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*November 22, 2009*

**Local Government Energy Program  
Energy Audit Final Report**

*For*

***The Brandon Farms Pump Station  
Township of Hopewell  
Pennington, NJ 08534***

***Project Number: LGEA16***



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## **INTRODUCTION**

On July 9<sup>th</sup>, August 6<sup>th</sup> and 7<sup>th</sup> Steven Winter Associates, Inc. (SWA) performed an energy audit and assessment for the Township of Hopewell municipal buildings. The audit included a review of the Brandon Farms Pump Station, the Municipal Building, the Public Works Garage, the Athletic Complex, the Union Fire and Rescue Station and the Princeton Farms Pump Station. These buildings are located in Titusville and Pennington, NJ. A separate energy audit report is issued for each of the referenced buildings.

This report addresses the Brandon Farms Pump Station in Pennington, NJ 08534. The current conditions and energy-related information were collected in order to analyze and facilitate the implementation of energy conservation measures for the building.

The Brandon Farms Pump Station building was built in 1993 and houses a hydraulic generator and grinder, an 80 kVA generator, three sewer pumps, a mixer, an exhaust fan and five suspended space heaters. The building consists of 1,295 square feet of conditioned main space and is built above a sewage accumulation wet well. Two employees maintain the building and pumps for a total of approximately three and a half hours per week.

The goal of this energy audit is to provide sufficient information to the Township of Hopewell to make decisions regarding the implementation of the most appropriate and most cost effective energy conservation measures for the Brandon Farms Pump Station building.

## EXECUTIVE SUMMARY

The energy audit performed by Steven Winter Associates (SWA) encompasses the Brandon Farms Pump Station building located at 395 Denow Rd., Pennington, NJ 08534. The Brandon Farms Pump Station building is a one story building on top of a sewage wet well and a pump basement, with a total floor area of 1,295 square feet and was built in 1993.

Based on the field visits performed by the SWA staff on July 9<sup>th</sup>, August 6<sup>th</sup> and 7<sup>th</sup> 2009 and the results of a comprehensive energy analysis, this report describes the site's current conditions and recommendations for improvements. Suggestions for measures related to energy conservation and improved comfort are provided in the scope of work. Energy and resource savings are estimated for each measure that results in a reduction of heating, cooling, and electric use.

In 2008, the Brandon Farms Pump Station building consumed 94,440 kWh or \$13,665 worth of electricity. The energy consumption for the building was 322 MM-Btus. A few fluctuations showed up for a couple of months on the utility bills which may be due to adjustments between estimated and actual meter readings.

SWA benchmarked the Brandon Farms Pump Station building using the U.S. Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* Energy benchmarking system. The building did not receive a performance rating due to size, nature of activity inside the building and hours occupied.

Based on the assessment of the Brandon Farms Pump Station building, SWA has separated the investment opportunities into three recommended categories:

1. Capital Improvements - Upgrades not directly associated with energy savings
2. Operations and Maintenance - Low Cost / No Cost Measures
3. Energy Conservation Measures - Higher cost upgrades with associated energy savings

### Category I Recommendations: Capital Improvements

- SWA does not have any recommendations for major capital investment at the Brandon Farms Pump Station building at this time.

### Category II Recommendations: Operations and Maintenance

- Weather Stripping / Air Sealing - SWA observed that exterior door weather-stripping in places was beginning to deteriorate. Doors and vestibules should be observed annually for deficient weather-stripping and replaced as needed. Any other accessible gaps or penetrations in the thermal envelope penetrations should also be sealed with caulk or spray foam.
- Gutters - Gutters should be regularly inspected for clogs from leaves or branches. SWA recommends extending the gutter downspouts two feet or more from the building.
- Create an educational program that teaches maintenance personnel how to minimize the energy use in the buildings. The US Department of Energy offers free information for hosting energy efficiency educational programs and for more information please visit: <http://www1.eere.energy.gov/education/>

### Category III Recommendations: Energy Conservation Measures

At this time, SWA considered a total of **2** Energy Conservation Measures (ECMs) for the Brandon Farms Pump Station building, summarized in the following table. The total investment cost for these ECMs with incentives is **\$20,765**. SWA estimates a first year savings of **\$1,444** with a simple payback of **14.4 years**. SWA estimates that implementing the considered ECMs will reduce the carbon footprint of the Brandon Farms Pump Station building by **13,645 lbs of CO<sub>2</sub>**.

There are various incentives that the Township of Hopewell could apply for that could also help lower the cost of installing the ECMs. SWA recommends that the Brandon Farms Pump Station building apply for the NJ SmartStart program through the New Jersey Office of Clean Energy. This incentive can help provide technical assistance for the building in the implementation phase of any energy conservation project. A new NJ Clean Power program, Direct Install, to be rolled out soon, could also assist to cover 80% of the capital investment.

The following table summarizes the proposed Energy Conservation Measures (ECM) and their economic relevance.

CONSIDERED													
ECM #	ECM description	Installed Cost		1st year energy savings					SPP	LoM	Lifetime	ROI %	Annual Carbon Reduced (lbs of CO2)
		Estimate \$	Source	Use	Unit	Demand /mo	Unit	Savings / year \$			Cost Savings \$		
1	Install VFD controls on pumps	\$19,000	Similar Projects	9,798	kWh	2.1	-	1,421	13.4	12	13,974	-2.2	13,423
2.1	replace 5 incandescent lamps to CFL	\$100	RS Means, Lit Search	50	kWh	0.0	kW	7	13.7	7	45	-7.8	69
2.2	replace building internal lights: T12s to T8s with INCENTIVES (incl. 75% labor)	\$1,665	RS Means, Lit Search, NJ Clean Energy Program	112	kWh	0.0	kW	16	102.8	20	237	-4.3	153
	<b>Total Proposed</b>	<b>\$20,765</b>	-	-	-	<b>2.2</b>	<b>kW</b>	<b>\$1,444</b>	<b>14.4</b>	<b>13</b>	<b>14,801</b>	<b>-2.3</b>	<b>13,645</b>

**Definitions:**

- SPP – Simple Payback (years)
- LoM: Life of Measure (years)
- ROI: Return on Investment (%)

**Assumptions:**

- Discount Rate: 3.2% per DOE FEMP Guidelines
- Energy Price Escalation Rate: 0% per DOE FEMP Guidelines

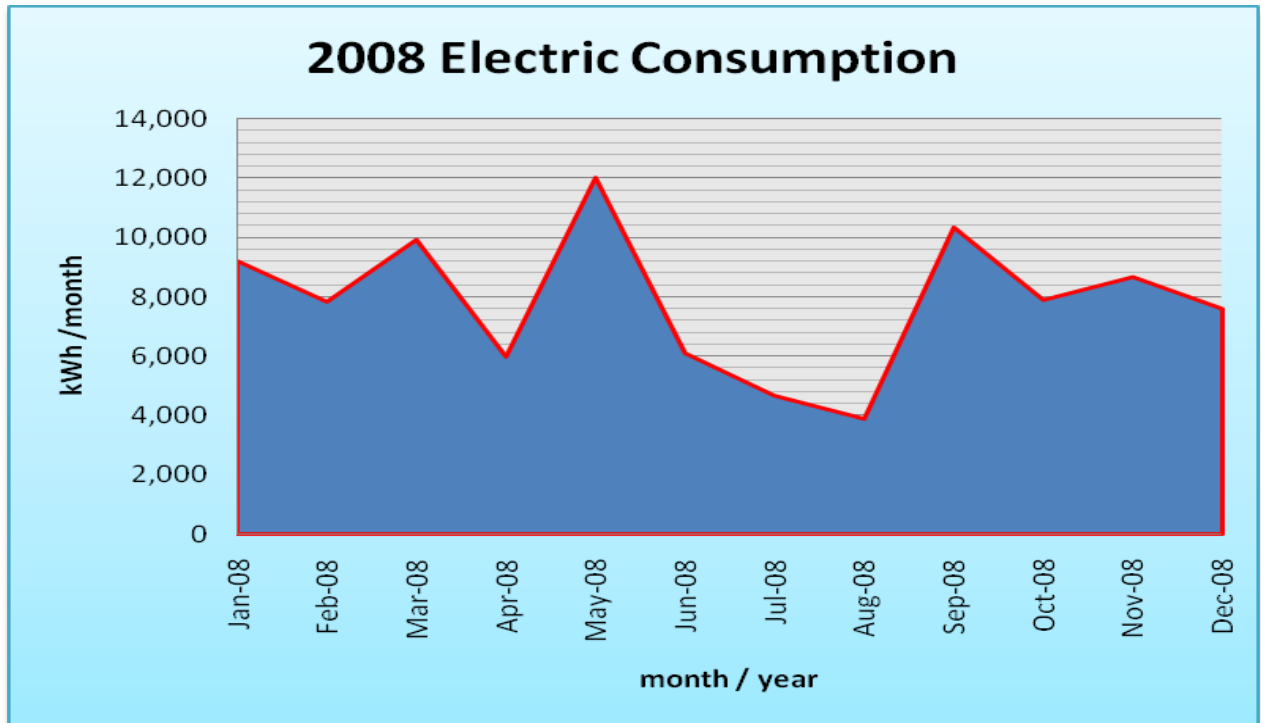
## 1. HISTORIC ENERGY CONSUMPTION

### 1.1. Energy use and cost analysis

SWA analyzed utility bills from January 2008 through March 2009 that were received from PSE&G supplying the Brandon Farms Pump Station building with electric power.

Electricity - The Brandon Farms Pump Station building is currently served by one electric meter. The Brandon Farms Pump Station building currently buys electricity from PSE&G at **an average rate of \$0.145/kWh** based on 12 months of utility bills for 2008. The Brandon Farms Pump Station building purchased **approximately 94,440 kWh or \$13,665 worth of electricity** in the previous year. The average monthly demand was 20 kW. Some electric fluctuations may be due to adjustments between estimated and actual meter readings.

The following chart shows electricity use for the Brandon Farms Pump Station building based on utility bills for the 12 month period of 2008. The annual electric use is 322 MM-Btus. In the summer when schools are closed and people take vacations, the sewer flows are lower and therefore the pump station electric usage lower than the rest of the year.



### 1.2. Utility rate

The Brandon Farms Pump Station building currently purchases electricity from PSE&G at a general service market rate for electricity use (kWh) with a separate (kW) demand charge. The Brandon Farms Pump Station building currently pays an average rate of approximately \$0.145/kWh based on 12 months of utility bills for 2008.

A few unusual utility fluctuations showed up for a couple of months on the utility bills which may be due to adjustments between estimated and actual meter readings.

### 1.3. Energy benchmarking

The Brandon Farms Pump Station building information and utility data were entered into the U.S. Environmental Protection Agency’s (EPA) Energy Star Portfolio Manager Energy benchmarking system. The building did not receive a performance rating due to size, nature of activity inside the building and hours occupied.

Per the LGEA program requirements, SWA has assisted the Township of Hopewell to create an *Energy Star Portfolio Manager* account and share the Brandon Farms Pump Station facilities information to allow future data to be added and tracked using the benchmarking tool. SWA has shared this Portfolio Manager site information with the Township of Hopewell (user name of “hopewelladmin” with a password of “hopewelltp1”) and TRC Energy Services (user name of TRC-LGEA).

## 2. FACILITY AND SYSTEMS DESCRIPTION

### 2.1. Building Characteristics

The Brandon Farms Pump House building is a single-story structure built in 1993. The building consists of 1,295 square feet of conditioned main space. This Pump house contains a hydraulic generator and grinder, an 80 kVA generator, three sewer pumps, a mixer, an exhaust fan and five suspended space heaters. The building has a basement that houses the three pumps and a sewage accumulation wet well.

### 2.2. Building occupancy profiles

There aren’t any full time occupants. Two employees check on the pumps and occupy the building approximately 3.5 hours per week.

### 2.3. Building envelope

#### 2.3.1. Exterior Walls

The exterior walls consist of 8” CMU blocks with both brick veneer on the front of the building and vinyl siding on all the rest of the exterior walls. Due to warm temperature conditions at the time of the field visits, insulation levels could not be verified with help of infrared technology. If desired, the Municipality could contract a separate envelope inspection during cooler months. Building drawings show 2” of rigid insulation located between the brick veneer and sheathing. SWA does not have additional recommendations for the exterior wall assembly. Regular maintenance should be performed on the exterior walls to maintain appropriate conditions.



### **2.3.2. Roof**

The pitched roof areas with dark colored asphalt shingles appear to be in good condition without any obvious penetrations or signs of leakage. Gable vents provide the only attic ventilation. The attic contained 6 ½” of fiberglass batt insulation, approximately R30. The insulation recorded is sufficient and SWA does not have additional recommendations.

### **2.3.3. Base**

The building’s base is a 4” concrete slab with a perimeter footing. The slab edge or perimeter insulation could not be verified and should be confirmed at the time of the next insulation inspection during cooler months when performing infrared evaluations. SWA recommends extending the gutter downspouts two feet or more from the building. Currently rain run-off is deposited around the perimeter of the building, settling near the foundation of the building. This may result in future foundation issues.



### **2.3.4. Windows**

The building contains one double paned window. Regular maintenance should be performed checking the seal around the window and caulking when necessary. A double-pane low-E rating would be of additional benefit for a future window replacement.

### **2.3.5. Exterior doors**

The aluminum framed exterior doors were observed to be in good condition except for some missing or worn weather-stripping. SWA recommends that the exterior doors of the building be weather-stripped in order to decrease the amount of conditioned air that is lost around each door. SWA also recommends checking the weather-stripping of each door on a regular basis and replacing any broken seals immediately. Tight seals around the doors will help ensure that the building is kept continuously tight and insulated.

### **2.3.6. Building air tightness**

Based on a visual inspection, the Brandon Farms Pump House building would benefit from air sealing any penetrations throughout the structure including piping and electrical penetrations. SWA recommends targeting attic / ceiling penetrations, focusing on any attic by-passes, attic top-plates, pipe, wire, or plumbing penetrations. SWA recommends performing regular maintenance caulking, foaming, and sealing around penetrations, windows, and verifying proper weather-stripping around



doors. Air tight building envelopes result in conserving energy while lowering heating and cooling costs.

## **2.4. HVAC Systems**

### **2.4.1. Heating**

In the Brandon Farms Pump Station building is heated by 5 electric 3 kW ceiling mounted electric unit heaters and fans. The thermostat setting is kept slightly above freezing.

### **2.4.2. Cooling**

The Brandon Farms Pump Station building is not air conditioned. Any cooling and fresh air circulation is achieved via cross-currents when opening doors and two building exhaust fans.

### **2.4.3. Ventilation**

Two exhaust fans keep the Brandon Farms Pump Station building purged from accumulation of explosive gases.

### **2.4.4. Domestic Hot Water**

There is one small electric 10 gal DHW unit available for hand washing in the building.

## **2.5. Electrical systems**

### **2.5.1. Lighting**

*Interior Lighting* - The Brandon Farms Pump Station building currently consists of mostly T12 fluorescent fixtures with magnetic ballasts. Based on measurements of lighting levels for each space, there are not any vastly over-lighted areas. SWA recommends replacing T12 lighting including magnetic ballasts whenever possible with T8 lighting and electronic ballasts. As this option may not be very cost effective, the changeover could take place as fixtures break down and are taken out of service. The building also has a number of lights with incandescent bulbs above the wet well space. SWA recommends replacing all incandescent bulbs with CFLs. See attached lighting schedule in Appendix A for a complete inventory of lighting throughout the building and estimated power consumption.

*Exterior Lighting* - The exterior lighting was surveyed during the building audit: a mix of 60 Watt high pressure sodium halide perimeter lamps. All exterior lighting is controlled by photocells. There is not any immediate need to upgrade this lighting or photocells.

### **2.5.2. Appliances and process**

There aren't any appliances housed by the Brandon Farms Pump Station building.

The three 20 Hp sewer pumps presently operate in a lead-lag configuration and come on as the wet well level fills up and go off when the wet well level is low. There is an opportunity to install VFD controls on these pumps in order to save energy and equipment wear and tear. The overall estimated upgrade is \$19,000 with a 13 year simple payback.

Educating the staff is a great way for Township of Hopewell to save energy while raising awareness about the importance of energy-efficiency. Prizes and challenges can be used to get employees involved in finding creative ways to reduce and monitor energy usage throughout the building or park. There are many free resources available to help. The US Department of Energy offers free information for hosting energy efficiency educational programs and lesson plans, for more information please visit: <http://www1.eere.energy.gov/education/> . NJ Clean Energy will also be coming out soon with a Teach Program for local government maintenance staff.

### **2.5.3. Elevators**

The Brandon Farms Pump Station building is a single story building with basement and does not contain any elevator equipment.

### **2.5.4. Others electrical systems**

There are not currently any other electrical systems installed at the Brandon Farms Pump Station building other than normal switchgear and control panels.

### 3. EQUIPMENT LIST

#### Inventory

The Brandon Farms Pump Station						
Building System	Description	Location	Model#	Fuel	Space served	Estimated Remaining useful life %
Process	3 sewer pumps - 950 gpm (1,000 gpm at start), minimal lift, 20 HP each, 3P, 480V, 60 Hz	lower floor in bldg	Yeoman with Reliance Electric oil cooled jkt motor (Frame: x320TY, Type P, Design B, 1760 RPM, 460 V, 25 amps, 60 Hz, 3 P, Code E, Encl-T EXP)	Electric	Brandon Farms Pump Station	40%
Process	1 hydraulic grinder - operating 24/7; with 5HP motor	upper floor in bldg	-	Electric	Brandon Farms Pump Station	80%
Process	1 electric mixer operating when pumps are off to keep oils from separating	wet well	-	Electric	Brandon Farms Pump Station	80%
Heating	5 small suspended space heaters - set to keep space above freezing - 3kW each - 1/10 HP	bldg	-	Electric	Brandon Farms Pump Station	40%
Ventilation	2 exhaust fans	bldg wall	-	Electric	Brandon Farms Pump Station	40%
Domestic Hot Water heater	1 electric 10 gal unit for hand washing	upper floor in bldg	-	Electric	Brandon Farms Pump Station	50%
Generator	1 backup 80 kVA - diesel	upper floor in bldg	Onan with Commons motor	Electric / Diesel	Brandon Farms Pump Station	50%
Transformer	one transformer 480V - 110V	next to generator	-	Electric	Brandon Farms Pump Station	50%
Lighting	See details - Appendix A	See details - Appendix A	-	Electric	Brandon Farms Pump Station	varies, average 40%

#### Note:

The remaining useful life of a system (in %) is an estimate based on the system date of built and existing conditions derived from visual inspection.

#### 4. ENERGY CONSERVATION MEASURES

Based on the assessment of the Brandon Farms Pump Station building, SWA has separated the investment opportunities into three recommended categories:

4. Capital Improvements - Upgrades not directly associated with energy savings
5. Operations and Maintenance - Low Cost / No Cost Measures
6. Energy Conservation Measures - Higher cost upgrades with associated energy savings

##### Category I Recommendations: Capital Improvements

- SWA does not have any recommendations for major capital investment at the Brandon Farms Pump Station building at this time.

##### Category II Recommendations: Operations and Maintenance

- Weather Stripping / Air Sealing - SWA observed that exterior door weather-stripping in places was beginning to deteriorate. Doors and vestibules should be observed annually for deficient weather-stripping and replaced as needed. Any other accessible gaps or penetrations in the thermal envelope penetrations should also be sealed with caulk or spray foam.
- Gutters - Gutters should be regularly inspected for clogs from leaves or branches. SWA recommends extending the gutter downspouts two feet or more from the building.
- Create an educational program that teaches maintenance personnel how to minimize the energy use in the buildings. The US Department of Energy offers free information for hosting energy efficiency educational programs and for more information please visit: <http://www1.eere.energy.gov/education/>

##### Category III Recommendations: Energy Conservation Measures

##### Summary table

ECM#	Description
1	Install Variable Frequency Drives on pump motors
2	Upgrade lighting: incandescent to CFLs and T12 magnetic fixtures to T8 electronic fixtures

## **ECM#1: Install VFD Controls for Pump Motors**

### **Description:**

Currently, the Brandon Farms Pump Station has a sewage wet well collection system which uses three pumps (each with a 20 Hp Reliance motor) for safe operating purposes. The systems operates under the pump-down method wherein when the accumulation of sewage laden liquid or waste water reaches a high upper limit in the wet well, the lead pump is automatically turned on until the level of liquid is reduced to a predetermined pumped down level at which point the pump is automatically turned off. The pumps are arranged to operate alternately. In case the lead pump cannot keep up with the incoming flow, a second lag pump automatically kicks in to assist in bringing down the level in the wet well. The Brandon Farms Pump Station annual flow is approximately 100,000,000 gallons. Depending on the incoming flow and wet well level, a pump generally comes on every 10-15 min and runs for about 4 min. SWA suggests that the Township of Hopewell consider installing Variable Frequency Drives (Allen Bradley PowerFlex-400 or equivalent) on the pump motors with a ultrasonic sensor control to operate pumps on the pump curve at all times at the most efficient power draw. The ultrasonic sensor (Control Electronics sensor - Model ERS-560 Ultrasonic Level Monitor or equivalent) will continuously measure the wet well level and feed information to the VFD controller. The benefits of such a systems control arrangement are:

- Energy savings by operating the pump at its most efficient design condition, even with variable conditions
- Prevention of motor overload
- Energy cost and utility demand charge savings by eliminating the current surge at pump start for contactor started pumps
- Operation of the pump closest to its Best Efficiency Point, where bearing loads and shaft deflection are minimized, leading to longer seal and bearing life
- Operation of the pump at reduced speeds, which also contributes to overall pump life
- Automatic reverse start to ensure clog free initial starting, particularly useful on grinder type pumps
- Full motor torque capability, even at low speeds, to ensure clog free pumping, again especially useful for driving the cutting mechanism on grinder pumps
- Prevention of "cross-talk" between the drives, which do emit local EMFs, and electronic level sensing devices
- Ethernet communication capabilities, for remote alarms as well as for troubleshooting

### **Installation cost:**

Estimated installed cost: \$19,000

Source of cost estimate: Similar projects

### **Economics:**

ECM description	Installed Cost		1st year energy savings					SPP	LoM	Lifetime	ROI %	Annual Carbon Reduced (lbs of CO2)
	Estimate \$	Source	Use	Unit	Demand / mo	Unit	Savings / year \$			Cost Savings \$		
Install VFD controls on pumps	\$19,000	Similar Projects	9,798	kWh	3.6	-	1,577	12.0	12	15,516	-1.5	13,423

**Assumptions:** SWA assumed electrical loads calculated using modeling and by conducting the billing analysis. In order to estimate savings for this measure, SWA assumed in the model an energy reduction equivalent to a conservative 30% (in view that the pumps often run outside the operating curve) of the total pump electric draw for the Brandon Farms Pump Station, based on the described VFD control scheme.

**Rebates/financial incentives:**

*This measure does not qualify for a rebate or financial incentive at this time, although the NJ Clean Energy does have incentives for applying variable speed drives to compressors, chilled water pumps and variable air volume fans.*

**Options for funding ECM:**

*This project may benefit from enrolling in NJ SmartStart program with Technical Assistance to offset a portion of the cost of implementation.*

*<http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/nj-smartstart-buildings>*

## ECM#2: Upgrade existing lighting

### Description:

On the day of the site visit, SWA completed a lighting inventory of the Brandon Farms Pump Station building (see Appendix A). The existing lighting consists of T12 fluorescent fixtures with magnetic ballasts, and incandescent lights. SWA has performed an evaluation of upgrading all the T12 magnetic ballast fixtures to T8 electronic ballast fixtures and incandescent bulbs to CFLs. The labor in all these installations was evaluated using prevailing electrical contractor wages. The Township of Hopewell may decide to perform this work with in-house resources from its Maintenance Department on a scheduled, longer timeline than otherwise performed by a contractor, to obtain savings. SWA recommends at a minimum that any incandescent bulbs be replaced with CFLs. See Appendix A for recommendations.

### Installation cost:

Estimated installed cost: \$1,765

Source of cost estimate: *RS Means; Published and established costs*

### Economics (Option with incentives considered that do not appear cost effective):

ECM description	Installed Cost		1st year energy savings					SPP	LoM	Lifetime	ROI %	Annual Carbon Reduced (lbs of CO2)
	Estimate \$	Source	Use	Unit	Demand /mo	Unit	Savings / year \$			Cost Savings \$		
replace 5 incandescent lamps to CFL	\$100	RS Means, Lit Search	50	kWh	0.0	kW	7	13.7	7	45	-7.8	69
replace building internal lights: T12s to T8s with INCENTIVES (incl. 75% labor)	\$1,665	RS Means, Lit Search, NJ Clean Energy Program	112	kWh	0.0	kW	16	102.8	20	237	-4.3	153
Total Proposed	\$1,765	-	-	-	0.0	kW	\$23	75.1	19	334	-4.2	222

**Assumptions:** SWA calculated the savings for this measure using measurements taken the day of the field visit and using the billing analysis.

### Rebates/financial incentives:

*NJ Clean Energy - Prescriptive Lighting Incentive, Incentive based on installing T5 or T8 lamps with electronic ballasts in existing facilities (\$10-\$30 per fixture, depending on quantity of lamps). Maximum incentive amount is \$270.*

## **Options for funding the Lighting ECM:**

*This project may benefit from enrolling in NJ SmartStart program with Technical Assistance to offset a portion of the cost of implementation.*

<http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/nj-smartstart-buildings>

## **5. RENEWABLE AND DISTRIBUTED ENERGY MEASURES**

### **5.1. Existing systems**

There are currently no existing renewable energy systems. The Township of Hopewell is commissioning a 40 kW photovoltaic system located on the lawn of the Public Works Garage.

### **5.2. Wind**

#### **Description:**

*Wind power production would not be applicable for the Brandon Farms Pump Station location, because the thermal winds generated in the area are blocked by trees and the area in general is not very windy.*

### **5.3. Solar Photovoltaic**

#### **Description:**

*Solar photovoltaic power production would not be applicable for the Brandon Farms Pump Station location, because the area is blocked by trees and offers insufficient space to properly lay out the panels.*

### **5.4. Solar Thermal Collectors**

*Solar thermal collectors are not cost effective for this building and would not be recommended because Domestic Hot Water is not used.*

### **5.5. Combined Heat and Power**

#### **Description:**

*CHP is not applicable for this building because there isn't any available gas service and it is costly to bring to the building at this time.*

### **5.6. Geothermal**

#### **Description:**

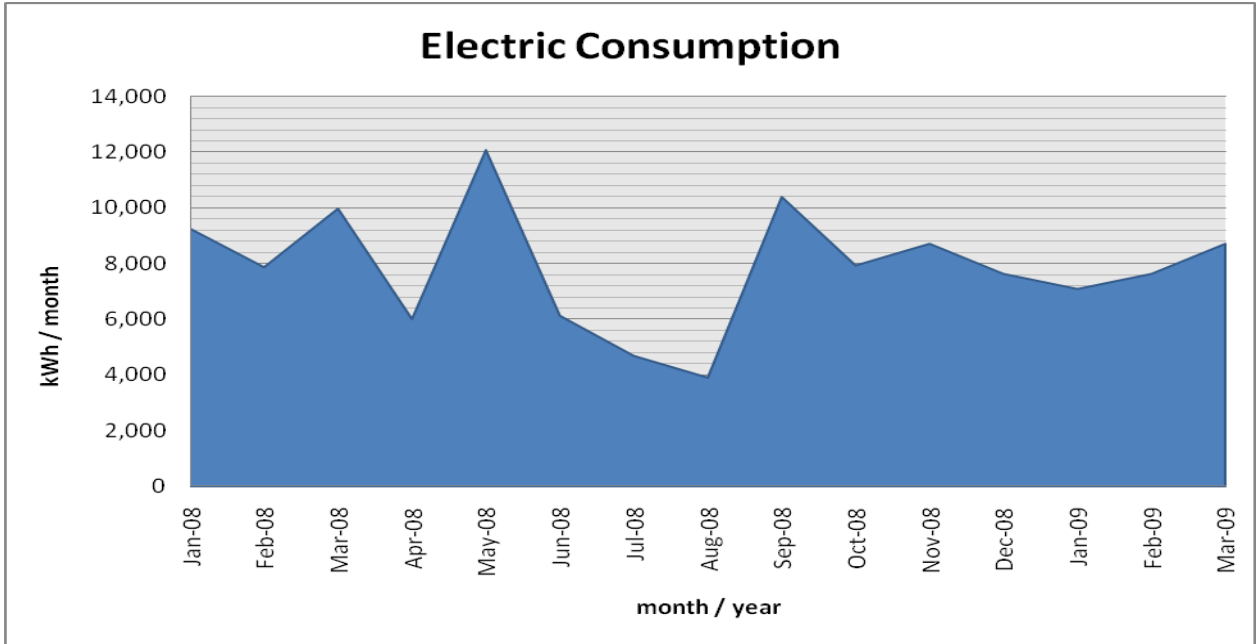
*Geothermal is not applicable for this building because it would not be cost effective to change to a geothermal system at this location.*



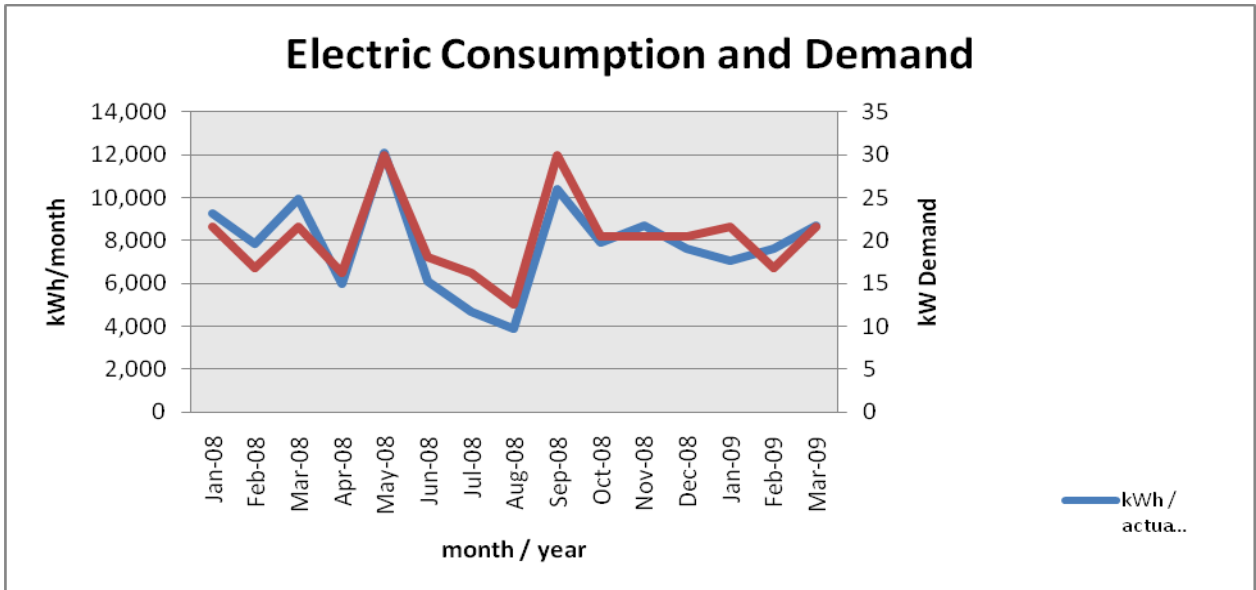
## 6. ENERGY PURCHASING AND PROCUREMENT STRATEGIES

### 6.1. Load profiles

The following are charts that show the annual electric load profiles for the Brandon Farms Pump Station building. In the summer when schools are closed and people take vacations, the sewer flows are lower and therefore the pump station electric usage lower than the rest of the year.



Also, note on the following chart how the electrical Demand peaks follow the electrical consumption peaks.

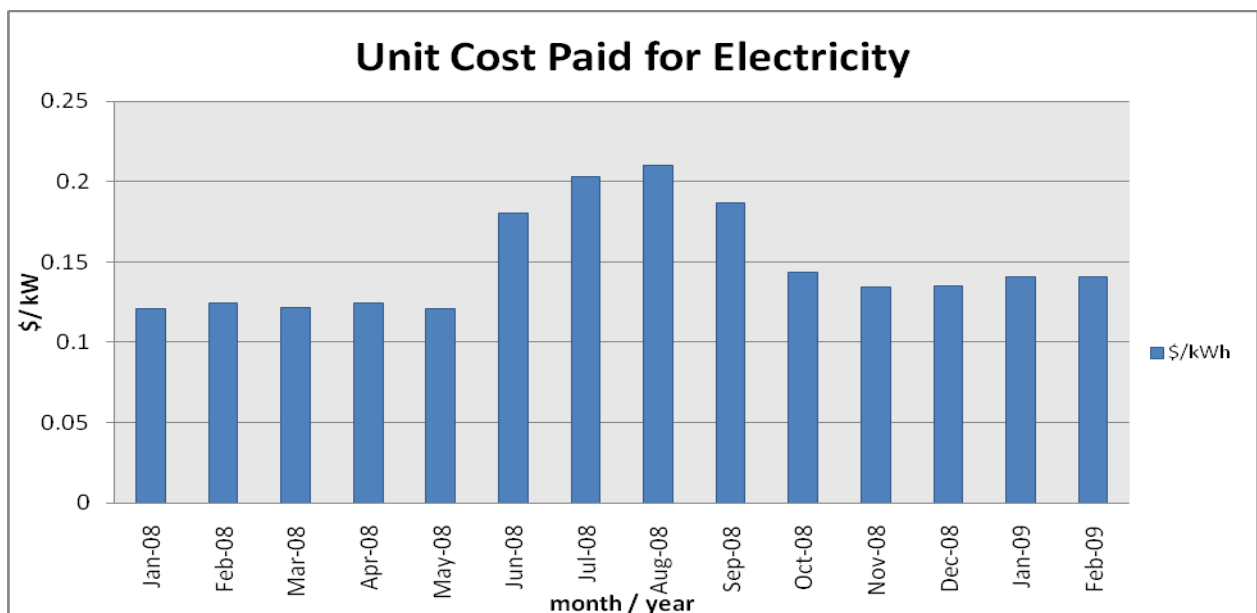


## 6.2. Tariff analysis

The Brandon Farms Pump Station building is direct-metered (via one main meter) and currently purchases electricity from PSE&G at a general service rate. The general service rate for electric charges are market-rate based on use and the Brandon Farms Pump Station billing does show a breakdown of demand costs. Demand prices are reflected in the utility bills and can be verified by observing the price fluctuations throughout the year. Typically, the electricity prices increase during the cooling months when electricity is used by air-handling units. The Brandon Farms Pump Station does not use air conditioning during the summer months and uses minimal electric heating during the winter months. The main power users are the sewer pumps and the hydraulic system for the sewer grinder.

## 6.3. Energy Procurement strategies

The Brandon Farms Pump Station does not have natural gas service. Electricity is purchased directly for the Brandon Farms Pump Station from PSE&G without an ESCO. There isn't and ESCO engaged in the process. An Energy Services Company (ESCO) is a consultancy group that engages in a performance based contract with a client firm to implement measures which reduce energy consumption and costs in a technically and financially viable manner. SWA analyzed the utility rate for electricity supply over an extended period. Electric bill analysis shows fluctuations up to 42% over the 12 month in 2008. Some of these fluctuations may have been caused by adjustments between estimated and actual meter readings, others may be due to unusual high and escalating energy costs in 2008. SWA recommends that the Township of Hopewell further explore opportunities of purchasing electricity from ESCOs in order to reduce rate fluctuation and ultimately reduce the annual cost of energy for the Brandon Farms Pump Station. Appendix B contains a complete list of third party energy suppliers for the Township of Hopewell service area. The Township of Hopewell may want to consider partnering with other school districts, municipalities, townships and communities to aggregate a substantial electric use for better leveraging in negotiations with ESCOs and of improving the pricing structures. This sort of activity is happening in many parts of the country and in New Jersey. Also, the Brandon Farms Pump Station would not be eligible for enrollment in a Demand Response Program, because there isn't the capability at this time to shed a minimum of 100 kW electric demand when requested by the utility during peak demand periods, which is the typical threshold for considering this option. The following charts show the Brandon Farms Pump Station monthly \$/kW spending for energy in 2008.



## 7. METHOD OF ANALYSIS

### 7.1. Assumptions and tools

Energy modeling tool: established / standard industry assumptions  
Cost estimates: RS Means 2009 (Facilities Maintenance & Repair Cost Data)  
RS Means 2009 (Building Construction Cost Data)  
RS Means 2009 (Mechanical Cost Data)  
Published and established specialized equipment material and labor costs  
Cost estimates also based on utility bill analysis and prior experience with similar projects

### 7.2. Disclaimer

This engineering audit was prepared using the most current and accurate fuel consumption data available for the site. The estimates that it projects are intended to help guide the owner toward best energy choices. The costs and savings are subject to fluctuations in weather, variations in quality of maintenance, changes in prices of fuel, materials, and labor, and other factors. Although we cannot guarantee savings or costs, we suggest that you use this report for economic analysis of the building and as a means to estimate future cash flow.

***THE RECOMMENDATIONS PRESENTED IN THIS REPORT ARE BASED ON THE RESULTS OF ANALYSIS, INSPECTION, AND PERFORMANCE TESTING OF A SAMPLE OF COMPONENTS OF THE BUILDING SITE. ALTHOUGH CODE-RELATED ISSUES MAY BE NOTED, SWA STAFF HAVE NOT COMPLETED A COMPREHENSIVE EVALUATION FOR CODE-COMPLIANCE OR HEALTH AND SAFETY ISSUES. THE OWNER(S) AND MANAGER(S) OF THE BUILDING(S) CONTAINED IN THIS REPORT ARE REMINDED THAT ANY IMPROVEMENTS SUGGESTED IN THIS SCOPE OF WORK MUST BE PERFORMED IN ACCORDANCE WITH ALL LOCAL, STATE, AND FEDERAL LAWS AND REGULATIONS THAT APPLY TO SAID WORK. PARTICULAR ATTENTION MUST BE PAID TO ANY WORK WHICH INVOLVES HEATING AND AIR MOVEMENT SYSTEMS, AND ANY WORK WHICH WILL INVOLVE THE DISTURBANCE OF PRODUCTS CONTAINING MOLD, ASBESTOS, OR LEAD.***

## Appendix A: Lighting Study

Brandon Farms Pump Station Existing Lighting Conditions														Proposed Lighting																											
#	Bldg	Fir	Location in Building	Measured Lighting Level in Foot-candles	Fixture Type	Ballast Type	No. of Fixtures	No. of Lamps	Type of Lamp	Watts /Lamp	Hrs/ Day	Energy Use (Watt hours / day)	Controls	Day-lighting possible?	Fixture Type	Ballast Type	No. of Fixtures	No. of Lamps	Type of Lamp	Watts/ Lamp	Hrs/ Day	Energy Use (Watt hours/ day)	Controls	Total Power (Watts)	further W-hr/day reduction with occupancy sensors																
1	BFPS	grd	inside bldg	-	T12 4'	M	9	2	F	34	2	1224	S	n	T8 4'	E	9	2	F	32	2	918	S	576																	
2	BFPS	grd	inside bldg	-	LED Exit	-	3	1	CFL	1	24	72	-	n	Exit LED	-	3	1	CFL	1	24	72	-	3																	
3	BFPS	grd	wet well space	-	incand	-	5	1	I	70	0.5	175	S	n	CFL	-	5	1	CFL	15	0.5	37.5	S	75																	
4	BFPS	ext	exterior	ext	sodium halide	-	3	1	HPS	60	12	2160	photo-cell	N/A	sodium halide	-	3	1	HPS	60	12	2160	photo-cell	180																	
TOTALS exterior																						2,160																			
TOTALS interior																						1,471																			
annual consumption (kWh)																						1,325																			
estimated cost (\$/year)																						\$192																			
Brandon Farms Pump Station bldg total light power (Watt)																						1,145																			
Brandon Farms Pump Station light power density (Watt/sq ft)																						0.88																			
Proposed Annual Savings (kWh)																						162																			
Proposed Annual Cost Savings (\$)																						\$23																			
Proposed Investment (\$)																						\$1,765																			
surface area (sq ft)																						1,295																			

Legend: BFPS - Brandon Farms Pump Station; M - magnetic; E - electronic; F - fluorescent; I or incand - incandescent; CFL - compact fluorescent lamp; HPS - high pressure sodium; MH - Metal Halide; S - on/off switch

**Appendix B: Third Party Energy Suppliers (ESCOs)**  
<http://www.state.nj.us/bpu/commercial/shopping.html>

<b>PSE&amp;G ELECTRICAL SERVICE TERRITORY</b>		
<b>Last Updated: 06/15/09</b>		
<p><b>Hess Corporation</b>            1 Hess Plaza            Woodbridge, NJ 07095            (800) 437-7872  <a href="http://www.hess.com">www.hess.com</a></p>	<p><b>BOC Energy Services, Inc.</b>            575 Mountain Avenue            Murray Hill, NJ 07974            (800) 247-2644  <a href="http://www.boc.com">www.boc.com</a></p>	<p><b>Commerce Energy, Inc.</b>            4400 Route 9 South, Suite 100            Freehold, NJ 07728            (800) 556-8457  <a href="http://www.commerceenergy.com">www.commerceenergy.com</a></p>
<p><b>Constellation NewEnergy, Inc.</b>            900A Lake Street,            Suite 2            Ramsey, NJ 07446            (888) 635-0827  <a href="http://www.newenergy.com">www.newenergy.com</a></p>	<p><b>Direct Energy Services, LLC</b>            120 Wood Avenue            Suite 611            Iselin, NJ 08830            (866) 547-2722  <a href="http://www.directenergy.com">www.directenergy.com</a></p>	<p><b>FirstEnergy Solutions Corp.</b>            300 Madison Avenue            Morristown, NJ 07962            (800) 977-0500  <a href="http://www.fes.com">www.fes.com</a></p>
<p><b>Glacial Energy of New Jersey, Inc.</b>            207 LaRoche Avenue            Harrington Park, NJ 07640            (877) 569-2841  <a href="http://www.glacialenergy.com">www.glacialenergy.com</a></p>	<p><b>Integritys Energy Services, Inc.</b>            99 Wood Ave, South, Suite 802            Iselin, NJ 08830            (877) 763-9977  <a href="http://www.integritysenergy.com">www.integritysenergy.com</a></p>	<p><b>Strategic Energy, LLC</b>            55 Madison Avenue, Suite 400            Morristown, NJ 07960            (888) 925-9115, <a href="http://www.sel.com">www.sel.com</a></p>
<p><b>Liberty Power Holdings, LLC</b>            Park 80 West, Plaza II, Suite 200            Saddle Brook, NJ 07663            (866) 769-3799  <a href="http://www.libertypowercorp.com">www.libertypowercorp.com</a></p>	<p><b>Pepco Energy Services, Inc.</b>            112 Main St.            Lebanon, NJ 08833            (800) ENERGY-9 (363-7499)  <a href="http://www.pepco-services.com">www.pepco-services.com</a></p>	<p><b>PPL EnergyPlus, LLC</b>            811 Church Road            Cherry Hill, NJ 08002            (800) 281-2000  <a href="http://www.pplenergyplus.com">www.pplenergyplus.com</a></p>
<p><b>Sempra Energy Solutions</b>            The Mac-Cali Building            581 Main Street, 8<sup>th</sup> Floor            Woodbridge, NJ 07095            (877) 273-6772  <a href="http://www.semprasolutions.com">www.semprasolutions.com</a></p>	<p><b>South Jersey Energy Company</b>            One South Jersey Plaza            Route 54            Folsom, NJ 08037            (800) 800-756-3749  <a href="http://www.southjerseyenergy.com">www.southjerseyenergy.com</a></p>	<p><b>Suez Energy Resources NA, Inc.</b>            333 Thornall Street            6th Floor            Edison, NJ 08837            (888) 644-1014  <a href="http://www.suezenergyresources.com">www.suezenergyresources.com</a></p>
<p><b>UGI Energy Services, Inc.</b>            704 East Main Street, Suite 1            Moorestown, NJ 08057            (856) 273-9995  <a href="http://www.ugienergyservices.com">www.ugienergyservices.com</a></p>	<p><b>American Powernet Management, LP</b>            437 North Grove St.            Berlin, NJ 08009            (800) 437-7872  <a href="http://www.hess.com">www.hess.com</a></p>	<p><b>ConEdison Solutions</b>            Cherry Tree, Corporate Center            535 State Highway 38            Cherry Hill, NJ 08002            (888) 665-0955  <a href="http://www.conedsolutions.com">www.conedsolutions.com</a></p>
<p><b>Credit Suisse, (USA) Inc.</b>            700 College Road East            Brandon, NJ 08450            212-538-3124  <a href="http://www.creditsuisse.com">www.creditsuisse.com</a></p>	<p><b>Sprague Energy Corp.</b>            12 Ridge Road            Chatham Township NJ 07928            (800) 225-1560  <a href="http://www.spragueenergy.com">www.spragueenergy.com</a></p>	

