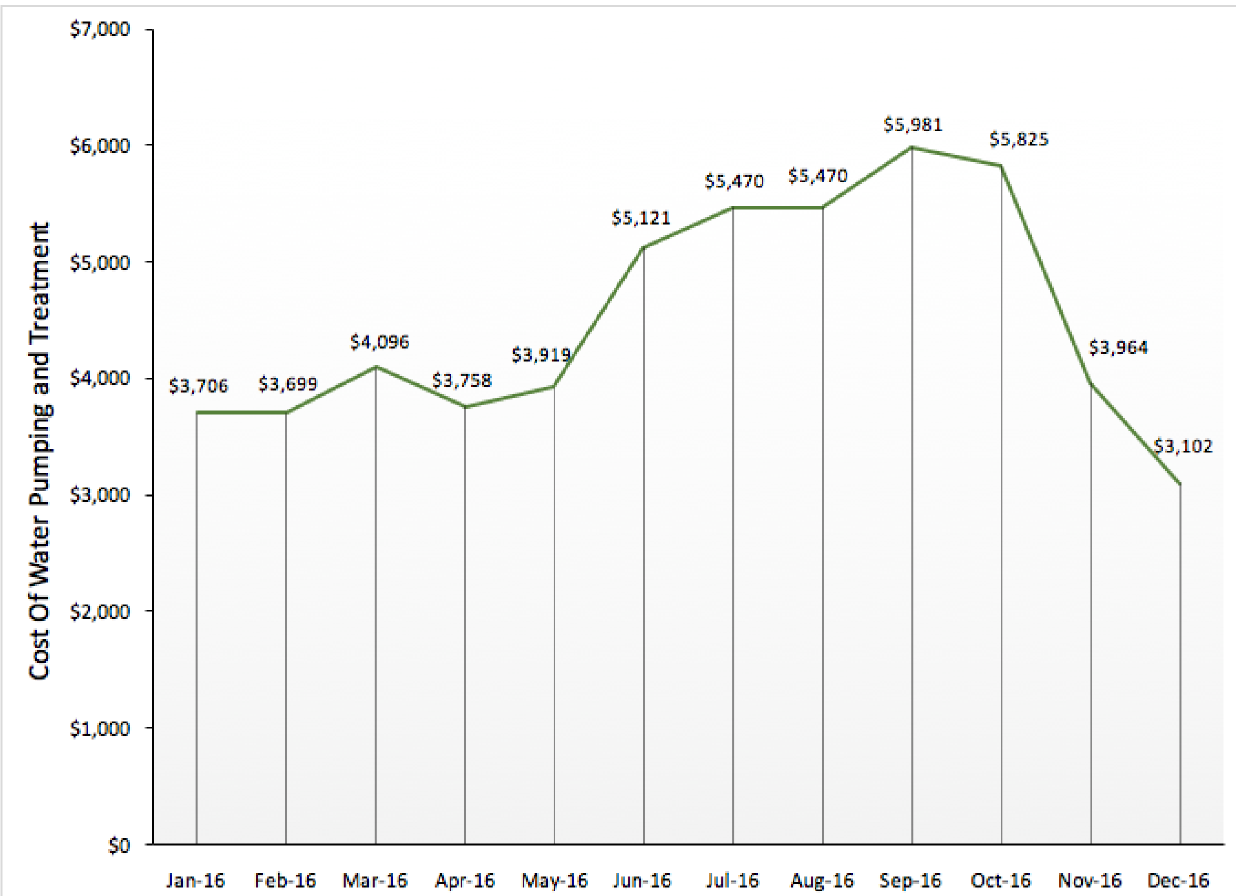

Figure 5. 2016 monthly costs of on-campus potable water pumping and chemical treatment (Source: Adkisson 2017).

2.3 Off-campus Usage

Due to the expansion of the university, a number of UM buildings are located beyond the main campus limits. These off-campus buildings receive utilities from the City of Oxford, and usages can be tracked through the monthly billing system provided by Facilities Management. Figure 6 shows the volume of potable water used in 2016 for off-campus UM buildings. The total off-campus usage for 2016 was approximately 34,000 gallons. A few examples of these off-campus buildings include the Ford Center, the Jackson Avenue Center, and the Baseball Stadium.

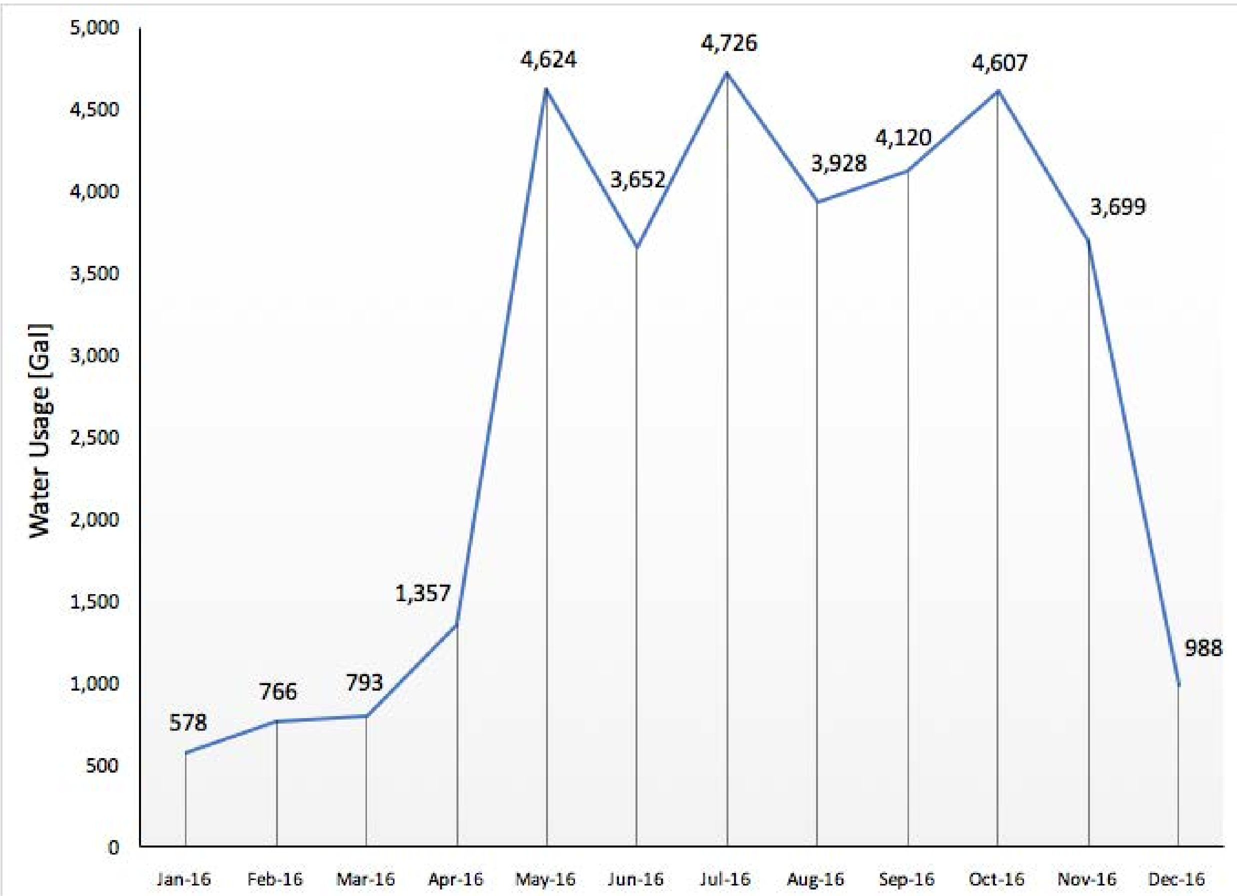

Figure 6. 2016 monthly volume of water pumped off-campus (Source: Bolen 2018)

While the numbers in Figure 6 are not considerably high (compared to on-campus water usage), the costs associated (shown in Figure 7) are worth noting. With continual expansion of academic buildings outside of the campus, the costs summarized here can be expected to rise. The total off-campus cost of drinking water for 2016 was about $15,000, for a per gallon cost of $0.44, or 44 cents/gallon.

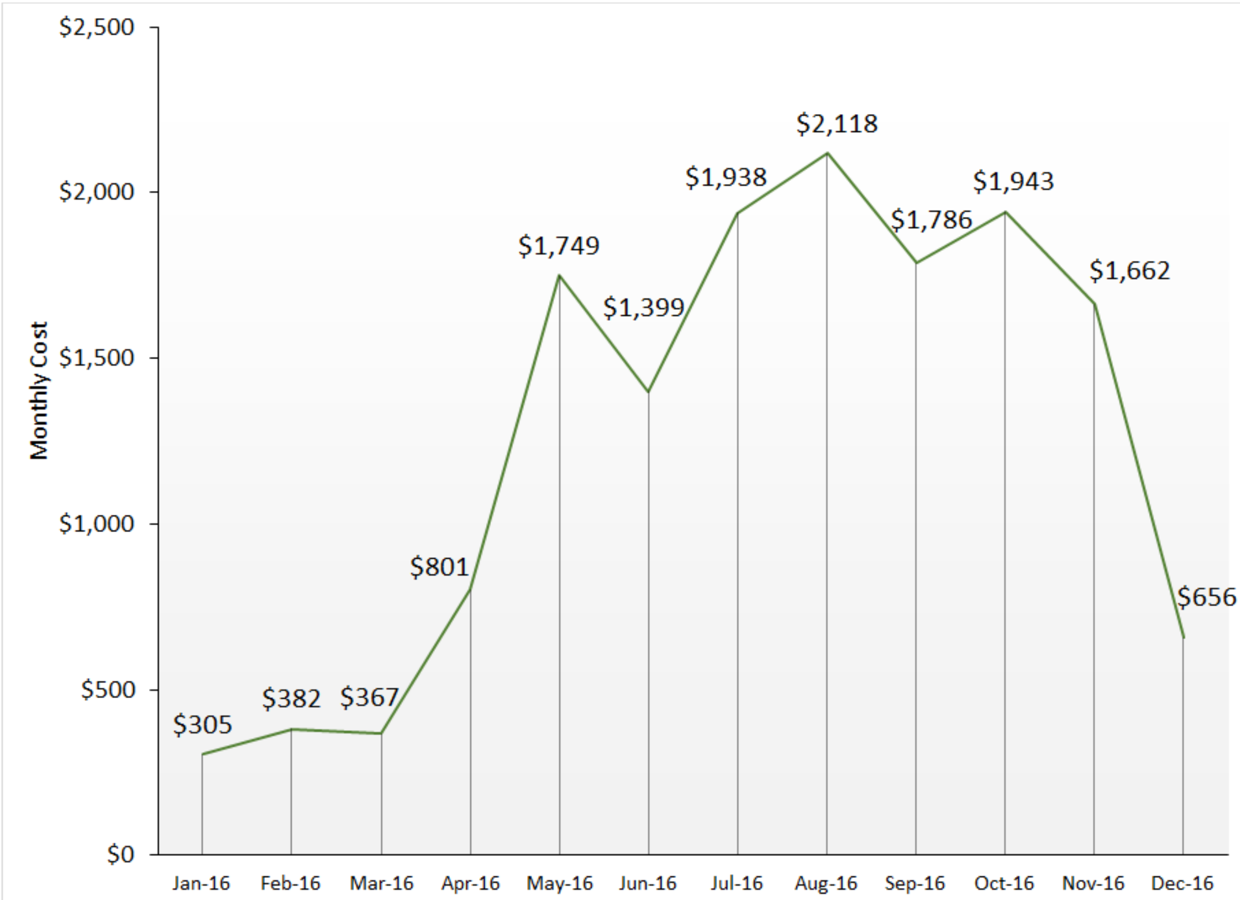

Figure 7. 2016 monthly cost of off-campus water usage (Source: Bolen 2018)

2.4 Use by Athletics

Athletic facilities are a large consumer on campus. The fields that the University athletes play on must be kept to the highest standards, and the athletes themselves must be kept hydrated during summer practices and during the regular season. The University supplies most of the water for the athletic buildings and fields. One of the biggest consumers of water, as seen in Figure 4, is the football field. In 2016, the University's football stadium was converted from artificial turf to an all-grass field. Irrigation of the all-grass field explains the large volume of water used at the stadium. Per Figure 4, the baseball stadium is not supplied by the campus water.

2.5 Hydration Stations

The UM Office of Sustainability, in efforts to reduce plastic water bottles used on campus and thrown away, introduced hydration stations in many campus buildings. The hydration station is an extension of the water fountain that is used to refill water bottles around campus. The hydration stations used on the UM main campus are manufactured by Elkay, the same manufacturer as most of the water fountains on campus. The University has installed 40 hydration stations at the time of this writing (see an example in Figure 8). The University installed the first four hydration stations in 2011. A feature of the hydration stations is that they keep a count of the number of 12.5 oz plastic bottles saved as users refill their bottles. The Office of Sustainability started keeping a record of the counter numbers in 2014. There have been some recording errors, but we can conclude that since 2011, a minimum of 179,000 gallons of on-campus water has been used for refilling bottles thus far the University, an equivalent of 1.83 million plastic bottles.

Figure 8. Hydration station in Brevard Hall.

2.6 Recommendations for Potable Water

1. Coordinate water usage among the different units on campus that use and track water.
2. Expand installation of the Toro Sentinel irrigation systems to better track irrigation water usage. Configure the systems so that the volume of water used can be tracked.
3. Install water meters in all buildings, prioritizing installation in the higher-use and older buildings.
4. Install water meters to track make-up water in the chill water loop.
5. Adopt a campus-wide improved leak detection and repair policy that institutes preventative leak investigation rather than focusing primarily on quick fixes.
6. Continue to monitor and repair pipe leaks.
7. Continue to install hydration stations.

3.0 Wastewater

In addition to treating and pumping its drinking water, the University of Mississippi operates its own wastewater treatment plant, which underwent significant renovations in 2017. The facility, while smaller than most municipal plants, can treat up to 1 million gallons of wastewater per day. However, the average daily rate is about half of that.

3.1 Background on Wastewater

Wastewater, also known as sewage, is any water that is discharged from residences, businesses, or industry. Typically, for residences and businesses, this comprises the water that goes down drains, toilets, showers, etc. For factories and manufacturing plants, wastewater can consist of all the previous and rinse water used in mechanical processes that becomes contaminated. Wastewater is collected through a massive grid of sewer pipes. Every parcel of land typically has at least one lateral pipe that connects all the plumbing from that building to this system. From there, these “collector” pipes feed into large diameter pipes (interceptors) that take all the sewage directly to the local wastewater treatment plant. Sewer pipes predominantly rely on gravity to convey flow, so no pumps are usually necessary. This is beneficial for cost efficiency but requires careful planning when installing or rehabilitating. In areas where gravity-based flow cannot be achieved, pump stations can provide the needed head pressure to continue flow through pressurized pipe systems. Because wastewater is contaminated, it must be treated before being discharged into a receiving water body.

Once the sewage reaches a local wastewater treatment plant, the following are the processes used for treatment. Pretreatment consists of micro-straining, to remove trash and large particles, as well as a settling in a tank named the grit chamber, to let material, such as sand, silt, broken glass, sink to the bottom. The wastewater then proceeds to an equalization basin, which is a large tank that holds the wastewater and lets it out for further treatment at a consistent flow rate. Equalization basins are particularly common in facilities that experience significantly varying flow rates. The UM plant has to overcome this issue on a regular basis. Large sporting events bring on significantly large flow rates of wastewater, while particular days in summer can bring extremely low rates. Following the equalization basin, the wastewater then undergoes primary treatment, which includes settling and separating all suspended particles in large basins known as clarifiers. The next step is secondary treatment, where the wastewater goes through an activated sludge tank where organic matter (mainly food waste and feces) decays through a biological process and is rendered inert. Lastly, the wastewater proceeds to disinfection, a process that seeks to reduce the remaining microorganisms to an acceptable level required by the discharge permit issued by the Mississippi Department of Environmental Quality (MDEQ). Following disinfection, the treated wastewater is discharged into a creek. Figure 9 is a view of UM’s wastewater treatment plant.

Figure 9. University of Mississippi wastewater treatment plant.

3.2 On-campus Wastewater

The average daily wastewater per month of 2016 entering the Ole Miss wastewater treatment facility was provided by David Adkisson (2017) of Facilities Management. These averages were then converted into monthly totals to generate Figure 10. The summer months have reduced flow due to the lack of students on campus during that time. While the absence of students during the summer does not decrease the potable water usage (reduction of student consumption is compensated by the increase in irrigation), the wastewater flow rate is significantly affected. In fact, the plant needs as much wastewater as it can get during these months in order to remain operational. Also, because wastewater treatment plants need a minimum flow rate to be efficiently operated, low-flow water fixtures in building may disrupt operations. Therefore, there needs to be coordination of water-saving measures with the operators of the wastewater treatment plant.

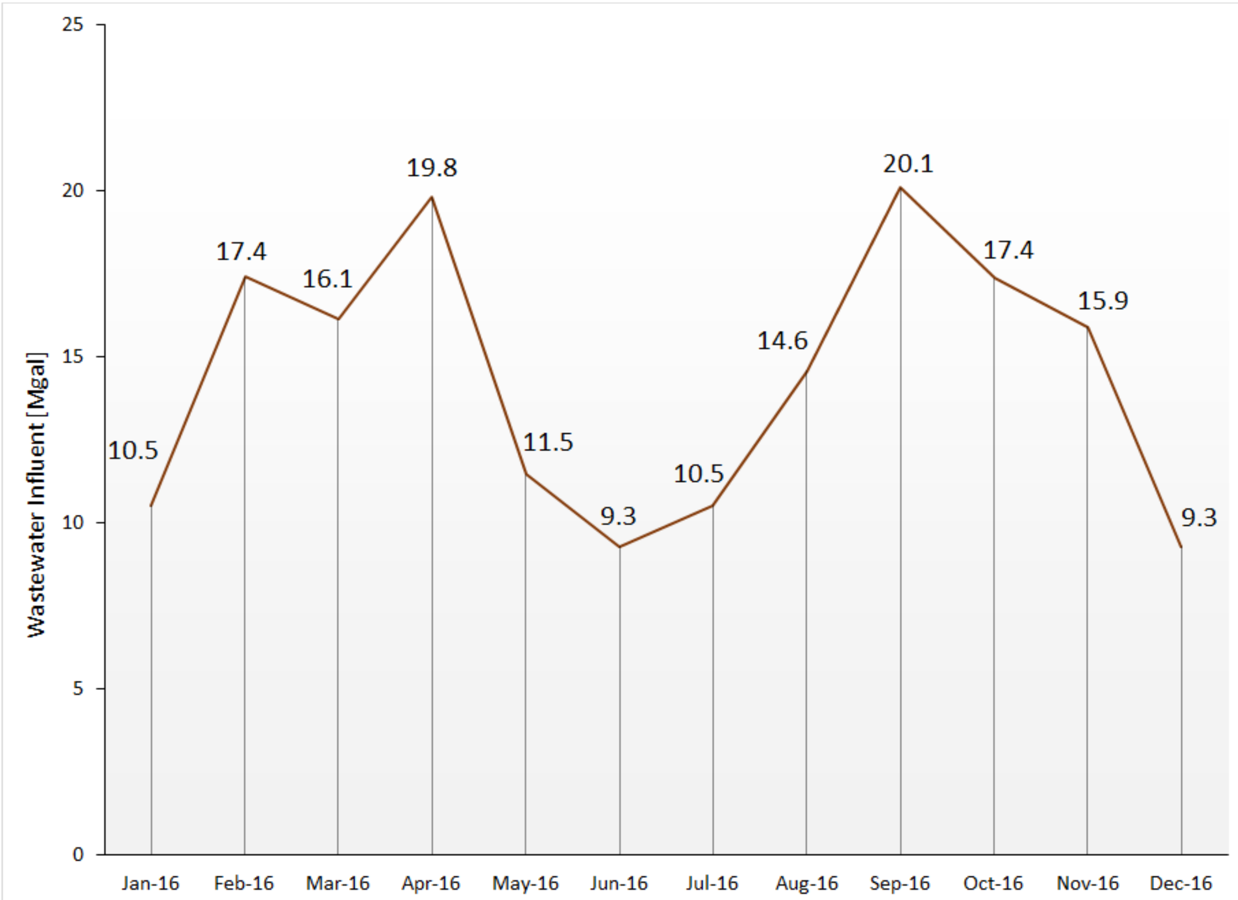

Figure 10. 2016 monthly volume of wastewater treated at the UM wastewater treatment plant (Source: Adkisson 2017)

3.3 Off-campus Wastewater

Off-campus buildings pay sewage fees to the City because their wastewater is sent to the Oxford wastewater treatment plant. Figure 11 shows the costs for each month for the off-campus buildings, a total of $6000 for 2016.

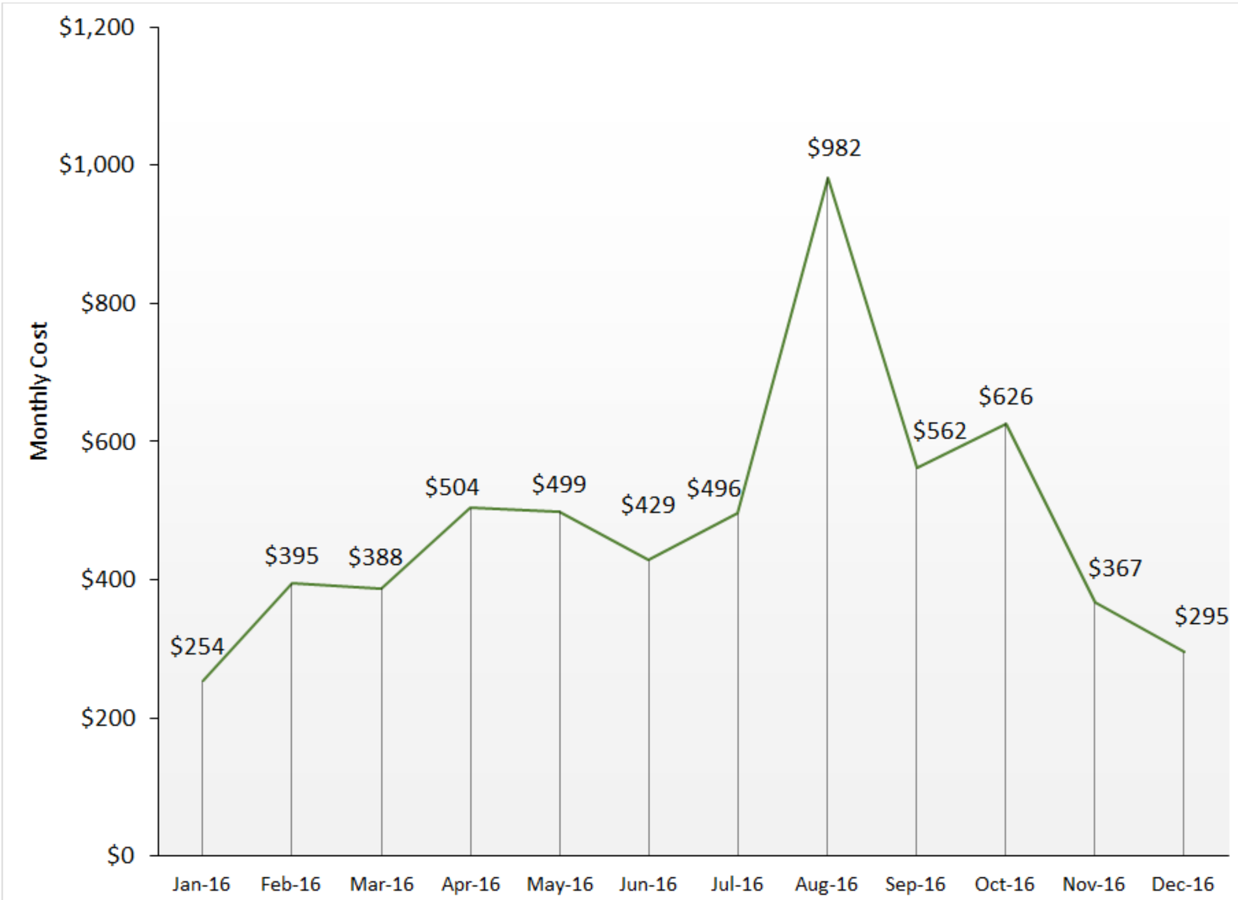

Figure 11. 2016 monthly costs of off-campus wastewater (Source: Bolen 2017)

3.4 Recommendations for Wastewater

1. Conduct a feasibility study to use treated wastewater as reclaimed water. Reclaimed water is wastewater that has been treated to higher standards, which allows for reuse as non-potable water. Areas where this could be applied are irrigation and heating/cooling make-up.
2. Communicate with wastewater treatment plant operators when installing low-flow fixtures because lower flow rates affect the performance of the wastewater treatment plant.

4.0 Stormwater

The water cycle (Figure 12) consists of four major components: precipitation, evaporation, runoff, and infiltration. When precipitation hits the ground, the water either is absorbed into the soil and then stored in groundwater aquifers (infiltration) or runs over the land and discharges into water bodies (runoff). As communities grow and the landscape is developed into a built environment, much of the volume of water that once infiltrated into the ground becomes stormwater runoff because of the newly-built impervious surfaces, such as rooftops, sideways, and roads. These surfaces do not allow water to pass through and infiltrate into the soil to replenish the aquifer. The additional volume of stormwater runoff can cause floods. Civilizations have developed storm drainage systems throughout towns and cities to combat the effects of flooding. These storm drainage systems consist of ditches and underground piping that discharge stormwater into lakes, streams, and the ocean. However, fast-moving stormwater discharged into these water bodies can cause erosion or land and stream banks and can be harmful to the local ecosystem because the stormwater runoff can pick up pollutants and spread them to the waterbody. A solution to these problems is to make modifications to traditional drainage systems to make them capture a large part of the stormwater runoff and treat it. The runoff then can be reused for a number of activities, such as irrigation.

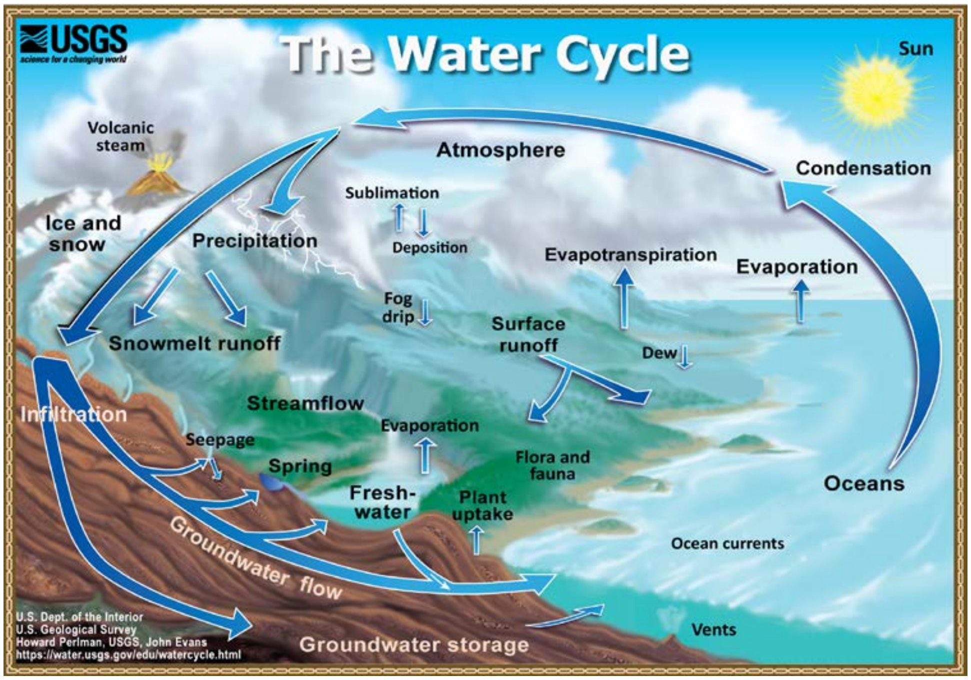

Figure 12. Typical water cycle. (USGS 2017)

4.1 Rainfall

Rainfall is precipitation in liquid form. In an effort to assess the potential volume of stormwater that could be reused on campus, we first examined the amount of rainfall that fell over the main campus in 2016. The National Oceanic and Atmospheric Administration (NOAA) website was used to download rainfall data for 2016. The NOAA weather station is located on the University campus, and the data are shown in Figure 13. Rainfall amounts are typically recorded in units of inches, which represent the depth of rain that has fallen into a tube-like rain gauge or even the entire campus area. 48 inches of rain fell on campus in 2016.

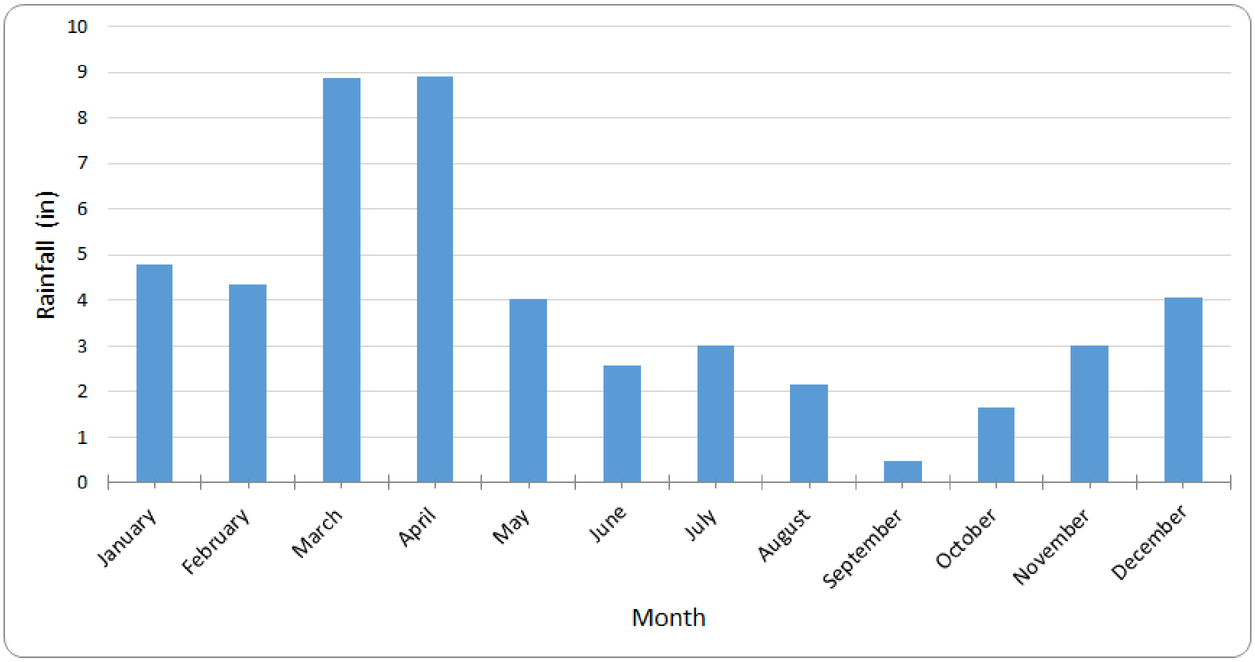

Figure 13. 2016 University of Mississippi rainfall data (NOAA 2016).

4.2 Stormwater Runoff

To determine how much stormwater on campus can result from the amount of rain, we had to determine the imperviousness of the land and buildings on campus. Using GeoMedia Pro Software and Google Earth Imagery, features in GeoMedia Pro were used to calculate the area of pervious and impervious surfaces on the main campus. Once the types of areas on campus were found (Figure 14 and Table 1), we used the Natural Resources Conservation Service (NRCS) Curve Number (CN) Method to estimate the volume of runoff that could be potentially generated in 2016. The CN is a number that represents the imperviousness of the main campus as a whole (NRCS 2004). The NRCS is a branch of the U.S. Department of Agriculture charged with protecting natural resources, including stormwater. The breakdown of types of areas to which assign CNs is show in Figure 15. The results of the CN method are shown in Figure 16, which shows the volume of runoff the campus would experience on a monthly basis. In total for 2016, there would be 27 inches of stormwater runoff, which, when multiplied by the area on campus is converted to 487 million gallons or 1500 acre-feet (ac-ft) of water in 2016.

This large amount of water must be managed, and many drainage projects seek to manage stormwater so that it is piped away from campus (ESI 2014 and ESI 2015). Smaller projects are dedicated to green infrastructure to facilitate infiltration of stormwater into the ground. If feasible, a large amount of stormwater could also be reused.

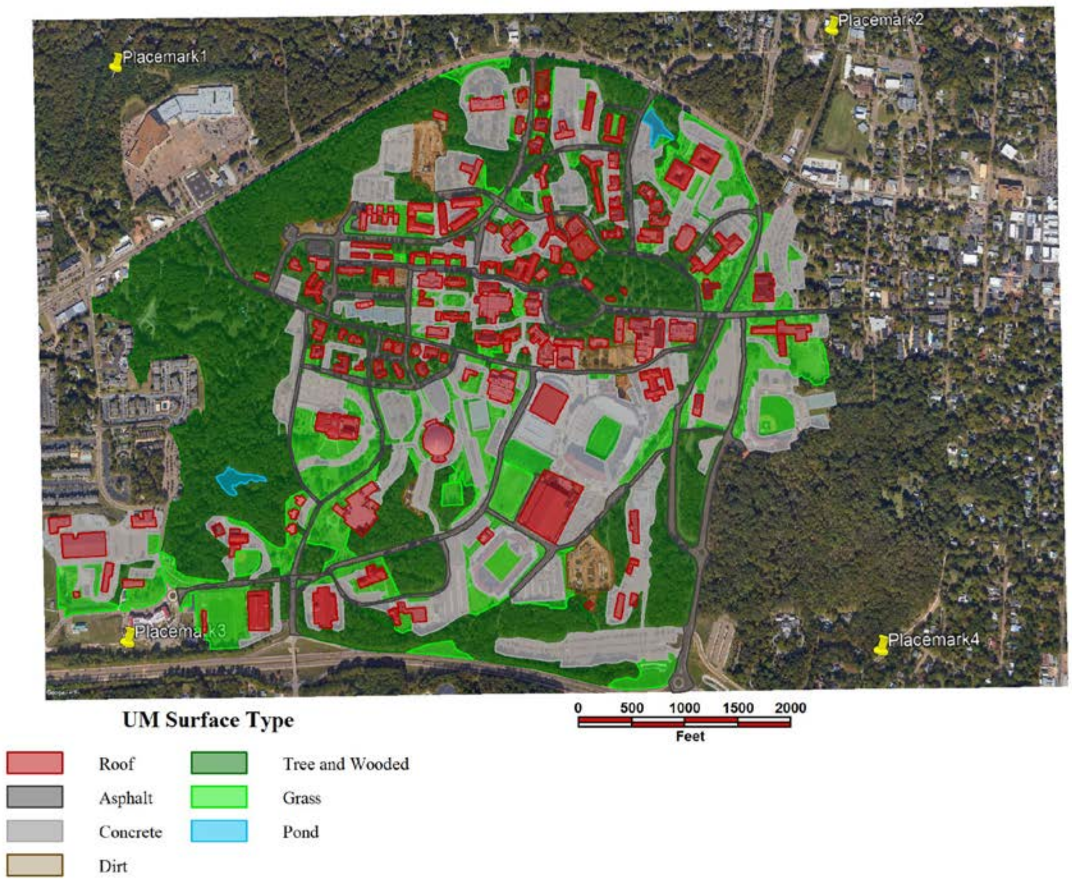

Figure 14. 2016 University of Mississippi main campus pervious and impervious surface mapping.

Table 1: 2016 University of Mississippi main campus surface types and areas.

Surface type	Area (sq ft)	Area (ac)
Roof	3,090,310	70
Asphalt	2,341,170	53
Concrete	7,361,555	169
Grass	4,760,279	17
Tree and Wooded	10,411,486	109
Dirt	753,660	239
Pond	81,163	1
Total	**28,799,627**	**661**

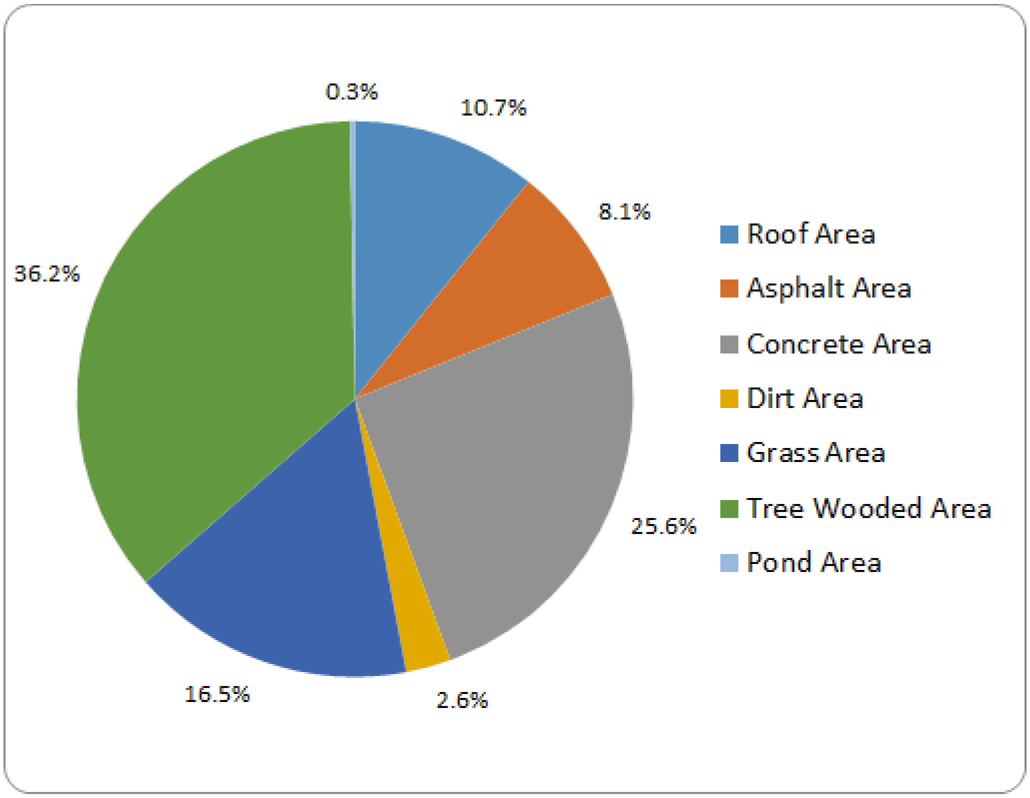

Figure 15. 2016 University of Mississippi Surface types by percent of area.

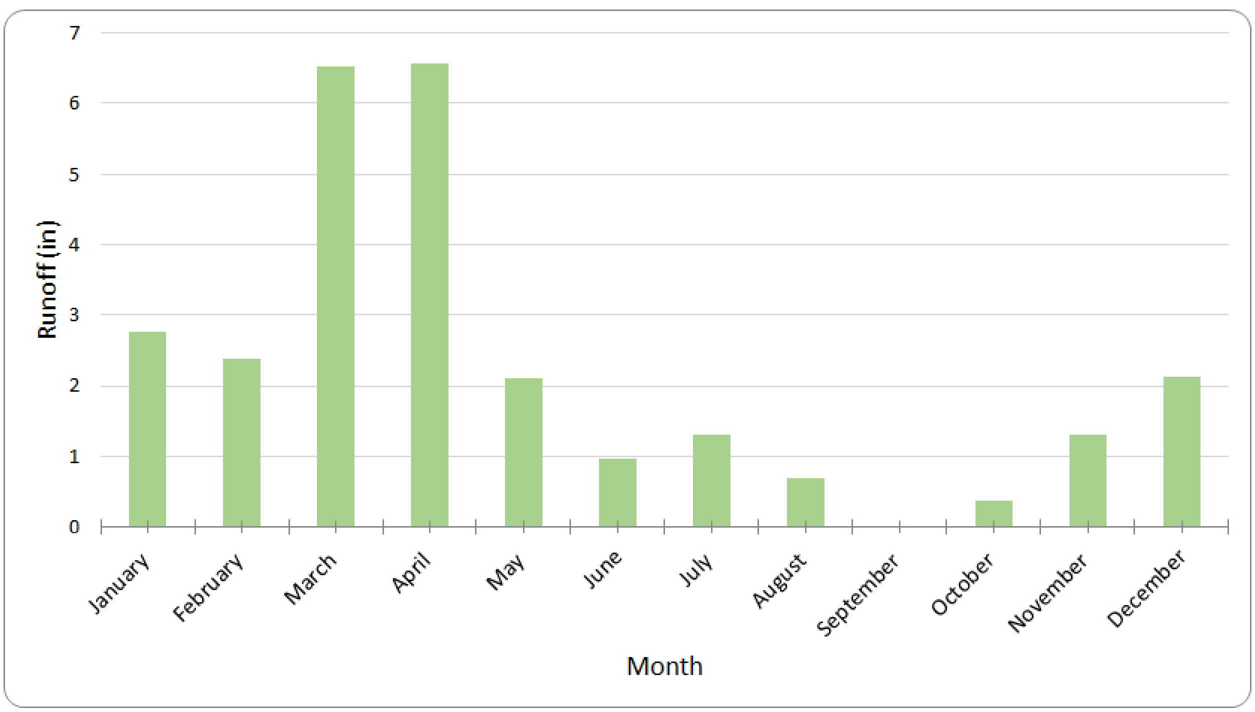

Figure 16. 2016 University of Mississippi estimated stormwater runoff.

4.3 Recommendations

1. Reduce stormwater runoff and facilitate infiltration by installing bioswales and rain gardens.
2. Use cisterns to collect rainwater and use the water to irrigate.

5.0 ASSHE STAR System

The Association for the Advancement of Sustainability in Higher Education (AASHE) has a self-reporting system for universities to measure their sustainability performance called the Sustainability Tracking, Assessment & Rating System™ (STARS) (AASHE 2017). Two credits under STARS relate to water: Operations (OP) 22 Water Use and OP 23 Rainwater Management. In the sections below, we report on the measurements that are possible based on the research for this Campus Water Footprint report.

5.1 OP 22: Water Use

STARS OP 22 aims to encourage institutions to reduce their water usage. For the UM campus, water usage relates to the on-campus and off-campus potable/drinking water supply. The grading system is separated into three different parts, each looking at weighted campus users, floor area, and vegetated ground versus potable water usage, respectively. A total of 4-6 points are available, and each part is graded individually. Specifically, the method compares a baseline year to the current performance year with a goal of achieving a 30 percent or larger reduction in water usage per campus user/floor area/vegetated ground for maximum points.

In addition, the points are also weighted based on scarcity and stress of water in the institution's location (low risk can only earn up to 1 ⅓ points per part whereas high risk can earn up to 2 points per part). Since Oxford, the surrounding area, and the regional aquifer do not currently bear any issue of scarcity, the appropriate risk category would have to be "low and low to medium risk" (World Resources Institute 2018).

Part 1:

$$Points\ earned = [E/0.3] \times \{[(A/B) - (C/D)]/(A/B)\}$$

where,

A = Potable water use, baseline year = 342,400,000 gallons in 2016

B = Weighted campus users, baseline year = 21,291 in 2016

C = Potable water use, performance year (to be determined)

D = Weighted campus users, performance year (to be determined)

E = Points available for Part 1 = 1.33 (low and low to medium risk)

Part 2:

$$Points\ earned = [E/0.3] \times \{[(A/B) - (C/D)]/(A/B)\}$$

where,

A = Potable water use, baseline year = 342,400,000 gallons in 2016

B = Gross floor area of building space, baseline year = 6,550,000 square feet in 2016

C = Potable water use, performance year (to be determined)

D = Gross floor area of building space, performance year (to be determined)

E = Points available for Part 2 = 1.33 (low and low to medium risk)

Part 3:

$$Points\ earned = [E/0.3] \times \{[(A/B) - (C/D)]/(A/B)\}$$

where,

A = Potable water use, baseline year = 342,400,000 gallons in 2016

B = Area of vegetated grounds, baseline year = 366 acres in 2016

C = Potable water use, performance year (to be determined)

D = Area of vegetated ground, performance year (to be determined)

E = Points available for Part 3 = 1.33 (low and low to medium risk)

Given that the UM is just beginning to implement STARS, there is no performance year to compare to the baseline year 2016. However, the equations above can be used in a future year.

5.2 OP 23: Rainwater Management

UM has implemented many types of green infrastructure across the main campus. Such infrastructure includes rain gardens, bioswales, pervious concrete and detention/retention ponds. Rain gardens, pervious concrete, and detention/retention ponds are used to increase the time that water can infiltrate through soil and replenish local aquifers. Bioswales are also used to reduce the amount pollutants that end up in local watersheds. Through the use of vegetation or riprap, water is slowed to maximize the time spent in the bioswale and to slow pollutants down enough to get caught in the vegetation or riprap. The rain garden on campus is located next to Crosby Hall and is maintained by Landscape Services. The bioswale is located next to the Gertrude Ford Center and is also maintained by Landscape Services. The pervious concrete is located in the parking lot of the Law School but has been known to clog with leaf litter. There are two detention ponds on campus, one located near the Law School and one across from the Gertrude Ford Performing Arts Center. Finally, Silver Pond is a retention pond located at the corner of Sorority Row and Jackson Avenue. There are plans for the future to incorporate cisterns in some new buildings.

With the current standing of the campus, UM would earn a 0.5 out of 2 for the campus STAR rating. The campus is currently considered an "Institution [that] uses green infrastructure to manage rainwater and employs LID [low impact development] practices on a case-by-case basis or for demonstration projects (i.e., in the absence of formal policies, plans, or guidelines" (ASSHE 2017). To earn a rating of 2, the University would need to have "comprehensive rainwater management policies, plans or guidelines that incorporate green infrastructure, cover the entire campus, and mandate the use of LID practices for all new construction, major renovation, and development projects" (ASSHE 2017).

The University of Mississippi's Instructions to Design Professionals does not provide guidelines that incorporate green infrastructure. Two paragraphs that allude to higher performance and sustainability that could include stormwater are the following, under Section 5 (UM Department of Facilities Planning 2017):

3. High Performance Building Requirements

The University of Mississippi is unable to pursue registered LEED projects. However, the design principles contained in much of the LEED program continue to be relevant as we seek to achieve energy efficient and environmentally sensitive buildings that exceed the academic goals of the university community. Design professionals are encouraged to apply principles that result in high performance buildings visually responding to the context of this historic campus.

4. Mississippi Institutions of Higher Learning Sustainability Policy

All new construction and major renovation projects must be in strict accordance with the Mississippi Institutions of Higher Learning Sustainability Policy found on the IHL website. http://www.mississippi.edu/facilities

6.0 Conclusions

This first University of Mississippi Campus Water Footprint Report provides baseline information on water usage and discharge on campus. Much of the information is kept in decentralized offices that do not often communicate with one another. For water efficiency, the campus would benefit from more integrated water management. The Recommendations sections under Potable Water, Wastewater, and Stormwater provide some future actions. The AASHE STAR System section provides baseline information needed for a future report to AASHE.

7.0 References

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Green Restaurant Association

Find Certified Green Restaurants®

Restaurant	Certification	Phone	Street	City	State	Zip
Catering at University of Mississippi	1 Star	662-915-7041	144 Johnson Commons	University	MS	38677
Lenoir Dining	1 Star		Lenoir Hall	University	MS	38677
The Rebel Market at University of Mississippi	1 Star	662-915-7185	144 Johnson Commons	University	MS	38677

Lenoir Dining: The *First* Green-Certified Restaurant in Mississippi

Overview:

With the University of Mississippi (UM) being "Red, Blue, & Green," it is only natural that the Department of Nutrition and Hospitality Management (NHM) move forward on gaining certification through the Green Restaurant Association (GRA) for Lenoir Dining, the student-operated restaurant in Lenoir Hall. Currently, there are no restaurants in the state of Mississippi that are green-certified. Other universities, including to Boston University, Harvard University, Northeastern University, University of Connecticut, Colorado University-Boulder, and University of New Hampshire, have green-certified restaurants through the GRA. By gaining and maintaining certification, Lenoir Dining will demonstrate *best-practices* for students entering the hospitality and nutrition industries. In addition to being an ideal teaching/learning tool for students, faculty, staff, industry, and visitors to the university will see *best practices in action* at the "Red, Blue, & Green" Lenoir Dining.

Purpose and Goals:

In an effort to teach best practices in the fields of hospitality management and nutrition, while conserving energy, water, and other resources, the purpose of the grant is to gain and maintain "two star" certification through the GRA for Lenoir Dining, http://dinegreen.com/restaurants/standards.asp. Lenoir Dining will be the *first* green certified restaurant in the state of Mississippi and only one of a small percentage of total restaurants certified in the country. The goal would be to begin the certification process upon receiving the grant, with the outcome of being certified within one year of grant receipt. The restaurant will need to make paradigm shifts in terms of procurement, waste management, energy conservation, sustainability, and other initiatives to meet and to adhere to the guidelines set forth by the GRA. In doing so, the restaurant will expand its ability to teach students in NHM best practices on foodservice operations with environmental considerations, keeping inline with UM's focus on establishing a "Red, Blue, & Green" campus.

Details and Timeline:

The GRA certification process entails goals in five distinct areas of the operation; Water Efficiency, Waste Reduction and Recycling, Sustainable Furnishings and Building Materials (not applicable to existing operations), Sustainable Food, Energy, Disposables, and Chemical and Pollution Reduction. For an initial two star certification, a minimum of ten points must be earned in each area, with an additional 40 points from any of the areas on top of the ten point minimum. Based on a review of the facility, there are a number of capital improvements that must be completed for the facility to earn the certification. Fortunately, our existing operation will earn points for procedures that are all ready in place. However, there are a number of areas where improvement is needed.

Prior to the initial audit to be completed, upon acceptance of the grant, improvements will need to be completed as follows:

Water Efficiency:

Flow Rate adaptors on all sinks in the kitchen (5) and bathrooms (10)
Foot pedal controlled hand wash sinks (2)
High Efficiency Toilets (5)
Touchless Sensor Faucets in bathrooms (10)

Waste Reduction and Recycling:

The restaurant will need to adopt the recycling programs currently on campus for:

Plastic, glass, and aluminum
Cardboard and paper
Composting

In addition to adopting the recycling program, the vendor billing will need to become paperless if at all possible.

Sustainable Furnishings and Building Materials (not applicable to existing operations):

Because we are an existing facility, this category does not apply to our certification.

Sustainable Food:

To earn the minimum point requirement in this category, procurement will need to be revised to include local products whenever possible. There will not need to be any capital investments to revamp our procurement systems.

Energy:

Window to be covered in solar blocking film (1)
Energy Star ceiling fans for dining room (2)

Disposables:

We will need to change our procurement specifications to only use biodegradable take out containers, cups and tableware. There will be no capital investment requirements for this upgrade.

Chemical and Pollution Reduction:

Many of the universities transportation services cover this requirement including the shuttle service and our bike friendly campus
LEED standard fluorescent bulbs will need to be used in the facility using the existing lighting fixtures (40)
Vegetable based inks and toners for paper printing. There will be no capital investment for this change.

Prior to year three, to increase certification standards, improvements will need to be completed as follows:

Upgrade all water heating systems for the restaurant to be tankless.

Upgrade all cleaning supplies and hand soaps to meet GRA standards (no capital investment)

Prior to year six, to increase certification standards, improvements will need to be completed as follows:

TBD

Through student audits each semester, improvements will be identified and addressed to maximize GRA standards at a minimum cost investment.

Budget:

The department has agreed to fund GRA membership costs <u>after</u> the initial five-year membership, as well as 10% of all costs associated with capital improvements and initial GRA annual dues.

Year	Item	Labor Estimate	Capital Investment	Total
1	Five-year Membership to the GRA	0	2500	2500
	Flow Rate Adaptors	200	200	400
	Foot Pedal Controls for Hand Wash Sink	200	900	1100
	Touchless sensors for Bathroom Faucets	500	2500	3000
	Window Solar Blocking Film	50	75	125
	Energy Star Ceiling Fans	50	200	250
	LEED Standard Bulbs	20	80	100
2	Tankless water heating systems	400	1800	2200
3	None			0
4	None			0
5	TBD- $1000 Capital Investment fund to be returned if not required	0	1000	1000
			Total	10675

Student Engagement:

Because the lab is student-operated by students in both Nutrition and Dietetics and Hospitality Management undergraduate programs, along with graduate students as either learners (Dietitian Education students completing a "Fine Dining and Staff Relief" Rotation) or teaching assistants, all undergraduate students earning a degree and all graduate students in the Dietitian Education Program will learn firsthand what is required to achieve, maintain, and improve green and sustainable restaurant practices on a daily basis. Students will need to design menus and recipes that adhere to the "sustainable food" requirements of the certification. Additionally, operational improvements from an ecological and financial perspective will be incorporated into the classroom lectures and laboratory experiences. Students will assist in the evaluation and planning process to increase "GreenPoints" each semester.

Product Evaluation:

The proposal will be evaluated on an annual basis with the goal of obtaining the GRA requirement of 160 GreenPoints after six years.

Year 1:	Achieve "Two Star" Certification through the GRA by maintaining a minimum of 100 GreenPoints through their certification standards
Year 2	Adopt initiatives to be at a minimum of 115 GreenPoints working toward the three-year requirement of 130 GreenPoints
Year 3	Continue with operational improvements to meet the 130 GreenPoint requirements to maintain certification
Year 4	Adopt initiatives to be at a minimum of 140 GreenPoints working toward the six-year requirement of 160 GreenPoints
Year 5	Adopt initiatives to be at a minimum of 150 GreenPoints working toward the six-year requirement of 160 GreenPoints
Year 6	Reach the 160-point requirement to maintain GRA certification.

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Conflict of Interest:

To my knowledge, there is not a conflict of interest by any of the participants of the proposal.