

**Utility Fact Sheet**

**University Park Campus**

**OPP-UFS-UP: 2015**

**Steam Boiler Plants:**

Steam is generated at high pressure (250 psi) from coal-fired and gas-fired boilers at two locations. Low-pressure steam is generated by steam turbines in the West Campus Steam Plant. The turbines utilize high-pressure steam as a power source and are set to exhaust at 13 psi. Summer plant operation yields a typical load of 80,000 lbs/hr @ 250 psi. A typical winter operation yields an average load of 250,000 lbs/hr @ 250 psi. In each case, approximately 50% of the steam generated is delivered to campus at 150 psi, after being reduced at the West Campus Steam Plant and also from the East Campus Steam Plant, and 50% of the steam generated is delivered to campus at 13 psi is only being produced at the West Campus Steam Plant. The peak load on the steam plants to date of approximately 433,300 lbs/hr occurred on 02/06/2007 when air temperatures approached -7°F for approximately one hour.

Peak steam load served during FY14/15: **424,000 lbs/hr**

Peak steam during FY14/15 occurred on: **02/20/2015**

Total steam production for FY14/15: **1,364,955,947 lbs**

Total electric production for FY14/15: **66,603,462 kWh**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Steam Generation** | **Steam Flow, kpph** | **PSI/ºF** | **BTU/Lb** | **Firm Capacity\*** |
| **WCSP** | **Type** | Name Plate | Proven |   |   | minus 1 WCSP Boiler | minus 1 ECSP Boiler |
| Boiler 1 | Coal |  110,000  |  90,000  |  250/530  | 1,290 | - | 90,000 |
| ~~Boiler 2\*\*~~ | - | - | - | - | - | ~~-~~ | ~~-~~ |
| Boiler 6 | Coal |  120,000  |  90,000  | 250/530 | 1,290 | 90,000 | 90,000 |
| Boiler 8 | Coal |  110,000  |  90,000  |  250/530  | 1,290 | 90,000 | 90,000 |
| ~~Boiler 5\*\*~~ | - | - | - | - | - | ~~-~~ | ~~-~~ |
|   |   |  340,000  |  270,000  |   |   | 180,000 | 270,000 |
| **ECSP** |  |   |   |   |   |  |  |
| Boiler 1 | Gas/Oil |  100,000  |  75,000  |  250/406  | 1,202 | 75,000 | 75,000 |
| Boiler 2 | Gas/Oil |  100,000  |  75,000  |  250/406  | 1,202 | 75,000 | 75,000 |
| CT/HRSG\*\*\* | Gas/Oil |  117,000 |  107,000 | 250/406 | 1,202 | 107,000 | - |
|   |   |  317,000  |  150,000  |   |   | 257,000 | 150,000 |
|   |   |  **657,000**  |  **555,000**  |  |  | **437,000** | **420,000** |

 \* The Firm Capacity, by definition, is the total with the largest boiler off-line.

\*\* WCSP Boiler 2 last operated in April 2014, WCSP Boiler 5 last operated in August of 2013. Both are being removed as part of the WCSP MACT Upgrade/Gas Conversion Project

 \*\*\* Steam flow is limited to 32,000 #/hr. when firing on oil.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Electricity Generation** | **Qty.** | **Capacity/Type** | **Psi / ºF in** | **Psi / ºF out** | **1b/KWH Max** |
| West Campus Steam Plant | 1 | 2200 kw / Steam Turbine | 250/530 | 13/246 | 27.0 |
| West Campus Steam Plant | 1 | 3000 kw / Steam Turbine | 250/530 | 13/246 | 26.8 |
| East Campus Steam Plant | 1 | 7000 kw / Generator  |   |   |   |
| Peak Output |   | 12,200 kw |   |   |   |
| Average Summer Output\* |   | 8,000 kw |   |   |   |

\* The electric output of the turbines is limited by the need for low-pressure steam or limitations in

our heating equipment to utilize low-pressure steam and not by the production capacity of the turbines.

The following events of significance occurred during FY13/14 at the Steam Boiler Plants:

* A new 20” high pressure steam main is being constructed from the ECSP to the Millennium Science Building. Completion is scheduled for fiscal year 14/15. - COMPLETE
* Design and permitting for West Campus Steam Plant MACT Upgrades/Gas Conversion continues. The demo of Boilers No. 5 and 2 were started and will complete in 14/15. - COMPLETE
* A project to re-tube the East Campus Steam Plant Boilers was initiated. - COMPLETE
* A project to return Condensate to East Campus Steam Plant was initiated. - COMPLETE
* A 12-inch high pressure gas line was installed from Porter Road to WCSP by Columbia Gas. - COMPLETE

**Steam Distribution:**

Steam consumption is by 250, 170 and 13-psi distribution systems. The 250-psi system is used to drive the turbine generators that produce the 13-psi steam while also co-generating electricity. Steam driven turbine feed water pumps, induced draft fans and forced draft fans are used in the boiler plant at 250 psi and also exhaust at 13 psi. The 170-psi system is used for process and heating loads throughout the campus. Process loads include lab use, sterilizers, distilled water, laundry, dining hall use, etc. For heating purposes, this steam is reduced to low pressure at the individual buildings. The 13-psi system is used for space heating, domestic hot water and absorption chillers throughout the campus. Due to system use and losses, the 13-psi system only delivers about 5 to 8 psi to the buildings during heavy load conditions in the winter months.

**Steam Condensate System:**

The steam condensate is gathered at the individual building level by a gravity return system to a building condensate pump. The building pump pushes the condensate into the campus return system. Most of the North and East areas of campus flow by gravity to the East View Condensate Pumping Station. From there the condensate is pumped to the West Campus Steam Plant. The Central campus area flows by gravity to Hammond Building, where it is pumped to the West Campus Steam Plant. The West campus is returned to the West Campus Steam Plant via a vacuum assisted pump. Approximately 25% of the campus condensate is now returned to the East Campus Steam Plant by gravity. Average return rate is 75%.

**Stack Emissions Control:**

A bag house filtration system is installed on the flue gas from the coal boilers to comply with the Department of Environmental Protection Standards. There are 2,112 gore-tex filter bags installed in eleven compartments designed to handle the 350,000 #/hr permitted capacity of the coal boilers. During FY05/06 the gore-tex filter bags were replaced for the first time since the initial baghouse installation in 1986.

**Other Power Plant Services Provided:**

Control air to main campus (Lab Quality): 3,000 SCFM @ 70 psi with a duty, standby and emergency compressor located at each steam boiler plant. (East Campus Plant & West Campus Plant)

**Campus Electrical System:**

Electricity for the Campus is supplied from four West Penn Power sub-stations at 12,470 volts. Each sub-station provides two dedicated feeders to the university with the exception of the Patterson Street substation which provides four feeders. The maximum import demand for the campus in FY14/15 was approximately 49.7 MW, an additional 6.2 MW being cogenerated.

|  |  |  |  |
| --- | --- | --- | --- |
| Substation ID | Voltage | **# Feeders** | **Available Capacity** |
| 1 | 12,470 | 2 @ 20 MW | Auto switched, 20 MW total |
| 2 | 12,470 | 2 @ 20 MW | Manual switched, 20 MW total |
| 3 | 12,470 | 2 @ 20 MW | Auto-switched, 20 MW total |
| 4 | 12,470 | 2 @ 20 MW | Manual switched, 20 MW total |
| 5 | 12,470 | 2 @ 20 MW | Auto-switched, 20 MW total |
| Steam Turbine 1 | 12,470 |  | Under ConstructionSteam flow dependent |
| Steam Turbine 2 | 12,470 |  |
| Combustion Turbine | 12,470 |  | 7 MWAir temperature dependent |

## Electrical Distribution System - Normal Power:

Electricity is distributed thru ought campus at 12,470 volts. 15mW of installed transformation reduces the 12,470 volts to 4,160 volts for an older part of the campus. All new facilities as well as newly renovated facilities are served from the 12,470 volt distribution system. The steam turbines at the West Campus Steam Plant generate power at 12,470 volts and operate in parallel with the utility power or in island mode in an emergency if utility power is not available. The combustion turbine generator is located at the East Campus Steam Plant. The combustion turbine can also operate in island mode if necessary.

## Electrical Distribution System - Emergency Power:

The emergency power is distributed at 4,160 volts to a significant number of campus facilities.

Automatic transfer switches at each building sense loss of normal power and transfer the building load life-safety load to the emergency system. The emergency systems are served from two 2,000 kW diesel generators.

Some buildings have a traditional emergency generator in lieu of a connection to the campus emergency circuit.

A second circuit, similar to the emergency system, provides power to the standby circuit on campus. That circuit serves critical research and legally required non-life safety backup power via transfer switching in buildings.

**Chilled Water System:**

A campus chilled water distribution system is relatively new compared with the other utility systems. The system has three chilled water production facilities connected to the distribution loop. The total system capacity when completed will be approximately 40,000 tons and will include an East Campus Chiller Plant, which is not yet into design. Many of the existing buildings still have their own chillers installed. An eventual connection to the campus distribution system will be made as selected building chiller plants are retired. There are approximately 135 air or water cooled chillers installed and maintained at University Park for process and air conditioning purposes ranging in size from a few tons to 1000 tons. These chillers represent approximately 25,000 tons of installed capacity. A second expansion of the North Campus Chiller Plant was completed in 2011 to bring the total number of chillers in the North Plant to 6. The second phase of expansions & modifications to the West Campus Chiller Plant were recently completed, which added a single, 3000 ton chiller.

Peak central chilled water load served during FY13/14: **13,500 tons**

Peak central chilled water load during FY13/14 occurred on: **07/18/2013**

Total central chilled water load production for FY13/14: **16,032,442 tons-hrs**

|  |  |
| --- | --- |
| **CHW Generation** | **Capacity** |
|  **Plant** | **Energy Source** | **Type** | **Refrigerant** | **Tons** |
|  **NCCP - North Campus Chiller Plant\*** |
|  Chiller 1 | Electric | Centrifugal | R134a | 1,500 |
|  Chiller 2 | Electric | Centrifugal | R134a | 1,500 |
|  Chiller 3 | Electric | Centrifugal | R134a | 1,300 |
|  Chiller 4 | Electric | Centrifugal | R134a | 1,300 |
|  Chiller 5  | Electric | Centrifugal | R134a | 1,500 |
|  Chiller 6  | Electric | Centrifugal | R134a | 1,500 |
|  **CHCP - Chemistry Chiller Plant**  |
|  Chiller 1 | Electric | Centrifugal | R134a | 1,300 |
|  Chiller 2 | Electric | Centrifugal | R134a | 1,300 |
|  Chiller 3 | Electric | Centrifugal | R134a | 1,300 |
| WCCP - West Campus Chiller Plant\*\* |
| Chiller 1 | Electric | Centrifugal | R123 | 1,000 |
| Chiller 2 | Electric | Centrifugal | R123 | 1,000 |
| Chiller 3 | Electric | Centrifugal | R134a | 1,300 |
| Chiller 4 | Electric | Centrifugal | R134a | 3,000 |
| **Total Capacity** | **18,800** |

\* The North Campus Chiller Plant has a potential future capacity of 12,000 tons.

\*\* The West Campus Chiller Plant has a potential future capacity of 13,500 tons.

**Chilled Water Distribution:**

Underground chilled water piping has been installed under the main road corridors that intersect campus including: Pollock Road, Shortlidge Road, Curtin Road, Bigler Road and McKean Road. Piping has also been installed from the West Campus Chiller Plant across Atherton Street. During FY06/07 loop additions were designed and installation was initiated in several areas. A branch was added to serve Reber, Hintz Alumni Center, EE East, EE West, and Deike. This branch is

designed to serve Hammond, Sackett, Hosler, and Steidle in the future. The branch serving Davey and Osmond was

extended to Chandlee. A branch was added along Bigler Road, under Park Avenue to serve the Katz Building. A

branch was added to serve Wartik, Althouse, and Buckhout. The extension of the main was added in the northwest corner of campus in summer of 2009 that connected Arts Building, Cedar Building, and Keller Building, Gary Schultz Child Care Center and the Moore Building Addition. These new mains will have the capacity to serve all existing buildings in this area in the future, including Ford, Rackley, Mateer, Chambers, Kern, and Carpenter Buildings. Old Main and White Building were connected to the campus chilled water system in 2012. Piping was extended under Curtin Road in 2012 to connect the IM addition and Shields. Piping was also extended to McKean Road and connected Redifer Dining Hall, Haller/Lyons Dorm and the new dormitory building, Chace Hall. The HUB, Bookstore, Grange and Pegula Ice Arena were also added to the campus chilled water system in 2013. New 24” underground piping was added in 2014 between the mains near Pond Building and the Forum Building, creating a new “loop” in this part of the system. In the process, piping was taken into Mueller Building, and the existing underground piping between the Library and the Pasquirilla Center was connected. Buildings that were added to the campus chilled water system in 2014 include Cooper/Hoyt and Ewing/Cross dormitories, the Water Tunnel, North Henderson Building, BioBehavoral Health Building, Ford Building and the main gym in Rec Hall. Buildings that were added in 2015 include Mateer, Hibbs/Stephens Dormitories, AG Science and Industries Building, Henning Building, and the Health and Human Development Building.

As of June 2014, the Campus Chilled Water System will serve a total of 5.8 million square feet in 79 buildings; an estimated peak cooling load of approximately 14,000 tons.

## Natural Gas System

Natural Gas is distributed around the campus by an underground system of direct buried, coated steel pipes. Columbia Gas owns some of the piping and all of the billing meters, while the University owns some of the piping and some sub-meters for billing within the University family. The majority of the University owned lines are at 5 psi, with the exception of some high-pressure gas lines on West Campus and near Physical Plant on the Northern part of campus. All of the Columbia Gas owned lines are at 25 psi or higher.

## Water System

The potable water system on the University Park Campus is owned and operated by the University. There are seven production wells currently in service in two well fields; each well field is capable of supplying the University’s needs. The University uses on average approximately 2.5 million gallons of water per day. Four above ground water storage tanks have a storage capacity of 3,750,000 gallons, which is over a day’s supply. Treatment and monitoring is provided for all wells to insure that water delivered to customers meets all regulatory requirements. Several connections with the State College Water Authority (SCBWA) are maintained where water can be exchanged. An additional emergency connection is maintained with College Township Municipal Water Authority which the University could supply water.

University Park has two main well fields: Big Hollow and Houserville. The Big Hollow Well Field has six permitted production wells: UN2, UN14, UN16, UN17, UN24, & UN26, of which four wells are currently in use. The Houserville Well Field has three permitted production wells: UN33, UN34, & UN35, of which all three wells are currently in use. An additional permitted production well is UN28A, which is not in use.

The wells have the following permitted capacities:

|  |  |  |  |
| --- | --- | --- | --- |
| **Big Hollow** | **gpm** | **mgd** | **Year Drill** |
| UN 2 | 400 | 0.576 | 1938 |
| UN 14 | 720 | 1.037 | 1948 |
| UN 16 | 250 | 0.360 | 1948 |
| UN 17 | 400 | 0.576 | 1949 |
| UN 24 | 450 | 0.648 | 1962 |
| UN 26 | 800 | 1.152 | 1965 |
| Total | 3,020 | 4.349 |  |
| **Houserville** | **gpm** | **mgd** | **Year Drill** |
| UN 33 | 1,200 | 1.728 | 1981 |
| UN 34 | 1,200 | 1.728 | 1981 |
| UN35 | 1,200 | 1.728 | 1984 |
| Total | 3,600 | 5.184 |  |

Well UN28A has a capacity of 300 gpm or 0.432 mgd (year drill – 1974). University Park’s total well fields’ production capacity is 6,920 gpm or 9.965 mgd.

**Geology and Hydrogeology**

Both the Big Hollow and Houserville Well Fields are located in karst limestone terrain. The region’s land surface contains many sinkholes, caves are common, and surface drainage is minimal. Big Hollow wells are installed in the Cambrian Gatesburg Formation. Houserville wells are over the Ordovician Nittany and Axeman Formations. The wells

in both fields have relative high yields for the consolidated formations they are sited.

**Water Quality**

Both the Big Hollow and Houserville Well Fields’ water is hard; Big Hollows water’s hardness ranges from 150 to 200 mg/l as CaCO3, and Houserville water’s hardness ranges from 300 to 350 mg/l as CaCO3. The water is high in alkalinity and total dissolved solids from the dissolved mineral content. Fifty water quality samples are collected and analyzed each month from the distribution system. The treated water meets both primary and secondary US EPA drinking water standards. An annual water quality report is prepared each year in June, which is referred to as Consumer Confidence Report (CCR). The 2013 CCR is posted on the Office of Physical Plant’s web site at <http://www.opp.psu.edu/about-opp/divisions/ee/util/water-services/2013-drinking-water-quality-report/2013-drinking-water-quality-report/view?searchterm=water+quality+report>

**Water Treatment**

Water Treatment Facilities for University Park’s potable water include Chlorine House #1, Chlorine House #2, Chlorine House #3 (inactive), Chlorine House #4 (inactive), Chlorine House #5, and the Water Treatment Plant.

Chlorine House #1 is in Big Hollow. It typically treats the water from Wells UN16, UN17, & UN26, but has the ablility to treat the other wells in Big Hollow. The treatment consists of flow monitoring, chemical addition of a sequestering agent (phosphate compound), and chlorination for disinfection. Three underground baffled tanks provide hydraulic retention time for proper disinfection. Chlorine House #1 is a regulated entry point to the distribution system. A continuous chlorine analyzer monitors the free residual chlorine in the treated water.

Chlorine House #2 is in Big Hollow. There are two parallel treatment trains, one for “finished water” and the other for “raw water”. The finished water train typically treats the water from Well UN24, but has the able to treat the other wells in Big Hollow. The treatment consists of flow monitoring, chemical addition of a sequestering agent (phosphate compound), and chlorination for disinfection. Two underground baffled tanks provide hydraulic retention time for proper

disinfection. Chlorine House #2 is a regulated entry point to the distribution system. A continuous chlorine analyzer

monitors the free residual chlorine in the treated water. The raw water train is for future use. It was designed and built to pretreat all of the Big Hollow Wells prior to flowing to the water treatment plant. The treatment will consist of flow monitoring, chemical addition of a sequestering agent (phosphate compound), and chlorination for disinfection. A continuous chlorine analyzer will monitor the free residual chlorine in the pretreated water.

Chlorine House #3 is on the Golf Course. The facility is inactive. It treated the water from Well UN28A. The treatment consisted of flow monitoring, chemical addition of a sequestering agent (phosphate compound), and chlorination for disinfection.

Chlorine House #4 is at the West Campus Steam Plant. The facility is inactive. It treated the water from Well UN12. The treatment consisted of flow monitoring, chemical addition of a sequestering agent (phosphate compound), and chlorination for disinfection.

Chlorine House # 5 is in Houserville. It pretreats the water from Wells UN33, UN34, & UN35. The pretreatment consists of flow monitoring, chemical addition of a sequestering agent (phosphate compound), and chlorination for disinfection. A continuous chlorine analyzer monitors the free residual chlorine in the treated water. The pretreated water is conveyed to the Water Treatment Plant for additional treatment.

Water Treatment Plant (WTP) is located north of the Physical Plant Building. Currently the facility treats water from Chlorine House #5, which serves Houserville. Raw water line is in place to convey water from Big Hollow through Chlorine House #2 to the WTP. The treatment process consists of two air stripping towers operated in parallel followed

by chlorine disinfection and retention in a clear well. Water is pumped from the clear well into the distribution system. The WTP is a regulated entry point to the distribution system. A continuous chlorine analyzer monitors the free residual chlorine in the treated water.

**Water Distribution System**

University Park’s potable (drinking) water system consists of over 60 miles of pipe. The majority of our distribution system’s piping is constructed of ductile iron. Four elevated storage tanks in the distribution system provide reserve storage capacity and fire protection for University Park.

W**ater Storage**

University Park’s potable water system has four elevated storage tanks. Water Tower #1 is located near the Nittany Lion Inn. It was erected in 1937 and has a storage capacity of 500,000 gallons. Water Tower #2 is located near the North Halls. It was erected in 1956 and has a storage capacity of 750,000 gallons. Water Tower #3 is located north of the Physical Plant Building. It was erected in 1962 and has a storage capacity of 1,000,000 gallons. Water Tower #4 is located on the Golf Course. It was erected in 1992 and has a storage capacity of 1,500,000 gallons.

## Sanitary System

A campus sanitary system is owned and operated by the University. The wastewater treatment plant is located on University Drive near Route 26. The plant currently operates at over 2 million gallons/average day. Included in the current daily throughput is about 400,000 gpd taken from the Borough of State College for a fee. None of the effluent is wasted to nearby Spring Creek; instead it is pumped to spray irrigation fields after being treated. Some parts on the north side of campus utilize a local sanitary system owned by the University Area Joint Authority on a fee for service basis.

## Storm System

The University Park Storm Drain System is currently a 100% gravity flow system consisting of approximately 73 linear miles of storm drain pipes varying from 6 inches to 66 inches in diameter, and thousands of inlets and manholes. The University has varying levels of documentation for the entire system including over 1/2 of which is precisely surveyed. The University owns large tracts of land in the Centre Region tributary to the Big Hollow (Chpt. 93, CWF), Shavers Creek (Chpt. 93, HQ-CWF), Thompson Run (Chpt. 93, HQ-CWF), Spruce Creek (Chpt. 93, HQ-CWF), Slab Cabin Run (Chpt. 93, CWF sections), and the main stem of Spring Creek (Chpt. 93, HQ-CWF).

The main campus portion of University Park is comprised of four primary drainage basins and several smaller drainage areas. The four are: 1) the Fox Hollow Drainage Basin, 2) the Bathgate Dam Basin, 3) the Main Campus Basin, and 4) the West Campus Drainage Basin. The Fox Hollow and West Campus Drainage Basins are tributary to the Big Hollow, the Bathgate Dam Basin is tributary to Slab Cabin Run, and the Main Campus Basin is tributary to Thompson Run. Examples of the smaller basins include the Foods Building Detention Pond, the Parking Lot 43 Detention Pond, the Corl Drywell, Cato Park Pond, and the Grad Circle Parking Bio-swales. Additional information can be found at:

<http://www.opp.psu.edu/about-opp/divisions/ee/engineering/eng-resources/Watershed%20Document-2010.pdf>

Peak runoff rate control, volume control, and water quality control are conducted in the University Park area to varying degrees in each of the four Basins. While minor structural stormwater management systems exist in each of the basins that were developed for specific land development projects, major systems have also been constructed to function at the basin scale. The Fox Hollow and West Campus Basins both are considered to effectively control peak runoff rates, volume, and water quality. The Bathgate Dam basin is considered to effectively control peak runoff rates and water quality. The Main Campus Basin at this time does not include any major stormwater management facilities other than the effects seen due to the Duck Pond, which is located immediately downstream. The Bathgate Dam Basin has additional storage capacity at the current time with approximately 11.8 acres of additional impervious acres accounted for remaining. Over two (2) acres of imperviousness have been removed in the Fox Hollow Basin since 2001.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Basin Name** | **Drainage****Area (ac)** | **Impervious****Area (ac)** | **Percent****Impervious** | **Average****Annual****Rainfall****Volume (gal)** | **Estimated Average****Annual****Runoff (gal)** | **Average Annual Runoff Percentage** |
| Fox Hollow | 453.6 | 118.9 | 26.2% | 476,990,376 | 15,265,079 | 3.2% |
| Bathgate Dam | 232.9 | 84.1 | 36.1% | 245,236,730 | 71,363,888 | 29.1% |
| Main Campus | 386.6 | 210 | 54.3% | 407,109,819 | 81,421,964 | 20.0% |
| West Campus | 186.0 | 30.6 | 16.5% | 195,852,433 | 0 | 0.0% |

Fox Hollow is defined at Basin V-notch Weir along Fox Hollow Road

Bathgate Dam defined as tributary area to DAM

Main Campus defined as tributary area to the University Drive cloverleaf structure

West Campus defined as tributary area directly upslope of Teaburry Ridge Property line, not including Corl Drywell areas

The above average annual runoff indicated is to the point of interest. However, the Fox Hollow Basin has almost 100% of all surface runoff infiltrated downstream within the Big Hollow. In fact the University has an extensive surface water monitoring project that shows that hundreds of millions of gallons a year from upslope municipalities are discharged onto the University’s property annually where it is infiltrated in protected areas. In 2007, the University established the Water Resource Preservation Area (WRPA) land use classification for 550 acres of its land, much of which is located within the Big Hollow. The ratio of runoff to precipitation is highest for the Bathgate Dam basin because it contains a high percentage of directly connected imperviousness due to the more recent development activities. While the Main Campus Basin has the highest percentage of imperviousness, some of the older buildings are completely disconnected from the storm drain system.

The University owns five (5) ponds at University Park that are large enough to be regulated as dams by PaDEP under Chapter 105. The hazard classification (Cat-1 or Cat-2) dams require annual inspections and repairs in addition to an updated emergency action plan every five years. The dams are:

|  |  |  |  |
| --- | --- | --- | --- |
| **Dam Number** | **Dam Name** | **Class** | **Hazard Classification** |
| 14-121 | University Park Airport Pond 1A | C | Cat-1 |
| 14-122 | Bathgate Detention Pond | C | Cat-1 |
| 14-123 | University Park Airport Pond 4A | C | Cat-2 |
| 31-072 | Shavers Creek | B | Cat-1 |
| 14-092 | Duck Pond | C | Cat-3 |

The University is in compliance with the requirements of the Municipal Separate Storm Sewer System (MS4) federal EPA and state PADEP programs for stormwater management. Eleven campuses, including University Park, are required to follow these regulations. The purpose of the regulatory program is to promote health, safety, and welfare within the University and its watershed by minimizing the harm to the environment by storm water from the campus. The regulations require that advance planning be done to minimize run-off from activities occurring on University property. A program for illegal detection and elimination of non-storm water discharges into the stormwater system is also required.

The University currently has numerous types of structural stormwater management best management practices in use. These include, but are not limited to: wet and dry surface detention ponds, subsurface detention ponds, extended detention ponds, constructed and natural wetlands, water quality forebays, grass lined and armored swales, bio-swales, green roofs, infiltration basins, infiltration trenches, porous pavements and concrete, drywells, rain gardens, vegetated filter strips/swales, disconnected downspouts, grass parking systems, oil/water separators, water quality inlets and filters. The University also has street sweeping and inlet marking programs. The University also has several advanced experimental areas for stormwater management. The University’s preferred BMP is the responsible use and protection of critical recharge areas that have deep and highly renovating in-situ soils. Examples of these areas include the Mitchell Tract closed depressions, the flower garden recharge areas, the Big Hollow, and the cow pasture recharge area. Additional information can be found on the web at: <http://www.opp.psu.edu/about-opp/divisions/ee/engineering/eng-resources/presentations-publications>

**Purchased Utilities for Fiscal Year 14/15:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Utility** | **Quantity** | **Units** | **Unit Cost** | **Cost** | **Current Supplier** |
| Coal | 28,761 | Tons | $109.00\* | $3,138,249 | Oak Grove, Valley Coal |
| Natural Gas | 1,507,153 | MCF | $4.24\*\* | $6,385,260 | Columbia Gas – (LDC)Direct Energy/Hess Energy Marketing |
| Fuel Oil | 28,900 | Gal | $3.00\*\*\* | $86,700 | CS Meyer |
| Electricity | 41,978 | KW |  | $15,757,939 | West Penn Power (LDC)American PowerNet |
| 220,860,428 | KWH | $0.07135\* |

\*Average cost. \*\* Blended rate at the burner tip. \*\*\* Tanks topped off, average cost.

**Utility Contracts:**

**Coal** is contracted for on a yearly basis from a third party vendor. A contract is currently in place with Valley Coal. Contract pricing is fixed cost but includes a fuel adjustment. The projected price average for FY 15-16 is $109.00 per ton including delivery.

**Natural Gas** is contracted on a one-year basis from a third party vendor. The current supplier for FY1516 is South Jersey Energy. This contract was bid in May of 2015. The contract contains a fixed price for production and delivery to the city gate (Basis pricing) and NYMEX based commodity pricing. Natural gas transportation is a tariff rate with Columbia Gas, the local distribution company. The projected cost at the burner tip for FY 15-16 is approximately $4.09 per mcf.

**Fuel Oil** is purchased as necessary to keep the oil fresh and the tanks full. The quantity of oil shown may not all be used in the year it was purchased since natural gas is preferred over fuel oil at the heating plants.

**Electricity** distribution service is purchased from West Penn Power. All ten incoming feeders are monitored concurrently by the utility company and billed as one service. The demand component is totaled each week and all four weeks are averaged for the month before billing, therefore low demand or load shedding in one week helps to reduce the overall demand charge. Electric generation for 15-16 is purchased at a wholesale supply rate. A wholesale contract began for calendar year 2010 and is in place till 2016. The rate for wholesale supply is variable; however the projected average rate including local distribution for FY 15-16 is $0.0702 per kWh.

## Utility Charge Rates

Some Departments pay the cost of their utility usage to OPP. These are Departments such as Housing and Food Service and Athletics. The following chart shows the billable rates charged as well as our avoidable costs that are used for Energy Savings Projects for FY 15-16:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Utility** | **Avoided Costs** | **Billable Rate** | **Units** | **Comments** |
| Electricity | $2.91 | $2.91 | KW | 5 sub-stations only |
| $0.06896 | $0.08912 | KWH | 5 sub-stations only |
| Natural Gas | $4.99 | $7.54 | MCF | Blended Rate |
| Steam | $11.70 | $18.70 | 1000 pounds |  |
| Water | $2.29 | $5.66 | 1000 gallons |  |
| Wastewater | $2.63 | $11.00 | 1000 gallons |  |
| Chilled Water | $0.22 | $0.22 | Ton-Hour |  |

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*Editor:* Tammy Steiner, Administrative Support Assistant, Ph: (814) 863-3325, email: tlq1@psu.edu

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