Steven Winter Associates, Inc.
Architects and Engineers

50 Washington Street
Norwalk, CT 06854
www.swinter.com

Telephone (203) 857-0200
Facsimile (203) 852-0741
E-mail: swinter@swinter.com

November 22, 2009

Local Government Energy Program
Energy Audit Final Report

For

The Princeton Farms Pump Station
Township of Hopewell
Pennington, NJ 08534

Project Number: LGEA16

TABLE OF CONTENTS

INTRODUCTION

On July 9th, August 6th and 7th 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 Princeton Farms Pump Station, the Municipal Building, the Public Works Garage, the Athletic Complex, the Union Fire and Rescue Station and the Brandon 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 Princeton 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 Princeton Farms Pump Station building was built in 1989 and houses a hydraulic generator for a grinder, a diesel generator, an exhaust fan and two suspended space heaters. The building consists of 416 square feet of conditioned main space. Two sewer pumps and a grinder are located in a pit in close proximity to the building. These pumps transport sewer water from an accumulation wet well to the Stony Brook Regional Sewerage Authority, which is 2 1/2 miles away. 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 Princeton Farms Pump Station building.

EXECUTIVE SUMMARY

The energy audit performed by Steven Winter Associates (SWA) encompasses the Princeton Farms Pump Station building located at 232 Pennington Rocky Hill Rd., Pennington, NJ 08534. The Princeton Farms Pump Station building is a one story building with a total floor area of 416 square feet and was built in 1989.

Based on the field visits performed by the SWA staff on July 9th, August 6th and 7th 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 Princeton Farms Pump Station building consumed 88,000 kWh or $14,136 worth of electricity. The energy consumption for the building was 300 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 Princeton 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 Princeton Farms Pump Station building, SWA has separated the investment opportunities into three recommended categories:

Category I Recommendations: Capital Improvements

- The two 40 Hp Fairbanks Morse sewer pumps in the pit require about $25,000 of annual maintenance with parts being relatively expensive. The existing pumps were replaced in kind in 2005. SWA recommends that the Township of Hopewell consider replacing these pumps with the more energy efficient submersible Flygt pumps. This changeover would eliminate the existing motor cooling fans and pumping seal water to the existing pump mechanical seals. Flygt pump parts cost a third of the cost of the existing pumps parts and the pumps would draw 13% less power to operate because they are cooled by the sewer water. The system has low opportunity for savings with a Variable Frequency Drive application (also considered) because of the pumps' relatively high static head. This is because most of the energy is used to overcome the elevation change associated with high static head system. SWA estimates the changeover to Flygt pumps would cost $90,000. This cannot be justified by energy savings alone, however with the reduced annual maintenance the payback would be 3 ½ years. The Township of Hopewell could prioritize this in the capital spending program.

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 recommends a total of **2** Energy Conservation Measures (ECMs) for the Princeton Farms Pump Station building, summarized in the following table. The total investment cost for these ECMs with incentives is **$30,140**. SWA estimates a first year savings of **$4,573** with a simple payback of **6.6 years**. SWA estimates that implementing the recommended ECMs will reduce the carbon footprint of the Princeton Farms Pump Station building by **8,278 lbs of CO_2.**

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 Princeton 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 Princeton Farms Pump Station building could also take advantage of incentives based on the installation of a photovoltaic (PV) system. Currently, the New Jersey Office of Clean Energy offers a Renewable Energy Incentive program that would pay $5,000 for the installation of a 5kW PV system. There is also an incentive that issues a Solar Renewable Energy Certificate for every 1,000kWh (1MWh) of electricity generated that can be sold or traded for the current market rate of electricity. $3,600 of SRECs will be received annually; however it requires proof of performance, application approval and negotiations with the utility. There is also a utility-sponsored loan program through PSE&G that would allow the building to pay for the installation of the PV system through a loan issued by PSE&G.

The following tables summarize the proposed Energy Conservation Measures (ECM) and their economic relevance.

PROPOSED													
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 $		
1.1	replace 7 incandescent lamps to CFL	$140	RS Means, Lit Search	141	kWh	0.1	kW	23	6.2	7	140	0.0	193
2	Install 5 kW PV System (with $1/W INCENTIVE and $600/1MWh SREC)	$30,000	Similar projects	5,902	kWh	5.0	kW	4,550	6.6	25	77,497	6.3	8,086
	Total Proposed	**$30,140**	-	-	-	**5.1**	**kW**	**$4,573**	**6.6**	**25**	**77,711**	**6.3**	**8,278**

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

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 $		
1.2	replace building internal lights: T12s to T8s with INCENTIVES (incl. 75% labor)	$370	RS Means, Lit Search, NJ Clean Energy Program	25	kWh	0.0	kW	4	92.6	20	58	-4.2	34

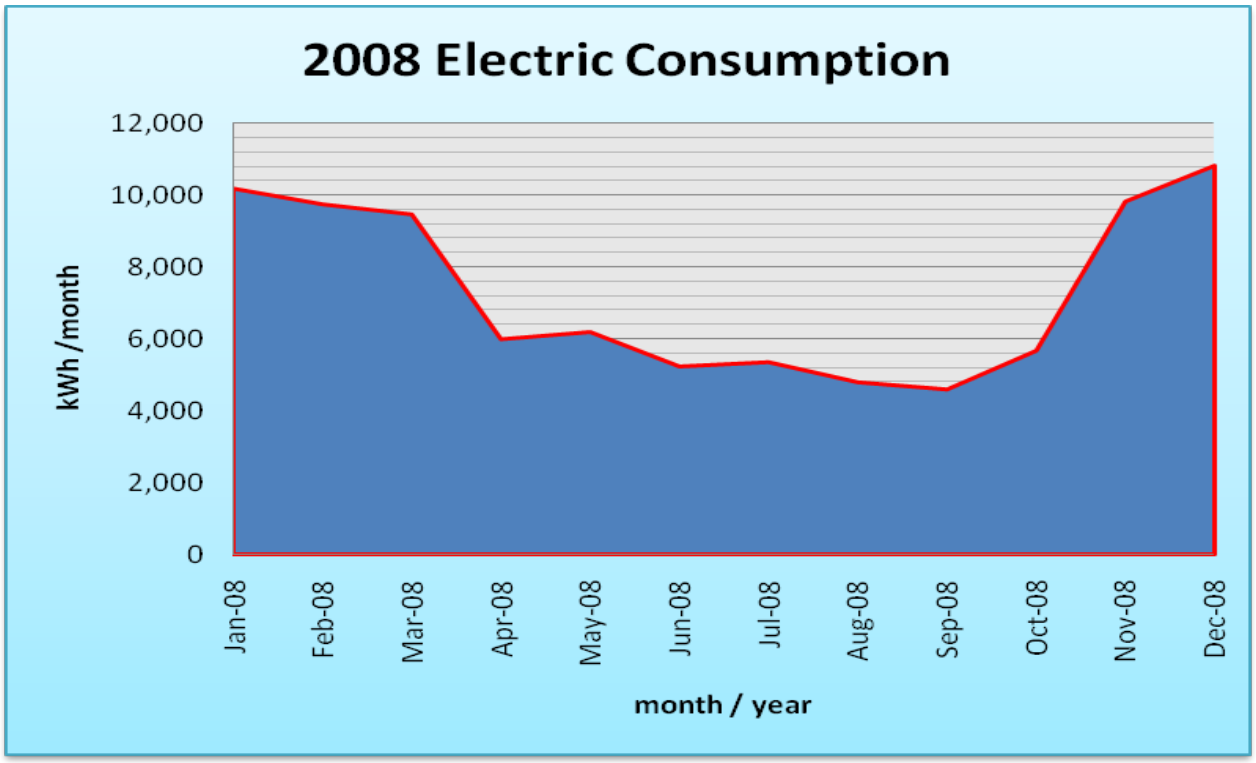
1. HISTORIC ENERGY CONSUMPTION

1.1. Energy use and cost analysis

SWA analyzed utility bills from December 2007 through February 2009 that were received from PSE&G supplying the Princeton Farms Pump Station building with electric power.

Electricity - The Princeton Farms Pump Station building is currently served by one electric meter. The Princeton Farms Pump Station building currently buys electricity from PSE&G at **an average rate of $0.161/kWh** based on 12 months of utility bills for 2008. The Princeton Farms Pump Station building purchased **approximately 88,000 kWh or $14,136 worth of electricity** in the previous year. The average monthly demand was 33 kW. Some electric fluctuations may be due to adjustments between estimated and actual meter readings.

The following chart shows electricity use for the Princeton Farms Pump Station building based on utility bills for the 12 month period of 2008. The annual electric use is 300 MM Btus. In the summer when schools are closed and people take vacations, the sewer flows are lower (coupled with electric building heaters being shut down), the pump station summer electric usage is lower than the rest of the year.



1.2. Utility rate

The Princeton 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 Princeton Farms Pump Station building currently pays an average rate of approximately $0.161/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 Princeton 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 Princeton 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 "hopewelltwp1") and TRC Energy Services (user name of TRC-LGEA).

2. FACILITY AND SYSTEMS DESCRIPTION

2.1. Building Characteristics

The Princeton Farm pump house building is a single-story structure built in 1989. The building consists of approximately 416 square feet of conditioned main space. This building houses 1 backup diesel generator and 2 suspended space heaters and a hydraulic generator for a grinder. Two sewer pumps and grinder are located a nearby pit. These pumps push sewer water from an accumulation wet well 2 1/2 miles to the Stony Brook Regional Sewerage Authority.

2.2. Building occupancy profiles

The building is in use as needed, roughly three and a half hours per week by two employees, during daytime hours.

2.3. Building envelope

2.3.1. Exterior Walls

The exterior walls consist of 8" CMU blocks, with no insulation in the walls, with brick veneer and vinyl siding. As heating costs are minimal for this small structure which is maintained above freezing conditions, SWA has no further recommendation for wall insulation. Regular maintenance should be performed on the exterior walls to maintain appropriate conditions.

2.3.2. Roof

The sloped roof areas with medium brown colored asphalt shingles appeared to be in good condition. Six inches of foil faced fiberglass is in the ceiling. Due to the current occupancy uses for the building, SWA does not have additional recommendations for adding insulation. SWA recommends the roof be replaced as signs of wear and tear increase with age.

2.3.3. Base

The building's base is on 8" reinforced concrete slab. The foundation has 2 coats of bituminous waterproof coating. 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

There are no windows at the Princeton Farms pump house.

2.3.5. Exterior doors

The hollow metal exterior doors were observed to be in good condition, except for some missing or worn weather-stripping. SWA recommends installing tight-fitting insulated doors with weather-stripping 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 Princeton Farms Pump Station building would benefit from air sealing any penetrations throughout the structure. SWA recommends air sealing attic top-plates. SWA recommends performing regular maintenance caulking, foaming, and sealing around penetrations 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 Princeton Farms Pump Station building is heated by 2 electric 5 kW ceiling mounted electric unit heaters and fans. The thermostat setting is kept slightly above freezing.

2.4.2. Cooling

The Princeton Farms Pump Station building is not air conditioned. Any cooling and fresh air circulation is achieved via cross-currents when opening doors and one building exhaust fan. There is one exhaust fan in the pump pit to keep the pump motors cool.

2.4.3. Ventilation

One exhaust fan purges the building air of the Princeton Farms Pump Station building. Two exhaust fans in the pit keep space purged from accumulation of explosive gases.

2.4.4. Domestic Hot Water

There isn't any potable water or DHW available in the building.

2.5. Electrical systems

2.5.1. Lighting

Interior Lighting - The Princeton Farms Pump Station building currently consists of mostly T12 fluorescent fixtures with magnetic ballasts with an area already retrofitted with T8 fixtures. 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. 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 70 Watt incandescent perimeter lamps. SWA recommends replacing any incandescent lamps with lower energy CFL bulbs. All exterior lighting is controlled by switch. There is not any immediate need to upgrade this lighting (except for any incandescent). The lights are turned on only a few hours a week and the road pole light provides another exterior source of lighting to the building.

2.5.2. Appliances and process

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

The two 40 Hp sewer pumps in the pit require about $25,000 of annual maintenance with parts being relatively expensive. Pump repair maintenance occurs about 3 times a year. A full replacement pump could cost upwards of $16,000. The pumps were replaced in 2005.

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 Princeton Farms Pump Station building is a single story building and therefore does not contain any elevator equipment.

2.5.4. Others electrical systems

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

3. EQUIPMENT LIST

Inventory

The Princeton Farms Pump Station						
Building System	**Description**	**Location**	**Model#**	**Fuel**	**Space served**	**Estimated Remaining useful life %**
Process	2 sewer pumps close coupled, 40 HP each, 3P, 480V, 60 Hz in wet well (specs. 225 gpm, 192 ft lift)	pit next to building	Fairbanks Morse 5434 B; soft start Sqr D LH4N272LY7	Electric	Princeton Farms Pump Station	60%
Process	1 hydraulic grinder - operating 24/7; with 5HP motor	hydraulic system in bldg	30000-12	Electric	Princeton Farms Pump Station	70%
Ventilation	1 exhaust fan for the building	bldg wall	-	Electric	Princeton Farms Pump Station	45%
Ventilation	2 exhaust fan for the wet well (manually operated)	wet well next to building	-	Electric	Princeton Farms Pump Station	45%
Ventilation	1 exhaust fan to remove heat generated by pump motors	pit next to building	-	Electric	Princeton Farms Pump Station	45%
Heating	2 small suspended space heaters - set to keep space above freezing - 5kW each - 3P, 480V, 60 Hz	inside bldg	-	Electric	Princeton Farms Pump Station	45%
Generator	1 backup 90 kV - diesel	inside bldg, generator room	Onan with Commons motor	Electric / Diesel	Princeton Farms Pump Station	45%
Transfor-mer	one transformer 480V - 110V	generator room	-	Electric	Princeton Farms Pump Station	45%
Lighting	See details - Appendix A	See details - Appendix A	-	Electric	Princeton 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 Princeton 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

- The two 40 Hp Fairbanks Morse sewer pumps in the pit require about $25,000 of annual maintenance with parts being relatively expensive. Pump repair maintenance occurs about 3 times a year. A full replacement pump could cost upwards of $16,000. The existing pumps were replaced in kind in 2005. SWA recommends that the Township of Hopewell consider replacing these pumps with the more energy efficient submersible Flygt pumps. This changeover would eliminate the existing motor cooling fans and pumping seal water to the existing pump mechanical seals. Flygt pump parts cost a third of the cost of the existing pumps parts and the pumps would draw 13% less power to operate because they are cooled by the sewer water. The system has low opportunity for savings with a Variable Frequency Drive application (which was also considered) because of the pumps' relatively high static head (TDH of 191 ft).This is because the system curve is flatter, so most of the energy is used to overcome the elevation change associated with high static head system. SWA estimates the changeover to Flygt pumps would cost $90,000. This cannot be justified by energy savings alone, however with the reduced annual maintenance the payback would be 3 ½ years. The Township of Hopewell could prioritize this in the capital spending program.

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	**Upgrade lighting: incandescent to CFLs and T12 magnetic fixtures to T8 electronic fixtures**
2	**Install a 5kW PV system to reduce annual electric consumption and demand**

ECM#1: *Upgrade existing lighting*

Description:

On the day of the site visit, SWA completed a lighting inventory of the Princeton Farms Pump Station building (see Appendix A). The existing lighting consists of many T12 fluorescent fixtures with magnetic ballasts, and incandescent lights. Some of the lights in the Princeton Farms Pump Station appear to have been partially upgraded recently to T8 fixtures. 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, and occupancy sensors be installed in a number of work spaces. See Appendix A for recommendations.

Installation cost:

Estimated installed cost: $140
Source of cost estimate: RS *Means; Published and established costs*

Economics (Some of the options considered with incentives):

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 7 incandescent lamps to CFL	$140	RS Means, Lit Search	141	kWh	0.1	kW	23	6.2	7	140	0.0	193

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 internal lights: T12s to T8s with INCENTIVES (incl. 75% labor)	$370	RS Means, Lit Search, NJ Clean Energy Program	25	kWh	0.0	kW	4	92.6	20	58	-4.2	34

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 $60.

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 Princeton 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

ECM#2: *Install 5kW PV system*

Description:

Currently, the Princeton Farms Pump Station building does not use any renewable energy systems. Renewable energy systems such as photovoltaic panels, can be mounted on the building roofs or lawns next to buildings, and can offset a portion of the purchased electricity for the building. Power stations generally have two separate electrical charges: usage and demand. Usage is the amount of electricity in kilowatt-hours that a building uses from month to month. Demand is the amount of electrical power that a building uses at any given instance in a month period. During the summer periods, when electric demand at a power station is high due to the amount of air conditioners, lights, equipment, etc… being used within the region, demand charges go up to offset the utility's cost to provide enough electricity at that given time. Photovoltaic systems not only offset the amount of electricity use by a building, but also reduce the building's electrical demand, resulting in a higher cost savings as well. SWA presents below the economics, however does not recommend at this time installing a 5kW PV system to offset electrical demand for the building and reduce the annual net electric consumption for the building, because there are insufficient guaranteed incentives from NJ rebates at this time to justify the investment. The Princeton Farms Pump Station is also not eligible for a 30% federal tax credit. The Township of Hopewell may consider applying for a grant and / or engage a PV generator / leaser who would install the PV system and then sell the power at a reduced rate. PSE&G provides the ability to buy SRECs at $600 / MWh or best market offer.

There are many possible locations for a 5kW PV installation on the ground next to the building. A commercial multi-crystalline 123 watt panel (17.2 volts, 7.16 amps) has 10.7 square feet of surface area (11.51 watts per square foot). A 5kW system needs approximately 41 panels which would take up 435 square feet.

The installation of a renewable Solar Photovoltaic power generating system could serve as a good educational tool and exhibit for the community.

Installation cost:

Estimated installed cost: $30,000
Source of cost estimate: Similar projects

Economics (with some incentives):

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 5 kW PV System (with $1/W INCENTIVE and $600/1MWh SREC)	$30,000	Similar projects	5,902	kWh	5.0	kW	4,550	6.6	25	77,497	6.3	8,086

Assumptions: SWA estimated the cost and savings of the system based on past PV projects. SWA projected physical dimensions based on a typical Polycrystalline Solar Panel by Sharp Electronics (123 Watts, model #ND-123UJF). PV systems are sized based on Watts and physical dimensions for an array will differ with the efficiency of a given solar panel (W/sq ft).

Rebates/financial incentives:

NJ Clean Energy - Renewable Energy Incentive Program, Incentive based on $1.00 / watt Solar PV application. Incentive amount for this application is $5,000.
http://www.njcleanenergy.com/renewable-energy/programs/renewable-energy-incentive-program

NJ Clean Energy - Solar Renewable Energy Certificate Program. Each time a solar electric system generates 1000kWh (1MWh) of electricity, a SREC is issued which can then be sold or traded separately from the power. The buildings must also become net-metered in order to earn SRECs as well as sell power back to the electric grid. $3,600 has been incorporated in the above costs, however it requires proof of performance, application approval and negotiations with the utility.

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

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 in no available gas service and it is costly to bring to the building at this time.

5.6. Geothermal

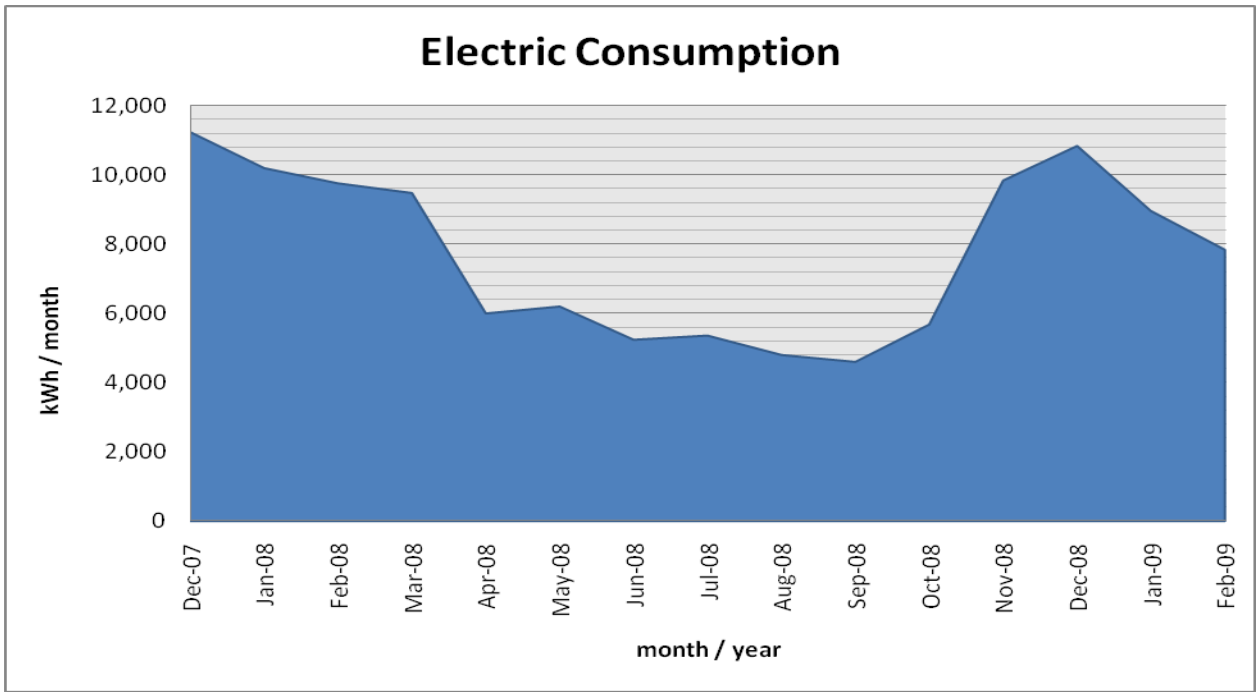
Description:

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

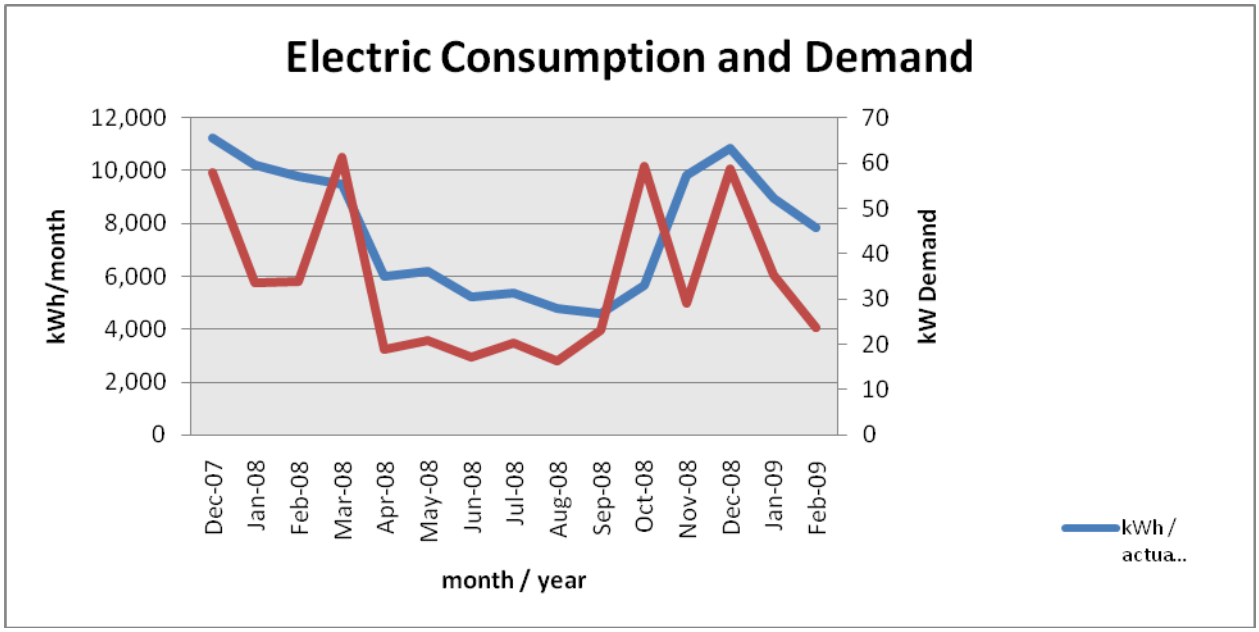
6. ENERGY PURCHASING AND PROCUREMENT STRATEGIES

6.1. Load profiles

The following are charts that show the annual electric load profiles for the Princeton Farms Pump Station building. In the summer when schools are closed and people take vacations, the sewer flows are lower (coupled with electric building heaters being shut down), the pump station summer electric usage is lower than the rest of the year.



Also, note below how the electrical Demand peaks follow the electrical consumption peaks.



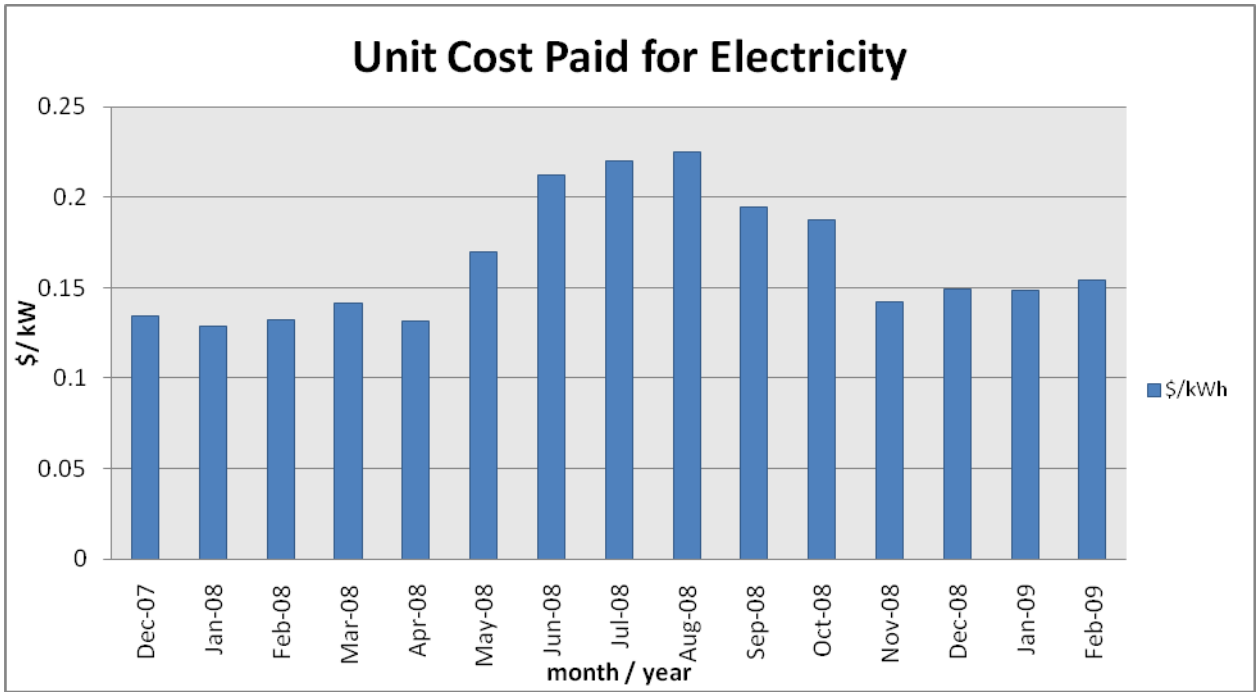
6.2. Tariff analysis

The Princeton 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 Princeton 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 Princeton 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 Princeton Farms Pump Station does not have natural gas service. Electricity is purchased directly for the Princeton 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 Princeton 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 Princeton 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 Princeton 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

Princeton Farms Pump Station Existing Lighting Conditions															Proposed Lighting										
#	Bldg	Flr	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)	Con-trols	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)	Con-trols	Total Power (Watts)	further W-hr/day reduction with occupancy sensors
1	PFPS	1	inside bldg	-	T12-4ft	M	2	2	F	34	2	272	S	n	**T8 4'**	**E**	**2**	**2**	**F**	**32**	**2**	**204**	**S**	**128**	
2	PFPS	1	inside bldg	-	T8-4ft	M	2	2	F	32	2	256	S	n	T8 4'	E	2	2	F	32	2	256	S	128	
3	PFPS	1	exterior	ext	incand	-	7	1	I	70	1	490	S	NA	**CFL**	**-**	**7**	**1**	**CFL**	**15**	**1**	**105**	**S**	**105**	
				TOTALS exterior								490										105			
				TOTALS interior								528										460		361	0
annual consumption (kWh)												372										206	includes occupancy sensors		
estimated cost ($/year)												$58										$32			
Princeton Farms Pump Station total light power (Watt)												754										361			
Princeton Farms Pump Station light power density (Watt/sq ft)												1.81										0.87			
Proposed Annual Savings (kWh)												165													
Proposed Annual Cost Savings ($)												$26													
Proposed Investment ($)												$510													
surface area (sq ft)												416										416			
Legend: PFPS - Princeton 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

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