

Green Buildings and Environmental Sustainability Plan for Bernards Township

Prepared by Bernards Township Planning Board and
Bernards Township Green Team
with assistance from
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INTRODUCTION

This Green Buildings and Environmental Sustainability Plan Element of the Master Plan (Green Plan Element) has been prepared in accordance with the Municipal Land Use Law (M.L.U.L.). N.J.S.A. 40:55D-28a provides that the Planning Board “may prepare and, after public hearing, adopt or amend a master plan or component parts thereof, to guide the use of lands within the municipality in a manner that protects public health and safety and promotes the general welfare.” The purpose of the Green Plan element is to establish goals, policies and strategies to protect natural resources and to create a healthy and sustainable economy and society.

Municipal planning for ‘green buildings and environmental sustainability’ is a new and dynamic field, and the 2008 statutory authorization for this plan element is among the most recent amendments to the Municipal Land Use Law. According to N.J.S.A. 40:55D-28b(16), a Green Buildings And Environmental Sustainability Plan Element:

“...shall provide for, encourage, and promote the efficient use of natural resources; consider the impact of buildings on the local, regional and global environment; allow ecosystems to function naturally; conserve and reuse water; treat storm water on site; and optimize climatic conditions through site orientation and design.”

The M.L.U.L. focus is on integrating local planning goals and objectives in a way that simultaneously addresses these several new provisions in the law. It raises the question “how can a municipality promote the efficient use of natural resources while at the same time allow ecosystems to function naturally?”

Community goals and objectives can be expected to change and evolve rapidly as new and innovative green approaches are conceived and developed, but it is critical that this plan element reinforce, and not detract from, Bernards’ desirable established community character as a carefully planned community.

Since the terms “green” and “sustainable” have become commonplace in today’s lexicon, it is important to define the terms “green” and “sustainable”. A glossary of “green” terms is appended to this plan, which includes the following two terms:

“Green design” is a general term implying a direction of improvement in design- i.e., continual improvement towards a whole and healthy integration of human activities with natural systems.

“Sustainability” is the capability to equitably meet the vital human needs of the present without compromising the ability of future generations to meet

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their own needs by preserving and protecting the area's ecosystems and natural resources. The concept of sustainability describes a condition in which human use of natural resources, required for the continuation of life, is in balance with nature's ability to replenish them.

When viewed together with the M.L.U.L. provisions for this Plan Element, a theme emerges centered on an underlying principle of conservation at a broad-based level.

More than one-half (nine out of fifteen) of the purposes of the M.L.U.L. direct the Planning Board to protect the environment, prevent urban sprawl, and protect the State's natural resources. These nine purposes of the law are listed below, which are consistent with the locally identified goals and objectives of this plan.

- (a) To encourage municipal action to guide the appropriate use of or development of all lands in the state, in a manner which will promote the public health, safety, morals and general welfare;
- (b) To secure safety from fire, flood, panic, and other natural and man-made disasters;
- (c) To provide adequate light, air and open space;
- (d) To ensure that the development of individual municipalities does not conflict with the development and general welfare of neighboring municipalities, the county and the State as a whole;
- (e) To promote the establishment of appropriate population densities and concentrations that will contribute to the well-being of persons, neighborhoods, communities and regions, and the preservation of the environment;
- (g) To provide sufficient space in appropriate locations for a variety of agricultural, residential, recreational, commercial, industrial uses, and open space both public and private, according to their respective environmental requirements in order to meet the needs of all New Jersey citizens;
- (j) To promote the conservation of historic sites and districts, open space, energy resources and valuable natural resources in the State and to prevent urban sprawl and degradation of the environment through improper use of the land;
- (n) To promote utilization of renewable energy sources; and
- (o) To promote the maximum practicable recovery and recycling of recyclable materials from municipal solid waste through the use of planning practices designed to incorporate the State Recycling Plan goals and to compliment municipal recycling programs.

The Planning Board has prepared this Green Plan element in furtherance of the M.L.U.L. purposes to conserve natural resources and promote the maintenance of a clean and healthy natural and built environment.

GOALS AND OBJECTIVES

The overriding goal of this Green Plan Element is to outline successful, sustainable practices to guide local business, industry, school, government and community policies, including efforts to reduce pollution, promote energy efficiency and use of renewable energy.

The following Master Plan Goals and Objectives are directly relevant to the Green Plan:

GOALS

1. To promote and encourage social comity, civic responsibility and neighborliness, which are key quality of life indicators in Bernards.
2. To promote sustainable practices in the design, construction and operation of public and private facilities.
3. To encourage an overarching respect for the natural environment and a desire to leave Bernards a better place as a result of these plans.
4. To retain the rural and agricultural character of the township to the greatest extent practicable.
5. To limit development to densities and intensities that can be adequately served by existing and planned private and municipal capital facilities and the natural and built infrastructure, and not purchasing additional wastewater treatment capacity to permit collection line extensions.
6. To limit development to densities and intensities that will retain the remaining natural areas of the Township and protect sensitive environmental areas.
7. To encourage the use of design techniques that result in energy and water conservation and minimize the impact of development on the everyday environment.
8. To continue to examine, and when appropriate, amend the Land Development Ordinance, to assure flexibility and excellence of design.
9. To examine new design approaches such as lot averaging and other open lands conservation techniques to determine their applicability in Bernards.
10. To promote the preservation of the Township's historic sites and districts.

OBJECTIVES

Land Use and Management

The following land use objectives serve to guide the master plan:

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1. Land use policies should strive to maintain and enhance community character, protect the integrity of existing neighborhoods and prevent the intrusion of incompatible new development.
2. The densities and intensities of permitted development on the limited remaining vacant lands should respect the environmental capabilities and limitations of these lands.
3. Groundwater aquifers and surface water quality and quantity should be protected, through the proper management of aquifer recharge areas, wetlands and their transition areas and fractured bedrock groundwater aquifers.
4. The Land Use Plan should assure a diversity and balance among various land uses that respects and reflects all the goals of the Master Plan.
5. Development densities and intensities should be planned at levels which do not exceed the capacity of the natural environment and current infrastructure, and growth-inducing infrastructure should not be extended into the rural countryside.

Green Buildings and Environmental Sustainability

1. Environmentally sensitive land should be protected through acquisitions and/or conservation easements.
2. Bernards should continue to promote and enhance local stewardship of open spaces.
3. Bernards should strive to create a more sustainable community through land use, transportation, local economies, and municipal services.
4. The Township should limit the impact of development and redevelopment on natural resources and promote regenerative measures to alleviate negative effects on individual sites and reduce the overall impact on the ecosystem. Historic preservation and adaptive reuse should be encouraged as sustainable green building techniques.
5. Encourage the use of alternative energy technologies, such as active solar collection for electricity or passive solar space heating without negative neighborhood visual impacts.
6. A coordinated policy should be created among municipal departments to purchase green goods and services as a means to save money, energy, and water, and to reduce waste.
7. The Township should promote sustainability, literacy, awareness, understanding, and action among municipal staff, residents, and the business and non-profit sectors of the community, including the need for and benefits of sustainable choices and behaviors.

SUSTAINABILITY IN BERNARDS TOWNSHIP

Planning for sustainability encompasses the decision-making processes for determining where and how to preserve and conserve, and where and how to grow. For a community to be “green,” it should be in harmony and balance with its natural environment. Harmony and balance includes protecting our natural resources and maintaining biodiversity, maintaining a healthy economy, and providing safe, healthy places to live, work, and recreate. It is important to achieve a dynamic balance among the environment, the economy and societal needs, collectively referred to as the “triple bottom line”.

To help bring the environment, the economy and the community into better balance, this plan addresses the interdependence of the three “P’s” of sustainability - *people*, *profit* and *planet*. To achieve a good balance of the “three P’s,” it is necessary to understand a community’s impact on its local, regional, and global environment. For these efforts to achieve maximum effectiveness, a wide range of stakeholders need to collaborate on a comprehensive approach that addresses the “triple bottom line” of sustainability.

For such a balance to be maintained, we need to thoroughly examine and improve our efforts to implement environmentally sound practices while recognizing that there are economic and social constraints that need to be considered when evaluating environmental initiatives. From a planning perspective, the intent is to examine and recommend green initiatives that are sustainable, balancing the environmental benefit against its cost both economically and socially. Bernards Township is committed to work towards becoming a sustainable community and has initiated efforts through the Environmental Commission, the Green Team, and the Sustainable Jersey program.

The Sustainable Jersey Program is for New Jersey municipalities that wish to control costs, save money, and take steps to sustain community quality of life over the long term through green planning. This innovative new program is an initiative of the NJ State League of Municipalities’ Mayors Committee for a Green Future, the Municipal Land Use Center at the College of New Jersey, the New Jersey Sustainable State Institute at Rutgers University, the NJDEP, the Rutgers Center for Green Building, the NJ Board of Public Utilities, and a coalition of non-profits, state agencies, and sustainability experts. Bernards Township earned Sustainable Jersey certification in November 2009. Certification offers technical resources for a municipality to implement their program and funding as it becomes available. However this is just one means to encourage sustainability throughout the community. Interested residents can learn more about Sustainable Jersey certification at www.sustainablejersey.com.

The Township has identified a policy to work towards sustainability in all municipal functions and operations, when appropriate. At the same time, a variety of

initiatives will be offered to inspire residents to move towards a lifestyle that minimizes human impact on the environment. Sustainability practices will be considered in the following activities:

- construction/occupation of new buildings
- retrofit and upgrade of existing buildings
- delivery of municipal services
- maintenance, enhancement, and operation of municipal facilities and properties
- maintenance, enhancement, and operation of our homes and commercial properties
- consumption and disposal of products
- education of our children and ourselves

Sustainability seeks to limit the intensity of potential impacts on the environment on a local and regional level. The intent of Bernards' sustainability movement is to progress beyond minimizing environmental impacts and toward regenerating ecosystem function, as well as repairing and remediating previous damage to the environment.

Green Plan Strategies

In order to achieve the goals outlined above this Green Plan Element is designed to outline successful, sustainable practices to guide local policies, including efforts to reduce pollution, promote energy efficiency and use of renewable energy. This can be achieved through:

- Municipal Planning and Design
- Resource Protection
- Energy Conservation
- Operations & Maintenance
- Education & Outreach

The greatest achievement of the plan will be to gain the involvement and acceptance of green initiatives in the local community. Continuing education and outreach are needed to lead in the direction of a more sustainable future.

MUNICIPAL PLANNING AND DESIGN

Creating a sustainable community is a top-down and a bottom-up approach. Through municipal planning and design, local officials will make planning decisions that will create a more sustainable community. Simultaneously, residents will work together to take action and provide necessary feedback that will determine the success of the Township's efforts toward sustainability.

This plan considers a number of larger issues to lessen the Township's environmental impact. Allocating resources in a responsible, more effective and efficient manner, will be a key element in land use planning, land preservation, and creating community vitality. Like much of New Jersey, Bernards Township is a product of sprawl-induced rapid development that did not account for sustainability. While the Township has done an excellent job of acquiring open space throughout the community, parcels of open land remain, presenting an opportunity to more wisely and proactively plan for their use.

In 2007, the Township Committee created the Bernards Township Green Team Advisory Committee to advise the Township Committee on ways to improve municipal operations with "Green" initiatives that are economically and environmentally sound through research and evaluation. The Green Team's goals were to audit municipal facilities, evaluate municipal fleet vehicles, and report on suggested best practices for greener municipal operations. Having met those goals, new goals were given in January, 2010: Maintain certification, and strive for the next certification level in Sustainable Jersey; advice on potential renewable energy projects at municipal facilities; and maintain and enhance the www.bernards.org based "Green Guide" as a reference for our citizens and a resource to other communities.

In October 2007, the Green Team prepared a report entitled, Sustainability Planning in Bernards Township (Appendix __). This report identifies areas where the Township could improve policies toward becoming a more sustainable community. For example, promoting alternative modes of transportation throughout the community requires that facilities be put in place to accommodate all users.

While Bernards Township features many bike paths and trails through parks and recreation areas, the Township should consider additional or improved bike paths in heavy traffic areas and areas where they would be used most. Areas that generate heavy traffic, like schools and local shopping centers, could benefit from the addition of bike paths to provide alternative means of travel and to reduce motor vehicle traffic, thereby reducing vehicle trips, idling and tailpipe emissions. The Circulation Plan discusses the walking and biking pathways serving as connections between community facilities (commercial and employment and historic sites, parks, playgrounds, schools, transportation nodes). Such features,

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which reduce motor vehicle use and help to improve air quality, should be encouraged in all site plan and subdivision applications.

In addition, the Township has been a leader in energy efficiency (see Energy Conservation) and encourages green building practices, such as utilizing the LEED rating system, which may be considered for use as a model in the Township's planning and future ordinances.

In summary, to achieve sustainability goals in Municipal Planning and Design, the Township should consider a comprehensive and holistic view of planning decisions and consider measures to:

- a. Encourage design options that create a visually pleasing pedestrian experience, that preserve greenfields and natural resources, and that promote a sense of community.
- b. Promote transportation alternatives to the automobile and encourage the single-occupancy driver to utilize those alternatives.
- c. Encourage practices and opportunities with local farmers.
- d. Encourage local businesses to adopt green business practices.
- e. Promote sustainability in municipal services to increase energy efficiency, protect and properly manage wildlife areas, and conserve water.
- f. Encourage the utilization of green building standards and integration of renewable energy technologies for new or renovated buildings that can reuse materials, minimize environmental impact, and reduce future energy costs through innovative construction.

RESOURCE PROTECTION

Development and redevelopment, which modifies the natural features of individual sites, can also have a greater impact on the surrounding ecosystem. Regenerative design objectives encourage development, preservation and restoration practices that limit environmental impact. Bernards Township should promote regenerative design principles that are aimed at multiple objectives including economic savings, remediation or restoration of natural systems that bring back the resource's natural state and design that improves quality of life. Regenerative design objectives applied to agricultural lands, open spaces, soils, and greenways can serve to improve natural function and increase the utility of these productive landscapes for people and for wildlife.

WATER

Bernards Township's stormwater management systems include drainage basins and storm sewers, which are highly effective in removing flood water from the community. Most of Bernards' roads are outfitted with Belgian block curbing and storm sewer systems that collect stormwater and nonpoint pollutants into storm sewers that discharge to surface waters. Proper maintenance of storm sewers and drainage basins can extend the life and function of these systems. Basin maintenance can improve the groundwater recharge function of these structures and reduce stormwater flows to surface waters. The section on surface water in the Conservation Plan addresses the benefits of natural stormwater management techniques to protect local waters from pollution.

The reduction of pesticide, herbicide and fertilizer use on landscaping and lawn areas decreases the amount of non-point source pollution entering local waterways as well as the groundwater regime. Integrated Pest Management (IPM) is a method of managing insects, undesired plants, and plant diseases with the tools that are least likely to impact human health or the environment. In 2008, Resolution #080520 established an Integrated Pest Management (IPM) policy within the Township. Preventing pollutants from entering the storm sewer system can significantly reduce nitrogen pollutant loads in stormwater and serve to improve water quality and biodiversity in streams and rivers in Bernards as well as downstream.

Snow removal is also a concern as water quality is threatened with every application of salt during winter weather. According to the Township Public Works Department, "deicers, primarily salt, are used regularly in a sensible application. At times other environmentally safe additives are used to enhance the deicing ability of salt at lower temperatures." The Township should consider utilizing the environmentally-safe option for deicing over traditional road salting.

WILDLIFE & VEGETATION

The Township's Conservation Plan states that 50% of Bernards Township's land mass is categorized as habitat suitable to threatened or endangered species. In order to protect these critical habitats from further degradation and to promote species diversity, the Township should consider inventorying species in the community, identify their habitat requirements, and monitor the effectiveness of policies put in place to protect these habitats over time. Bernards has adopted a Natural Resources Inventory (NRI) and established a Community Forestry Program, both of which can help to educate the public and continue to inform data sources such as the NJ Landscape Project.

LIGHT POLLUTION

Street lights, security lights, decorative lighting – all of these become an increasing issue as population growth leads to new homes and more light. A 1996 study by the NJ Light Pollution Study Commission found that the effects of light pollution include glare, energy waste, light trespass (nuisance light) and sky glow. The study recommended twelve strategies to reduce light pollution. Some of the recommendations include: aiming of lighting; public awareness of light pollution; designation of dark sky areas; and other potential guidelines for the development of local ordinances. Using reduced voltage in outdoor decorative lighting will serve to dim and reduce lighting impacts on the dark sky and reduce energy consumption that can yield important energy cost saving benefits.

AIR QUALITY

The Township currently has an ordinance in place banning excessive idling of all motor vehicles within the Township; however there is a lack of public awareness of the ordinance. In Bernards there are a number of locations where idling occurs: at convenience stores, at bus stops, in parking lots, in drive-thru service lanes (i.e. bank or gas station) and in lines of cars waiting to pick up or drop off children at schools. Bernards should develop a public awareness campaign to reduce the amount of idling that occurs in the Township.

In summary, to promote enhanced protection and restoration of the Township's natural resources, the Township, in partnership with local organizations, should consider:

- a. Adopting or refining Water Quality Best Management Practices (BMP's) to protect the quality of surface waters and promote healthy wildlife habitats.
- b. Encourage land use practices that reduce the potential impact to surface waters from non-point source pollution.
- c. Conducting an inventory of wildlife habitat to evaluate best practices for preserving and monitoring of wildlife and ecology.
- d. Reducing light pollution and designating "dark sky" areas where limited exterior lighting is permitted.

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- e. Promote and enforce additional anti-idling policies to improve air quality.

ENERGY CONSERVATION

According to the U.S. Department of Energy, buildings consume approximately 37% of the energy and 68% of the electricity produced in the United States annually. In addition, burning of fossil-based fuels to generate electricity releases carbon dioxide, which contributes to global climate change.¹ Development of efficient energy use practices within a building helps to reduce the amount of electricity used and reduces the demand for carbon-based fuels. Innovative technologies, such as solar, wind, and geothermal power, can also reduce the need for extraction of additional fossil fuels to generate electricity.

The 2007 Green Team report “Sustainability Planning in Bernards Township” found that the largest energy consumers under the control of Bernards Township are the Municipal Building, the Police Department, the Library, the Health Department, and the Department of Public Works. Average monthly energy expenses for these buildings combined is about \$15,000. The Green Team further recommended that Bernards Township reduce the combined total of energy expenses by one third, to \$10,000.

Since the release of that report, the Township has promoted better insulation in homes, encouraged the use of more energy-efficient appliances, and promoted other innovative techniques to reduce the community’s dependence on fossil fuels.

In summary, to ensure greater energy independence, the Township should advance strategies designed to:

- a. Promote the construction of green buildings.
- b. Promote utilization of context sensitive and compatible green rehabilitation strategies for existing buildings.
- c. Encourage the utilization of resources through the Sustainable Jersey program to increase energy efficiency and energy conservation.
- d. Encourage Township residents to participate in the NJ CleanPower Choice Program and to consider renewable energy sources and technologies when possible. (More information on the NJ CleanPower Choice Program is available at: <http://www.njcleanenergy.com/renewable-energy/programs/cleanpower-choice-program/new-jersey-cleanpower-choice-program>).
- e. Promote awareness education among Township staff, businesses, schools and residents on the benefits of energy conservation.

¹ US Green Building Council, New Construction & Major Renovation Version 2.2 Reference Guide, 2nd Edition, September 2006.

OPERATIONS & MAINTENANCE

Bernards Township has established a policy on purchasing that works to minimize the impacts on human health and the natural environment. A coordinated policy for environmentally preferable purchasing (EPP) of green goods and services, as an alternative to potentially harmful products can save residents, government and businesses money, energy and water and reduce waste. Green purchasing also takes into account the raw materials used to manufacture the product, the production itself, packaging and distribution and the distance of transporting the product to the final destination.

The Township's integrated policy on the maintenance of lawns and landscaping requires the use of natural pesticides and fertilizers, thereby reducing the potential to degrade local waterways and groundwater sources. The use of drought-tolerant, hardy varieties of grass can reduce the need for watering and fertilization in municipal parks. The Township should expand outreach regarding this Township-wide policy to individual homeowners and businesses.

In addition, the Township maintains and continually adds to procurement measures, environmentally-preferable products and services in an effort to support green and sustainable industries. This growing list also guides the Township to utilize the EPP program to avoid the purchase of harmful products. This helps protect employees who spend significant amounts of time working with potentially harmful products. The Rutgers website at <http://www.cook.rutgers.edu/~envpurchase/> provides a variety of EPP lists that will assist Bernards Township through the development of their EPP program. The categories of lists include: Paper, Electronics, Packaging, Building Materials, Chemicals/Cleaning, Landscaping and Other.

In summary, to advance an integrated sustainability policy within municipal operations, the Township should:

- a. Encourage all municipal departments to establish a coordinated Green Purchasing Program for the purchase of goods and services.
- b. Expand the green Grounds and Maintenance Program to ensure that municipally-maintained parks, gardens, and landscaped areas are managed in the most efficient and environmentally friendly manner.
- c. Encourage recycling and waste reduction throughout all municipal departments, and among residents, businesses, schools, and other public facilities.
- d. Continue to expand recycling programs.

EDUCATION & OUTREACH

An aware and educated public can provide support and feedback to policy-makers as short-term and long-term actions are implemented. The education and outreach process is a continuous effort through which Bernards Township can model and share sustainable practices, such as conserving energy, green purchasing, recycling, etc.

This Green Plan Element offers many opportunities for Township residents to participate in reducing the individual, as well as the community, environmental footprint. The success of the plan will be measured by a change in behavior among various stakeholders, who in turn, learn about sustainability initiatives and implement sustainable practices.

Presently, the Township involves the public in a number of community activities such as Charter Day and Community Wildlife Habitat projects. In addition, the Township and Green Team have published several information pieces to educate the public about topics like cost effective home improvements, recycling guidelines, and best use practices for energy consuming appliances, energy saving computing practices, and best office practices.

In summary, to ensure an educated, involved, and informed public body, the Township should strive to:

- a. Provide opportunities for sustainability education throughout all sectors of the community.
- b. Promote awareness and education on energy conservation through the use of established materials such as the Bernards Township Green Guide, and through media outlets that exist in the Township.
- c. Encourage community involvement and support volunteerism to increase the level of participation in green initiatives and community projects.
- d. Encourage residents to initiate their own sustainability projects, to share their experiences and to provide suggestions for such actions to the Township.

SUMMARY

Bernards Township is acknowledged as a leader in New Jersey's green movement through its 2009 Sustainable Jersey certification. Further success in becoming a more sustainable community will occur through local planning choices that are consistent with the green buildings and environmental sustainability goals and objectives of this plan. Through the decisions, practices and policies of local government and Bernards' residents, the community will achieve success in its efforts to strive for a sustainable future.

GLOSSARY OF GREEN TERMS

Adaptive Reuse The process of adapting old structures for purposes other than those initially intended. An example of adaptive reuse could include transforming an old warehouse or factory into apartments or lofts.

Context-Sensitive Design Roadway design that is in harmony with the community and preserves the environmental, scenic, aesthetic, historic, and natural resource values of an area.

Environmental Footprint A measure of human demand on the Earth's [ecosystems](#), it compares human demand with planet [Earth's ecological](#) capacity to regenerate. It represents the amount of biologically productive land and sea area needed to regenerate the resources a human [population](#) consumes and to absorb and render harmless the corresponding waste. Using this assessment, it is possible to estimate how much of the [Earth](#) (or how many planet Earths) it would take to support humanity if everybody lived a given lifestyle. For 2005, humanity's total ecological footprint was estimated at 1.3 planet Earths - in other words, humanity uses ecological services 1.3 times as fast as Earth can renew them.²

Environmentally Preferable Purchasing (EPP) Program initiated by former President Bill Clinton in September 1998, with Executive Order (EO)13101, entitled "Greening the Government through Waste Prevention, Recycling and Federal Acquisition." The program encourages the purchase of products or services that "have a lesser or reduced effect on human health and the environment when compared with competing products or services that serve the same purpose. This comparison may consider raw materials acquisition, production, manufacturing, packaging, distribution, reuse, operation, maintenance or disposal of the product or service."³

² Global Footprint Network. www.footprintnetwork.org

³ US EPA, EPP guidelines <http://www.epa.gov/epp/pubs/guidance/finalguidance.htm>

Fossil Fuels	Fuels formed by natural resources such as anaerobic decomposition of buried dead organisms. Fossil fuels range from volatile materials with low carbon-hydrogen ratios like methane, to liquid petroleum, to nonvolatile materials composed of almost pure carbon, like anthracite coal. Fossil fuels are non-renewable (see definition below) resources because they take millions of years to form, and reserves are being depleted much faster than new ones are being formed.
Geothermal Power	Power extracted from heat stored in the earth. The Earth's geothermal resources are theoretically more than adequate to supply humanity's energy needs, but only a very small fraction of it may be profitably exploited.
Green Business	A business that manufactures and/or sells organic and eco-friendly products. Successful green businesses not only benefit the environment, but also use green business practices as means to market their products. ⁴
Green Goods and Services	Organic and eco-friendly products, typically manufactured and sold by a green business.
Greenfield	Any parcel of land that has not had any previous type of development on site. Greenfield sites are almost always found in suburban or rural areas. Parcels of land include but are not limited to undeveloped farmlands and woodlands.
Greenhouse Gas	Gases in the atmosphere that absorb and emit radiation within the thermal infrared range. The main greenhouse gases in the Earth's atmosphere are water vapor, carbon dioxide, methane, nitrous oxide, and ozone.
Indicators	Provide direction for further investigation and progress towards achieving goals; they do not provide the solutions themselves. ⁵ Examples include: average vehicle miles traveled by residents of the community; average energy use of all government facilities in the

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⁵ NJ Sustainable State Institute www.njssi.org

community; voter turnout at primary elections, etc.

LEED™

The Leadership in Energy and Environmental Design (LEED™) Green Building Rating System was developed by the U.S. Green Building Council, a non-profit trade organization that promotes sustainability in building design and construction. LEED™-certified buildings use resources more efficiently when compared to conventional buildings that are simply built to code.

**Non-Point Source
Pollution (NPS)**

Generally results from land runoff, precipitation, atmospheric deposition, drainage, seepage or hydrologic modification. Any source of water pollution that does not meet the legal definition of "point source" in section 502(14) of the Clean Water Act (see definition of Point Source Pollution, below). Non-point sources can include, but are not limited to: excess fertilizers, herbicides and insecticides from agricultural lands and residential areas; oil, grease and toxic chemicals from urban runoff and energy production; sediment from improperly managed construction sites, crop and forest lands, and eroding streambanks; salt from de-icing and irrigation practices and acid drainage from abandoned mines; bacteria and nutrients from livestock, pet wastes and faulty septic systems; and atmospheric deposition and hydromodification.

**Non-Renewable
Resource**

A natural resource that cannot be produced, re-grown, regenerated, or reused on a scale which can sustain its consumption rate.

**Point Source
Pollution**

Any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged. Does not include agricultural storm water discharges and return flows from irrigated agriculture.

**Raw Materials
Regeneration**

the process of restoring, renewing or revitalizing sources of energy and materials, creating sustainable systems that integrate the needs of society with the integrity of nature.

Remediation

Removal of pollution or contaminants from environmental media such as soil, groundwater, sediment, or surface water for the general protection of human health and the environment or from a brownfield site intended for redevelopment.

Renewable Resource

Those replaced by natural processes at a rate comparable or faster than its rate of consumption by humans. May also include commodities such as wood, paper, and leather, if harvesting is performed in a sustainable manner.

Restoration

Renewing a degraded, damaged, or destroyed ecosystem through active human intervention.

Solar Power

The capture of energy from sunlight. The energy can be in two forms: heat or electricity. Heat from the sun can be captured to heat water or air; photovoltaics (PV) generate electricity directly from solar rays. Power gained from PV can reduce or eliminate the need for purchased electricity (usually electricity gained from burning fossil fuels) or, if energy gained from PV exceeds the home's requirements, the extra electricity can be sold back to the home's supplier of energy, typically for credit.

Sustainability

The capability to equitably meet the vital human needs of the present without compromising the ability of future generations to meet their own needs by preserving and protecting the area's ecosystems and natural resources. The concept of sustainability describes a condition in which human use of natural resources, required for the continuation of life, is in balance with Nature's ability to replenish them.⁶

⁶ American Planning Association – Policy Guide on Planning for Sustainability – p. 3

Targets quantitative measures that identify what a community needs to do to achieve sustainability. Targets identify if a community is generally moving in the right direction and how far it still has to go to achieve sustainability.

Triple Bottom Line (TBL) A method of accounting that attempts to describe the social and environmental impact of an organization's activities, in a measurable way, to its economic performance in order to show improvement or to make evaluation more in-depth.

Wind Power The conversion of wind energy into a useful form of energy, such as using wind turbines to make electricity, wind mills for mechanical power, or wind pumps for pumping water or drainage.

RELATED TERMS NOT FOUND IN THIS PLAN

Brownfield	Sites that are abandoned, idled, or under-used industrial and commercial facilities where expansion or redevelopment is complicated by real or perceived environmental contaminations
Carbon Footprint	A measure of the impact our activities have on the environment, and in particular climate change. It relates to the amount of greenhouse gases produced in our day-to-day lives through burning fossil fuels for electricity, heating and transportation etc. ⁷
High Performance Design	Design that realizes high efficiency and reduced impact in the building structure, operations, and site activities; Focuses on technical efficiency; May limit embracing the larger natural system benefits.
Green Design	A general term implying a direction of improvement in design- i.e., continual improvement towards a whole and healthy integration of human activities with natural systems.
LEED Accredited Professional (LEED-AP)	A professional accreditation indicating professional excellence and a strong depth of knowledge and practical understanding of the LEED Rating Systems.
Sustainable Design	See "Green Design" with an emphasis on reaching a point of being able to sustain the health of the planet's organisms and systems over time.
Restorative Design	A design approach that uses the activities of design and building to restore the capability of local natural systems to a healthy state of self organization.
Regenerative Design	A design approach, in which an ecosystem restores, renews, or revitalizes its own sources of energy and materials, creating a sustainable system that integrates the needs of society with the integrity of nature. Based on a closed loop input-output model in which the output is greater than or equal to the input with all outputs viable and all inputs accounted for. The model is meant to be applied to many different aspects of

⁷ www.carbonfootprint.org

human habitation such as urban environments, buildings, economics, industry and social systems.

Whole System

Integration Process

A process that seeks to optimize (make the best use of) the relationships among key systems and entities in the service of desired objectives. Typically requires that the smallest unit of design be the largest manageable watershed within which a project resides.

Appendix A

“Sustainable Planning in Bernards Township” prepared October 2007
(see attached)



Sustainable Planning in Bernards Township

October 2007

Introduction

According to coolnewjersey.org, “New Jersey has about .1 percent of the world’s population; but produces .5 percent of the planet’s greenhouse gas emissions.” The following study was conducted to help Bernards Township reduce our resource pollution and curb our greenhouse gas emissions through making changes in our operations and purchasing practices. We have chosen the following four pronged approach to begin action against climate change and pollution:

- Internal Efficiency
- Legislation
- Community Incentives
- Education

This report will refer to these four prongs throughout, while focusing on many of the important issues that play a role in greenhouse gas emission and resource pollution. Topics to be covered include: Energy, Transportation, Municipal Planning and Design, Operation, Public Awareness, and finally suggested initiatives. The Green Team and its initiative were established by Resolution #070292 which states:

WHEREAS, the Township Committee of the Township of Bernards strives to save tax dollars, assure clean air and water, improve working and living environments to build a community that is sustainable economically, environmentally and socially; a community which would thrive well into the new century; and

WHEREAS, the Township Committee of the Township of Bernards wishes to build a model of government which benefits our residents now and far into the future with green community initiatives which are easy to replicate and affordable to implement; and

WHEREAS, in an attempt to focus attention on “Green” issues, the Township Committee wishes to establish a Green Team Advisory Committee (GTA); and

WHEREAS, the Township Committee of the Township of Bernards wants to begin the process of focusing on “Green” issues by starting with audits of municipality facilities and operations first.

WHEREAS, the Township Committee of the Township of Bernards has appropriated “seed money” in their 2007 budget to begin the process of making its operations greener, and more environmentally friendly beginning with energy audits of the Township’s facilities to pinpoint the most effective ways to reduce energy consumption; and

WHEREAS, solar power, changes to fleet purchasing and maintenance, water quality improvements, and operational changes will all be considered as the Township moves to do their share to lessen the environmental impact of its operations.

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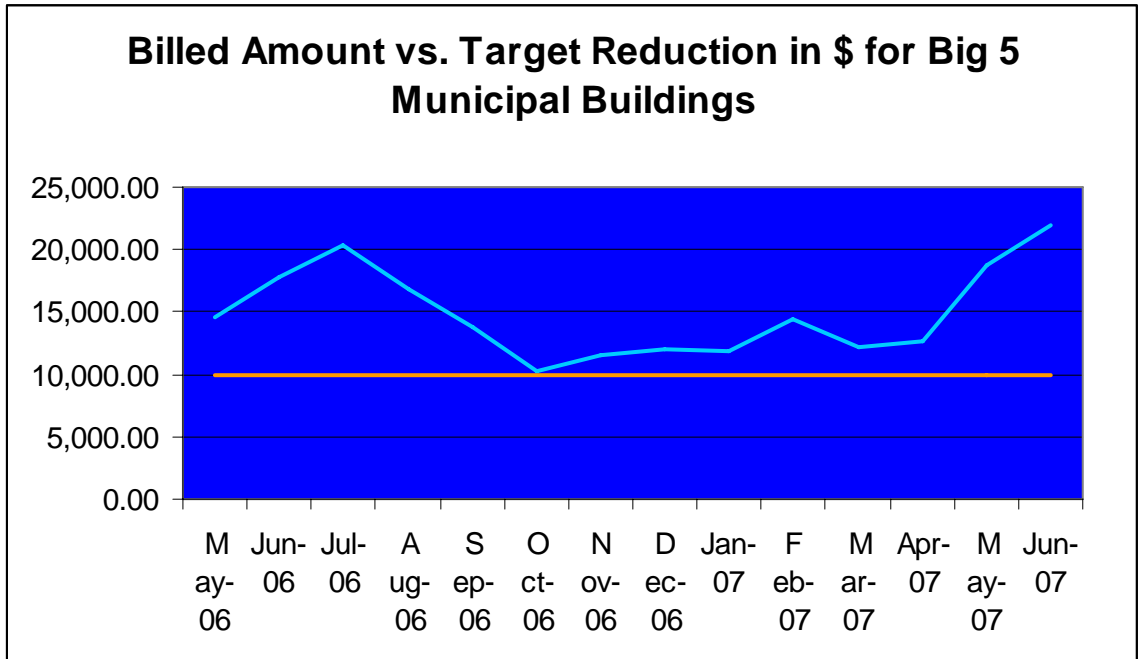
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I. Energy

Energy, which encompasses the costs of running appliances, lighting, heating and cooling, and communications equipment is not only a large polluter but a crippling cost for many municipalities. Many machines pull energy from the grid even when they are not in use, not during business hours, and almost all facilities consume the most energy during peak hours, when the rates are also at their highest. The source of pollution from the use of energy is not something easily witnessed either, because the most pollutants are released at the point of generation, at the coal burning plants that supply us with the majority of our power.



The utility of electrical power is enormous, but the supply itself is often unintentionally wasted by outdated appliances and practices. Modern technology has supplied us with new innovative appliances that are lighter, faster, and more energy efficient, as well as ways individuals, corporations, and governments can make energy of their own. Although many of these technologies have a high up front cost, their cost is almost always justifiable in a life cycle analysis of their utility.

The largest energy consumers under the control of Bernards Township are the Municipal Building, the Police Department, the Library, the Health Department, and the Department of Public Works. Average monthly energy expenses for these buildings combined is about \$15,000. It is recommended that Bernards Township make reducing the combined total of energy expenses by one third, to \$10,000.

- **Internal Efficiency –**

1. **Energy Audit** – Can be performed internally by skilled employees or externally by a firm or individual with an architectural/engineering background. Energy Audits can determine cost saving opportunities concerning the use of electricity, gas, water, and fossil fuels. Auditors will typically need information such as 1 to 2 years of utility bills, entry point of utility, square footage of buildings, location and service area of meters, footprint of building, land area of property, and structural information about the buildings

being analyzed. An audit can help to determine cost saving opportunities that involve little or no investment as well as outline capital improvements that will improve efficiency. The services of an auditor, however, are not necessary for making more energy efficient and cost-effective improvements to your facilities. Bernards Township has not yet had an energy audit performed on any facilities but has consulted with several firms about an energy audit in some of our buildings that carry the largest energy load: the Municipal Building, Police Department, Department of Public Works, Library, and Health Department.

Firms offering this service:

<u>Firm</u>	<u>Estimated Cost</u>
PMK Group Contact: James Ferris P.E., Executive Vice President Operations (908) 497-8900 jferris@pmkgroup.com www.pmkgroup.com	\$0.10 per square foot, per consultation with James Ferris, has worked with Union, Mercer, Monmouth...
Metro Energy Solutions (973) 439-7283 conserve@metroenergysolutions.com www.metroenergysolutions.com	Firm used by Montclair, cost Montclair between \$5,000 and \$10,000 for 13 buildings per Gray Russell, Montclair Township Environmental Affairs Coordinator
Advanced Solar Products, Inc. (609) 466-4495 Contact: Edward M. Seliga, Vice President ed@advancedsolarproducts.com Contact: Doreen Holley, Residential/Commercial Sales Doreen@advancedsolarproducts.com www.advancedsolarproducts.com	No price for energy audit indicated upon consultation with Bernards Township, more interested in bidding on an energy audit if in conjunction with a solar panel project

<u>Big 5 Buildings</u>	<u>Square Footage</u>
Municipal Building	14,433
Police Department	6,328
Library	26,900
Department of Public Works	22,260
Health Department	2,337

Bernards Township will contract with PMK Group on August 28th, 2007 and from them we hope to be supplied information about our current energy usage, overlooked opportunities for saving, and assistance in drawing plans for a solar panel array on the Department of Public Works. They have been supplied with the square footages as well as plans for the buildings listed above. We also plan to consult with them about energy procurement. A copy of their proposal can be found attached at **Appendix A**.

Energy Audit Executive Summary:



2. Solar Power – Solar power from the installation of Solar Panels can be a great investment for a municipality not only because it is a cost-effective way to meet energy needs, but because it makes a statement about conserving energy and often inspires individuals to make independent conservation geared changes. Solar power serves the unique purpose of decreasing electricity bills and usage in two ways. First, the electricity produced by solar panels feeds into the electrical grid of the property in question, thus reducing the amount of electricity used coming from the electrical provider. Next, solar panels characteristically produce the most power when the sun is at its strongest, thus offsetting the amount of energy used during sunny peak use hours, and allowing the avoidance of the heavier fees associated with such hours.

The New Jersey Clean Energy Program made a grant available for the installation of photovoltaic solar panels, among other clean energy sources, which will cover 50-60% of the up-front cost of buying and installing panels. However, because of its popularity the value of this grant, the Customer Onsite Renewable Energy Program (CORE), is expected to decrease after August 31st, 2007, so it is imperative to have plans for a solar system drawn, and grant application submitted as quickly as possible. In addition, the Clean Energy Program is offering an another incentive for the installation of solar power systems: SRECs. Solar Renewable Energy Certificates (SRECs) are credits awarded to an energy producing solar power system in the quantity of 1 SREC per 1,000 Kilowatt hours. The New Jersey Board of Public Utilities will require energy suppliers to produce roughly 22.5% of their electricity from clean energy sources by 2020, and are planning a more aggressive clean energy plan for the years beyond 2020 which will be released no later than 2018 (www.ucsusa.org). Energy providers such as JCP&L can do this by building their own clean energy system, but they can also meet this requirement by purchasing SRECs from owners of private clean energy systems. Pricing for one SREC typically falls between \$150 and \$250. SRECs can also be sold to corporations or private investors hoping to meet clean energy goals. The price of an SREC is only expected to increase as more organizations are required to get more of their power from clean energy sources.

This may be the perfect time to invest in solar power because of the climbing cost of electricity. New Jersey has removed the rate caps that held electrical rates steady in

the past, in an effort to deregulate the industry. Since the caps were removed increases in electricity rates in the State of New Jersey were seen across the board, and with increased demand these rates are only expected to rise.

Although it is no longer the site of interest, Bernards Township staff did receive information on the costs, expected utility, and life cycle pay off period of hosting a solar panel system on the roof of the Mountain Park Maintenance Garage from The Solar Center.

Projected Cost:	\$78,900.00	
Annual kWh Production:	11,919	
System Size (sq/ft):	908	
Projected Savings per kWh (2006):	\$0.135	
Projected Savings in First Year:		\$1,609.05
Revenue per SREC:	\$225.00	
Annual Revenue from SRECs:		\$2,681.75
First Year Annual Return:		\$4,290.80
Proposed Panels:	Sharp 208 watt	Model: ND-208U1
Quote from The Solar Center, Appendix B.		

The simple payback period for this investment at the listed price and annual return is about 7 years if both the CORE grant and SRECs are attained. Moreover, solar panels have an expected life of 25 years, so depending on energy usage, the period between year 7 and as long as the panels are still effective the township can expect extremely discounted energy bills, or perhaps even earning a profit from SREC sales.

After a consultation with Advanced Solar Products Inc., the site of interest has shifted from the Mountain Park Maintenance Building to the Department of Public Works. The DPW building is more ideal because of its large, flat roof that is free of shade spots because of the absence of trees immediately around the building. This site would also be able to accommodate a larger solar array, produce more electricity, and more opportunity to earn SRECs.

In addition, a Solar Energy system can also be acquired through a power-purchase agreement. In such an agreement, a third-party firm agrees to install a solar energy system on a site location belonging to the customer, who pays for the power generated by the solar system and used by their facility. With a third-party agreement, the Municipality would be able to buy the power supplied by the on site solar energy system, which would run more expensive than conventional power, but not require the high up front cost of constructing a independent system. Ownership of a solar energy system constructed by a third party is typically turned over to the customer in a period less than 10 years. However, if a solar power system is acquired through a power purchase agreement the Township would not be eligible for the CORE grant, and only the owner is allowed to sell the SRECs, therefore this revenue would be lost to the 3rd party during the time period in which they own the system.

Featured in the Bernardsville news on Thursday, August 2nd was a story reporting that Ridge High School is to get solar panels on the roof of their new gymnasium, which is currently under construction. It is reported that they plan to spend between \$650,000 and \$775,000 on a solar system that would also pay itself off in 7 years. They have

applied for and are factoring both the CORE grant and SRECs into their anticipated payback period. Also reported by the Bernardsville news, they are expecting the CORE rebate to lessen the project's cost to \$325,000 to \$450,000.

Judging by the prices quoted it is evident that they are planning the installation of a large panel system, while the projected costs for the Mountain Park system are lower, because the system was relatively small. Size and price of the solar panel system sought for the DPW will likely be small and less costly than the one planned for Ridge High School, but bigger and more costly than Mountain Park.

3. Light Retrofitting – Florescent lighting is far more energy efficient than standard incandescent light bulbs, but there has been much debate about its environmental impact because florescent bulbs contain small amounts of mercury. Mercury is a naturally occurring substance, but can be harmful to the environment if it finds its way into the air or water supply. However, according to the EPA the largest amount of mercury finds its way into the environment from burning fossil fuels. So while compact florescent bulbs contain the mercury an incandescent bulb does not, in the same amount of time incandescent bulbs require more electricity from fossil fuel burning electric plants to run, thus being the bigger mercury polluters. In addition, florescent bulbs disposed of correctly pose no threat to the environment. Florescent bulbs and other mercury containing products are to be disposed of at Somerset County Hazardous Waste Days; Bernards Township disposes of all mercury containing florescent tubes and compact florescent lights via this event. The EPA Fact Sheet on Compact Florescent Lights can be found attached as **Appendix C**.

Undoubtedly the most cost-effective and immediate savings change a Municipality can make is to replace incandescent light bulbs in Municipal offices and other facilities with Compact Florescent Lights. A 14 watt CFL can replace a 60 watt incandescent in the same light fixture, and produce the same amount of soft white light. A typical CFL of this type costs between \$3 and \$4 dollars, while its incandescent counterpart typically comes in a multi-pack with a price breakdown of under \$0.50 cents a bulb. Although the sticker price of incandescent bulbs is lower, they consume more energy than and have 1/5 the lifespan of CFLs.

Energy Savings Calculator for Replacing Light Bulbs

	Incandescent Light Bulbs	CFL (Compact Fluorescent Light Bulbs)
Life Span (in hours)	1,500	10,000
Watts	60	14
Cost	<u>\$1.345</u>	<u>\$2.98</u>
KWh of electricity used over 60k hours	3,600	840
Electricity Cost (@ \$0.10 per KWh)	\$360.00	\$84.00
Bulbs needed for 60k hours of usage	40	6
Equivalent 60k hour bulb expense	\$53.80	\$17.88
Total 60,000 Hour Lighting Spend	\$413.80	\$101.88

http://www.productdose.com/LightBulb_Comparison.xls

In addition, the majority of Bernards Township municipal buildings are equipped with overhead fluorescent lighting in the form of T12 lights which should be updated to more efficient models. **According to Westar Energy, T5**

lamps, a similar style lamp that differs in width and wattage, uses 45% less energy than the T12 model. Westar’s explanation of the different types of bulbs and their energy usage can be found in **Appendix D**. Typically these lights are on 8 hours a day, 5 days a week, and we have hundreds of fixtures so the realized savings on electricity would be significant. Additional energy savings can be realized from switching to 2 bulb fixtures instead of 4 bulb fixtures, the fixtures currently most common in Municipal offices. Rebates for updating T12 fixtures to T5 fixtures are available from the New Jersey SmartStart Buildings Program through the New Jersey Clean Energy Program. Applications can be found at njcleanenergy.com; the 2007 Prescriptive Lighting Application and Worksheet can also be found attached to this document as **Appendix E**.

**T12 Fluorescent Lights:
Municipal Building, 1 Collyer Lane**

<u>Fixture Type</u>	<u># of this fixture</u>	<u>Bulbs per fixture</u>	<u>Total Bulbs</u>	<u>Watts per Bulb</u>	<u>Total Watts per Fixture</u>	<u>Total Watts</u>	<u>Total kWh (one 8 hr. day)</u>	<u>Total kWh (1 year)</u>	<u>Projected T5 comparison</u>
6" x 4'	6	2	12	34	68	408	3.26	850.97	468.03
6" x 8'	1	4	4	60	240	240	1.92	500.57	275.31
16" x 2'	2	4	8	20	80	160	1.28	333.71	183.54
1' x 4'	60	2	102	34	68	4080	32.64	8509.71	4680.34
2' x 2'	24	2	48	20	40	960	7.68	2002.29	1101.26
2' x 4'	73	4	292	34	136	9928	79.42	20706.97	11388.83

It is recommended that these retrofits be made in all municipal facilities, including the courtroom.

4. Motion Detectors - An inexpensive way to cut down on energy usage was observed during a tour of the Willow School, a sustainable elementary school in Gladstone, NJ. In spaces that get little traffic and do not need constant lighting the school features motion detectors, so lights will switch on automatically as soon as an occupant enters the room. Examples of environments well suited for this technology are bathrooms, mailrooms, and copy rooms. The price of this type of improvement was indicated to be relatively inexpensive, costing around \$20 per motion detector. Not including installation, recouping investment should happen within the 1st year.

Potential kWh Savings from the addition of Motion Detectors

	<u>kWh per hour</u>	<u>kWh per day</u>	<u>kWh per year</u>
1 100 watt incandescent lighting a small bathroom 8 hrs. a day	0.1	0.8	208.57
Same bulb and location operating 1 hr. a day	0.0125	0.1	26.07

100 Watts x 1 hour = 1 Wh; 1000 Wh = 1 kWh

5. LED Exit Signs – 42 Bernards Township Exit signs were retrofitted with LED exit signs at the price of \$13.68 a light. The electricity usage of the LED Exit signs is less than 1 watt a lamp, and they replaced both 15 and 25 watt incandescent exit signs, most of which were 25 watts. Both incandescent and LED models were outfitted with two lamps a piece, and there were significant savings achieved by retrofitting the signs instead of just outright buying new signs. The following cost comparison is provided by Energy Star and available at energystar.gov:

Exit Sign Energy Use by the Numbers				
Exit Sign Lighting Technology	Annual Energy Use	Annual Energy Cost	Lamp Service Life	Annual Carbon Dioxide (CO ₂) Pollution
<i>LED</i>	44 kWh	\$4	10+ Years	72 pounds
<i>Fluorescent/CFL</i>	140 kWh	\$11	10.8 months	230 pounds
<i>Incandescent</i>	350 kWh	\$28	2.8 months	574 pounds

6. LED Traffic Lights - Somerset County converted all Bernards Township traffic lights to LED traffic lights between 2003 and 2004. Although the traffic lights are owned and maintained by Somerset County, Bernards Township is responsible for covering the cost of the energy they require. Although the cost of powering a traffic light may seem insignificant, it can accrue to a substantial total considering the lights operate all day and night, every day of the year. Post LED traffic light conversion Bernards Township has experienced decreased electricity costs and total energy consumption. Aside from significant savings on monthly energy bills they also need replacement and less frequently than incandescent traffic signal lights, which typically burn out prior to 24 months after they have been installed. According to energystar.gov, LED lights typically last 10 times as long as their incandescent predecessors. Also, costs of frequent repairs due to burnt out light bulbs is avoided and made infrequent when LED traffic lights are used. In addition, LED traffic lights, unlike incandescents, do not burn out all at once, but instead fade over time, giving maintenance crews advanced notice that it is time to replace the light. As a result of their energy saving capacity, LED lights expend less carbon dioxide into the atmosphere than do incandescent lights. **According to energystar.gov, LED lights use 90% less energy than incandescents, which directly correlates to CO2 emissions, subsequently reducing the emissions by 90%.** A full report on the cost and emission savings experienced by Bernards Township post-LED installation can be found attached as **Appendix F**.

7. Efficient Appliances – In order to save electricity and make cost-effective decisions periodic update of machinery and appliances in municipal buildings is necessary. Appliances like air conditioners, hot water heaters, furnaces, and computing equipment use substantial amounts of electricity in all municipal facilities. It is recommended that all air conditioners purchased by the municipality be a higher seer, but at the very least 13 seer. It is recommended that all newly purchased furnaces purchased by the municipality be at least 90% efficient. It is recommended that all newly purchases hot water heaters purchased by the municipality be energy star certified models. It is recommended that all lighting in new municipal construction be 90, if not 100% energy star certified lighting. It is recommended that 90, if not 100% of all future technology purchases by energy star

certified computing/technology models. A resolution describing this philosophy can be found attached as **Appendix G**.

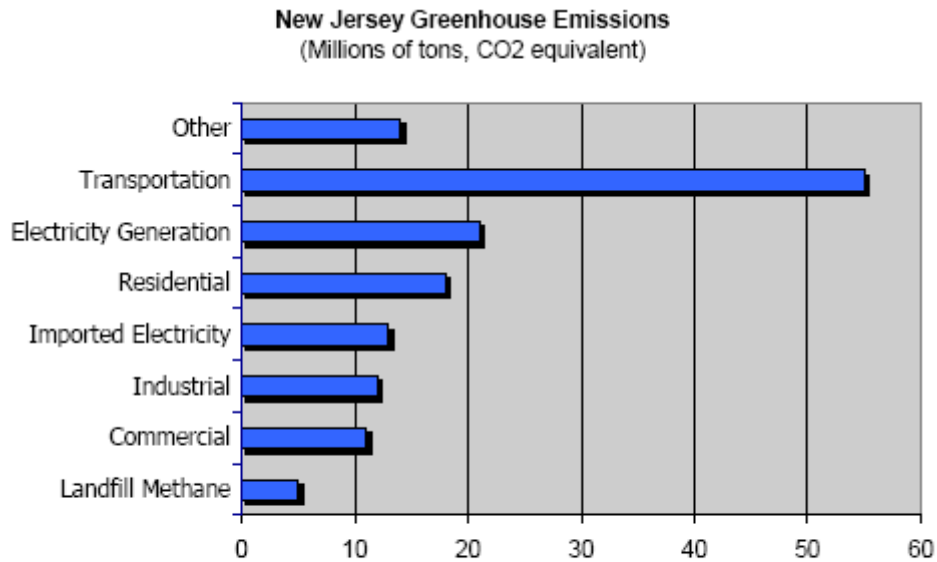
In addition, New Jersey's Clean Energy Program (www.njcep.com) has made grants available for the installation of new efficient heaters and air conditioners in New Jersey residences. For details on the *WarmAdvantage* and *CoolAdvantage* programs reference **Appendix H**.

8. Inventory – Bernards Township covers the electricity expenses for several series of streetlights throughout the township in addition to the traffic lights. Some of these lights operate on the timed schedule, whereas others have sensors that dictate when they turn on or off. Regular checks and an inventory of these lights should be kept. A check should be performed to make sure the sensors on the sensor controlled lights are not blocked, thus causing the light to operate unnecessarily.

Township funded streetlights and traffic lights should ultimately be added to the Township's Geographic Information System, which would allow us to better manage and keep record of these utilities.

9. Energy Procurement – At present the Bernards Township Sewerage Authority has a contracted Energy Agent who locates the best rates on energy for the Sewerage Authority and contracts with the lowest priced energy provider. The Energy Agent then collects their fees by charging the Sewerage Authority a very low amount for every kilowatt hour used during that pay period. The Sewerage Authority currently has a contract with Gabel Associates, and was quoted rates of \$0.0005 per kWh for a one year contract and \$0.0003 kWh for a two year contract by them. Resolution #0705 establishing Gabel Associates as the Sewerage Authority Energy Provider is attached as **Appendix I**. It is recommended that the services of an energy agent be looked into for Municipal Buildings/Facilities as well.

II. Transportation –



Transportation is the largest single source of climate changing emissions in New Jersey

www.coolnewjersey.org

According to coolnewjersey.org, about 44% of climate changing emissions in New Jersey are caused by transportation. With New Jersey's ever-increasing population, the only ways to stabilize or decrease the amount of fossil fuels burned by transportation and the resulting pollution are through increased mass transit, increased opportunities for alternative modes of transportation, alternative sustainable fuels, and improved vehicle technology. **In addition, Governor Corzine recently signed a bill pledging to reduce greenhouse gas emissions to 1990 levels by 2020, and reduce 2006 levels 80% by 2050.** Improvements in transportation will undoubtedly be on the Governor's agenda for the remainder of his term, as it should be for every level of government down to municipalities.

- **Internal Efficiency –**

1. **Fleet Vehicles -** Bernards Township recently purchased its first two hybrid vehicles, a Toyota Prius, and a four wheel drive Ford Escape Hybrid. The vehicles were purchased with the assistance of two grants from the Board of Public Utilities that had a combined total of \$6,200. The Prius is currently a member of the fleet at Town Hall while the Escape is expected to join the Construction Department fleet late this year or in early 2008. These vehicles were chosen not only because their hybrid status agreed with our environmental initiatives, but because they would be available for the use of municipal employees and hopefully create a positive feeling about conserving resources. There were also cost-effective choices, each vehicle making up the difference in the increased cost of the hybrid option with savings on fuel in less than 10 years.

2007 Prius Purchase Price: \$20,823 - \$2,200 (BPU Rebate) = \$18,623

2007 Escape Purchase Price: \$24,940 - \$4000 (BPU Rebate) = \$20,940

2006 Dodge Stratus Purchase Price = \$12,994

2004 Dodge Durango Purchase Price = \$20,150

	<u>2007 Toyota Prius</u>	<u>2006 Dodge Stratus</u>	<u>Savings</u>
Annual Fuel Cost (based on 10,000 avg. miles driven per year and \$2.25 per gallon per wholesaler)	\$479.00	\$1,125.00	\$646.00
Total Fuel expenses after: 2yrs:	\$958.00	\$2,250.00	\$1,292.00
3 yrs:	\$1,437.00	\$3,375.00	\$1,938.00
4 yrs:	\$1,916.00	\$4,500.00	\$2,584.00
5 yrs:	\$2,395.00	\$5,625.00	\$3,320.00
6 yrs:	\$2,874.00	\$6,750.00	\$3,876.00
7 yrs:	\$3,353.00	\$7,875.00	\$4,522.00
8 yrs:	\$3,832.00	\$9,000.00	\$5,168.00
9 yrs:	\$4,311.00	\$10,125.00	\$5,814.00
10 yrs:	\$4,790.00	\$11,250.00	\$6,460.00
The Toyota Prius runs about \$6,000 more expensive (after clean energy rebates) than a similar economy model, the Dodge Stratus, but makes up for this cost difference in fuel savings in 8-9 years.			

	<u>2007 Ford Escape Hybrid</u>	<u>2004 Dodge Durango 4WD</u>	<u>Savings</u>
Annual Fuel Cost (based on 10,000 avg. miles driven per year and \$2.25 per gallon per wholesaler)	\$804	\$1,731	\$927
Total Fuel expenses after: 2yrs:	\$1,608.00	\$3,462.00	\$1,854.00
3 yrs:	\$2,412.00	\$5,193.00	\$2,781.00
4 yrs:	\$3,216.00	\$6,924.00	\$3,708.00
5 yrs:	\$4,020.00	\$8,655.00	\$4,635.00
6 yrs:	\$4,824.00	\$10,386.00	\$5,562.00
7 yrs:	\$5,628.00	\$12,117.00	\$6,489.00
8 yrs:	\$6,432.00	\$13,848.00	\$7,416.00
9 yrs:	\$7,236.00	\$15,579.00	\$8,343.00
10 yrs:	\$8,040.00	\$17,310.00	\$9,270.00
The Ford Escape Hybrid is only \$790 more expensive (after clean energy rebates) than the similar model it is replacing, the 2004 Dodge Durango, but makes up for the cost difference in savings on fuel in only 1-2 years.			

It is recommended that the Township be forward minded with vehicle procurement now and into the future, also exploring vehicles that use alternative fuels such as biodiesel, electricity, and hydrogen fuel cells. It is recommended that future Township vehicle purchases be limited to vehicles rated PZEV or better.

SULEVs are super-ultra low-emission vehicles, extremely clean. There are both gas SULEVs and gas-electric hybrid SULEVs on the market today. The classifications of ZEV, PZEV, or SULEV only refer to the air emissions, by the way -- not the fuel efficiency. The EPA Green Vehicle Guide in the link below will allow you to look up vehicles and compare both emission and fuel efficiency characteristics. Remember that 2005 and 2006 trucks and Sport Utility Vehicles do not have the same standards and ratings as cars, so a SULEV Sport Utility Vehicle can pollute much more than a SULEV car.

PZEVs are partial zero-emission vehicles, the closest you can get to zero without being a ZEV. The partial refers to the fact that automakers get partial ZEV credit for making and selling PZEVs. They're cleaner than SULEVs since they also have a design that doesn't allow evaporative emissions from the gas tank. There are PZEV versions of several new gasoline car models on the market today. To see a list of these, visit the California Air Resources Board link in the list below.

AT PZEVs are PZEVs that have an advanced-technology component, such as a hybrid system.

ZEVs are zero-emission vehicles, the cleanest you can find. The only ZEVs are electric vehicles, and some fuel cell vehicles (not available to consumers for several years). It's difficult for a consumer to purchase a new electric vehicle at this point, as there are not many on the market.

Santa Barbara County Air Pollution Control District, (2007), <http://www.sbcpd.org/sbc/linkscars.htm>

2. Biodiesel – Diesel fuel is the petroleum based fuel used to power most municipal utility vehicles and heavy trucks, the burning of which is a large source of air pollution in the state of New Jersey. Fortunately, cleaner burning options are now available, and their use requires little or no engine modifications.

Biodiesel, according to the EPA, is a fuel with a similar composition to traditional diesel produced through refining sustainable biological oils, mostly vegetable oils. Also according to the EPA, “Biodiesel has a higher cetane number, but slightly lower energy content than diesel. To the average driver, this means better engine performance and lubrication, but a small decrease in fuel economy (2-8 percent).” Biodiesel is offered in a variety of different blends from B5 (5 percent biodiesel, 95% petrodiesel), to B100 (100% Biodiesel). There are some petrodiesel vehicles that are approved for use of B100, however the use of this fuel currently annuls the warranty of many vehicles. Biodiesel also tends to be slightly more expensive than traditional diesel, although rebates are currently available that make it more affordable. According to coolnewjersey.org, the Atlantic County Utilities Authority runs its entire fleet on B20 Biodiesel. The New Jersey Board of Public Utilities is currently offering a rebate that covers the difference in cost between blends of biodiesel and petrodiesel; for more information see **Appendix J**.

Biodiesel Distributors in New Jersey

<u>Distributor</u>	<u>Contact</u>	<u>Blend</u>
J.W. Pierson CO. 89 Dodd St, East Orange, NJ 07017	George Scoles (973) 673-5000	B20
Taylor Oil Co., Inc. 2610 S. Black Horse Pike, Williamstown, NJ 08094	Bob Dilullo (856) 262-3133	All
Taylor Oil Co., Inc. 77 Second Street, Somerville, NJ 08876	Frank Bloom (908) 725-7737	All
TransMontaigne 78 Lafayette St, Carteret, NJ 07008	Danny Sells (303) 860-5379	All
Woodruff Energy 73 Water Street, Bridgeton, NJ 08302	B. Woodruff (856) 455-1111	All

www.biodiesel.org

According to the BPU, biodiesel can also be purchased through the State of New Jersey using State Contract #T-1844. For additional information on biodiesel from the EPA see **Appendix K**.

Considering the warranties of several of our diesel engine vehicles, it is not advised that B20 or greater blends be used at this time. It is advised that in future vehicle procurement the Township focus on lighter flex-fuel and hybrid vehicles that are built biodiesel compatible. The use of biodiesel in large quantity would warrant another fuel tank, which may be a capital improvement needed by the Department of Public Works in the near future anyhow.

3. Hybrid Utility Vehicles - Hybrid technology has been shown to be especially efficient when paired with a vehicle that does mostly city driving, or a vehicle that includes features that the vehicle must be running to utilize. For this reason, hybrid electric engines have proven to be particularly useful in utility trucks, such as dump trucks, that need to be on in order to operate the bucket even if the vehicle will remain stationary while doing so. Current Heavy Utility Vehicles consume fuel to remain on and operate their electronics, even if the vehicle remains stationary. Hybrid Utility Vehicles are the advised choice for future Utility Vehicle Purchases.

▪ **Legislation –**

1. Anti-Idling Ordinance – Bernards Township Ordinance No. 1034 bans excessive idling of commercial trucks within Bernards Township. A revision of ordinance 1034, which makes the original ordinance applicable to all motor vehicles, as well as the original ordinance can be found attached as **Appendix L**. Adoption of the proposed revisions or revisions with similar implications is advised. Also, we should consider adding signs on public school campuses that ask motorists to please turn off their engines when not in motion. Signs may read something like, “Please do not idle your engine, it’s the law.”

▪ **Community Incentives –**

1. Discounted Parking Passes for Advanced Technology Partial Zero Emissions, Zero Emissions Vehicles and Carpool Vehicles – Vehicles with an AT PZEV rating should be eligible for a parking decal pertaining to the 3 municipal lots for a fee at \$100

less than the standard price. Current parking decal price for a Bernards Township resident is \$150, while the price for a non resident is \$250. With the proposed change this price would decrease by \$100 dollars for both parties. AT PZEVs are vehicles with an Advanced Technology Partial Zero Emissions Rating, and it is important to distinguish vehicles by emissions rating rather than gas mileage because some vehicles may have a poorer gas mileage but use a cleaner more sustainable fuel type. PZEV rated vehicles are not only low on emissions but have superior fuel efficiency as well. Current AT PZEV vehicles include gasoline – hybrid vehicles like the Toyota Prius. ZEV vehicles are vehicles with a Zero Emission Vehicle rating, including electric, hydrogen gas, and hydrogen fuel cell vehicles. These models are especially clean, creating little or no greenhouse gasses, and vehicles that burn hydrogen produce only a byproduct of water. A list of qualifying vehicles can be found attached as **Appendix M**.

Carpool vehicles should also be eligible for the same discount, if all applicants involved can prove they are frequent rail and/or bus commuters. If a carpool pass is applied for and granted the names of all carpoolers involved should be taken down, and a duplicate pass cannot be issued to any of the parties involved until the pass expires. Two or more residents who reside in the same household should not be eligible for a carpool pass, however if a third party from another household was included I their carpool route the carpool pass would then be available to them. **A system that rewards carpooling may even be more effective in reducing emissions and increasing mass transit ridership than discounted passes alone**, as carpool agreements may introduce new riders to the available public transportation.

III. Municipal Planning and Design -

- **Internal Efficiency –**

1. LEED Certified Sewerage Authority Addition – LEED Certification, in Bronze, Silver, Gold, or Platinum, is one of the most prestigious and sought after certification a building can achieve. LEED certified status, short for Leadership in Energy and Environmental Design, can be achieved by a commercial building, building addition, schools, commercial interiors, and homes. LEED certification and level of certification, Platinum being the highest, is based on a point system that grades the sustainability of the materials used in construction, energy efficiency, water efficiency, operations, and materials used in cleaning and maintenance of the structure. Peter Messina, Township Engineer and Planner is currently working with a LEED Certified Architect in designing a LEED certified addition to the Administrative Building of the Bernards Township Sewerage Authority located on Martinsville Road. It has been indicated that the LEED elements slated for use in the addition are as follows:

- Bike racks
- Carpool Parking Spaces
- Reduced site disturbance
- Stormwater management via Bio-filtration
- Shade trees
- Reduced light pollution
- Rainwater capture
- No potable water usage for irrigation
- Low flow toilets/urinals
- Solar panels (voltaic)
- Solar hot water panels
- No halons or CFCS
- Building reuse
- Construction waste management
- Reuse salvage
- Recycled new materials
- Certified woods
- CO2 Monitoring system
- Upgrade ventilation air exchanges
- Indoor air quality management
- Low emitting materials – adhesive, sealant, paints, and wood
- Entrance floor grill
- Operable windows
- Skylights

This project is still in the planning stages but should be under construction by late winter 2008.

2. Capital Improvements to Facilitate Non-Vehicular Transportation - Citizens concerned with Climate Change and reducing individual impact on the environment have

been taking action into their own hands by making climate friendly lifestyle changes such as green purchasing or using alternative modes of transportation and mass transit. But many would agree that suburban communities like ours are built for vehicular transportation, and because of local design, transportation like walking or biking lack everyday utility. Bernards Township, with few parcels of land vacant for development, has entered a “maintenance period”, and improvements that increase the utility of walking and biking are among the improvements we should be making.

Although Bernards Township does feature many bike paths and trails through parks and recreation areas, **the Township needs to see an increase in bike paths in heavy traffic areas and areas where they would have the most everyday utility.** Areas that see heavy traffic, like schools and local shopping centers, could benefit from the addition of bike paths through reduced car and truck traffic, thus reduced vehicle idling and tailpipe emissions. Already in place are bike paths to Liberty Corner School through the Canterbury Estates development, paths to and around Mt. Prospect in the Hills, paths weaving through the adjoining properties of Ridge High School and Cedar Hill School, as well as access available to Oak Street School on almost all sides.

However, William Annin Middle School, the school at which all three elementary schools convene for 6th through 8th grade, is only accessible from one side. Since the school is only accessible from its front, there are often long lines of cars weekday mornings of parents dropping their children off at school, as well as after school for pick up. Not only is vehicle idling an environmental ill, but children are often late for school because of traffic. The back end of the school, which is connected to pieces of municipal land opening up to developments like Gristmill and Autumn Drive, cannot be utilized as walking or biking routes to school because of the presence of Harrison Brook between the school and the street accesses to these properties.

It is proposed that in an effort to reduce road traffic, and prepare for safe and sustainable population growth in Bernards, that permitting be applied for and funds allocated for the development of back accesses and alternative routes to William Annin. Because both of these areas are wetland areas, permitting for the paths from the Department of Environmental Protection should be sought. Areas of focus should be the stated municipal properties located off Autumn Drive, Block 106, Lot 73.03, and Gristmill Drive, Block 106, Lot 92. In addition, only one bridge would be necessary to facilitate the access of both neighborhoods to William Annin.

Paths to the Middle School in these locations would not only serve the Gristmill and Autumn Drive neighborhoods, but would open up an alternative access to the school for several neighborhoods located along the areas of Lake and Mt. Airy Roads such as Fairview Drive, Galloping Hill, areas near Stockmar Drive and Kensington Road, as well as Flintlock Court and Kinnan Way. Maps highlighting the proposed location of these paths can be found attached as **Appendix N**.

Expenses of such a project would include permitting, architectural drawings, materials for construction of a bridge, as well as expense of labor. In addition, there would be expenses involving the purchase of stone for footpaths as well as clearing trails. Expenses involved in the creation of paths and routes to school are eligible for grants from the New Jersey Department of Transportation’s Safe Routes to School Program as well as from the New Jersey Department of Environment Protection division of Parks and Forestry’s New Jersey Trails Program. The maximum award for the New Jersey

Trails grant is \$25,000; Safe Routes to School award amount varies based on need. More information on both grants can be found attached as **Appendix O**.

In addition to bike paths for increased non-vehicular transportation, additional bike racks are also needed. Again, these facilities would have the most utility and most impact on reducing car traffic when they are located in high traffic areas. Examples of such areas are near shopping centers, schools, and transit hubs. Suggested sites for the addition of bicycle racks are the Lyons Park & Ride lot, additional and updated bike racks at the district middle and high schools, local trail stations, as well as at Municipal Parks. Also, property owners, especially those that own shopping complexes, should be encouraged to add and keep updated the bike racks at their facilities. It is also suggested that in locations where bikes may be parked for long stretches of time, like the Lyons Park & Ride lot, and the train stations, that covered and stall style bike racks be installed. These types of racks not only provide protection from theft and vandalism, but protection from the elements as well.

Also, widening roads in high traffic areas for the inclusion of marked bicycle lanes or wider shoulders facilitates bicycle and alternative modes of transportation. Some



www.pedbikeimages.org

may argue that additional pavement will only harm the environment by adding to the area of impermeable cover and creating additional potential for polluted stormwater runoff. However, in high traffic areas elements like bike lanes have been proven to have a traffic calming effect. Road widening does not have to happen in a linear fashion with the addition of a certain amount of area to each side of an existing road; a road that was originally straight can be made to weave more from

side to side wherever the most land for widening is available or pitch of the land permits, and traffic lines painted to match the new contours. This type of road widening should be done in conjunction with road resurfacing, as it would require the repainting of traffic stripes for inclusion of a bike lane, and the outline of the new, curvier road. **In fact, the addition of both bike lanes and road curvatures both have the effect of traffic calming, and should be considered in areas where speeding is a problem.** We cannot simply encourage alternative modes or transportation without the addition of amenities to facilitate them.

3. Zoning Considerations – To lessen our environmental impact we must rethink how we allocate our resources, including land. More effective land use planning is essential to land preservation and community vitality. Our community, like much of New Jersey is a product of sprawl, which induced rapid development that did not account for sustainability. According to coolnewjersey.org, “Since most of the remaining land is either protected or not buildable, New Jersey is likely to be the first state to exhaust its supply of buildable land. This is called buildout. Some think we’ll reach that point in as

little as two to four decades.” Bernards Township has done a superior job of acquiring open space throughout the community, but there are still parcels of open land that we have the opportunity to plan for the use of more wisely and progressively than we had in the past. Local Government needs to take charge of land planning and management instead of letting developers buy and build piecemeal.

The addition of mixed-use zoned properties in Bernards Township is essential to smart growth and sustainable design. Mixed use properties attract small businesses, medical and professional practices, and individuals in the young adult and “empty nester” demographics. Not only do a wide range of local industry and population promote a vibrant community, but individuals in these age groups generally do not have schoolchildren who require the use of public schools.

In a document dated July 2nd, 2007, Town Demographer William Draper writes, “Sale of new homes and single family homes of seniors and recent “empty nesters” continue adding about 1.7 public school children and 0.4 pre-school age children per home. Other homes add few school children - averaging about 0.1 additional public school children and 0.2 pre-school children per sale. On average, resale by other out migrating families is to a replacement family of similar composition.” It can be assumed given the demographics of Bernards Township that “other homes” refers to the various developments of condominium and multi-family units that exist throughout the township. **A statistic of .1 children per “other home” would mean that 1 in 10 of these units has a child. Alternatively, 10 single family homes would yield approximately 17 school aged children according to the statistic above. It can then be deduced that it would take approximately 170 homes classified as “other homes” to create the equivalent amount of school aged children as 10 single family homes.**

These statistics speak volumes, however, the development of other homes and affordable housing alone will not make our community more sustainable. Mixed use housing offers much more than multi family units alone can. Mixed use properties allow people to both live and work in the same place, thus cutting down on travel time, travel associated pollution, and fosters a sense or pride in one’s community. Mixed use properties would be particularly useful in cutting down pollution from transportation in areas near metro, rail, and bus stations. Properties that include commercial entities as well as residential create more pedestrian friendly communities, promoting public health and mental satiation. It is recommended that parcels of land on, near, or that have easy access to transit be reviewed and their zoning reconsidered. Land areas within walking distance to Lyons and Basking Ridge Train Stations should be of particular interest. To help with this and similar initiatives monies are available through the New Jersey Department of Transportation’s Transit Village Initiative. According to coolnewjersey.org, some communities have received up to \$100,000 from this initiative. More information about the Transit Village Initiative is available online at www.state.nj.us/transportation/community/village.

▪ **Legislation –**

1. Cluster Developing - Another method of land use planning that preserves environmental integrity is cluster developing. Cluster developing is the practice concentrating the development of buildings on one section of a property by allowing for smaller lot sizes, while using the remainder of the land as environmental preservation

areas and community facilities. A development of this style is not typically allowed any more houses than if it had followed the existing zoning regulations in place for the land, they are simply allowed smaller lots with greater untouched areas. This type of building can be appealing to both local planning boards and builders alike; it is appealing to planning boards because of the land preservation aspect, whereas builders can typically save money on clearing land. A sample Cluster Development ordinance from the American Planning Association (www.planning.org) is attached as **Appendix P**.

2. Requirement for the Recycling of Construction and Demolition Waste – Bernards Township has entered a ‘maintenance period’, a period in the Township’s history where there is almost no buildable land available and it is time to maintain the spaces we already inhabit. As a result of this, many buyers cannot buy new homes and instead choose to expand or update older ones. While these changes beautify and add value to neighborhoods, they also generate a lot of waste, usually at least several dumpsters full. The city of Santa Monica, California has enacted an ordinance requiring all within the city limits to recycle 60% of construction and demolition waste materials if the project costs exceed \$50,000 or are greater than 1,000 square feet. The Township of Bernards may alter the language and requirement, but an ordinance of a similar nature would be largely beneficial and have a direct impact on the amount of construction and demolition waste going to landfills. A copy of Santa Monica’s ordinance on construction and demolition waste is attached as a model, as **Appendix Q**.

▪ **Community Incentives –**

1. Alternative Fee Determination for Sewer Users - It has been long standing practice in Bernards Township that every user of the Sewerage Authority pays a flat annual fee of \$360 for its services. Although this system furnishes the Sewerage Authority with ample resources to operate, it does not account for water usage. Presently, condominiums with one resident and single family homes with 5 residents are paying the same fees. In an effort to distribute fees more fairly and encourage water conservation it is recommended that sewer users pay rates based on water usage figures furnished by the water company. The rates should be scaled based on 1000 gallons of water usage per water utility furnished information. The water usage at the beginning of the first quarter (i.e. Jan-March months) will be the utility information used to base sewer rates off of. The scaled system could resemble a system similar to the following:

Class A	0 – 2,449 gal/mo	\$60 /year
Class B	2,500 – 4,999 gal/mo	\$132 /year
Class C	5,000 – 8,999 gal/mo	\$250 /year
Class D	9,000 – 13,999 gal/mo	\$402 /year
Class E	14,000 – 19,999 gal/mo	\$522 /year
Class F	20,000 + gal/mo	\$522 + \$2.00 per thousand gallons over 20,000 /year

Figures from the water company should be rounded both up or down depending on the next closest whole number in order to determine what class a resident is in, thus determining their annual fee. Class F would normally be reserved for corporate campuses and only the largest water users. The hopes are that a scaled system would

reduce not only the amount of water needing treatment by the sewerage authority, but usage of clean potable water altogether. The rates listed above vary somewhat substantially, thus providing fiscal incentive for a sewerage authority customer who uses 3,000 gallons a month to lower their usage to a Class A rating. These rates along with notification of the system change should be published on the Bernards Township website, in local publication, and sent through the email listserv months before the rate change is effective, in conjunction with water saving tips that can be used to conserve and waste less potable water. Some easy tips residents should be informed of are installing faucet and shower aerators, as well as fixing leaky sinks and toilets.

Sewer rates for well users should remain the current flat rate of \$360 annually, or another reasonable flat rate determined.

2. Accelerated Permitting for LEED Certified Buildings – As incentive for building LEED buildings as compared to the conventional style of building, permitting materials for LEED planned commercial and residential buildings as well as additions should allowed to be “fast-tracked”. The amount of wait time for permits on buildings drawn to be LEED by a LEED certified architect should reduce substantially from the standard 30 day period, as building LEED structures can be significantly more complicated and expensive. It is proposed that the wait time for permits for LEED certified structures be 5 business days, instead of 30 days after submitting the application.

Accelerated permitting should also be considered for construction and demolition projects that intend to recycle 60% or greater of their construction and demolition waste. Such projects must submit a waste management plan detailing the materials to be recycled and method of recycling along with permit application in order to be eligible.

IV. Resource Protection –

▪ Internal Efficiency –

1. Natural Drainage Systems – Like many communities Bernard Township is outfitted with several water and stormwater management provisions, like drainage basins and storm sewers. While these amenities are highly effective in removing excess water from the community but, they are often, because of their design, flooded with polluted water.



http://ricecreek.org/content/bmp/images/rg_rainfall_s.jpg

Storm sewers can be found on and are essential to the design of most Bernards Township roads. They are an essential feature because most Bernards Township roads have Belgium block curbing, thus preventing runoff from spilling off the road naturally. When stormwater falls on roads, it picks up pollutants and chemicals on the road, mostly vehicle discharge and other chemicals, and

then enters the storm sewer. In the storm sewers water is mixed with other polluted waters, all of which eventually merge into the Passaic river.

Similarly, drainage basins are frequently mowed, contributing to air pollution by burning fossil fuels, but the grass also has the potential to be polluted with chemicals. In addition, grass is a highly impermeable form of vegetation, making groundwater recharge and natural drainage in a basin more difficult.

The pollution of stormwater could be prevented by practicing better stormwater management tactics that allow for natural filtration, purification, and groundwater recharge. Bio-filtration systems are stormwater management facilities that can both retain and filter water naturally. Bio-filtration is an umbrella term that captures bioretention systems, rain gardens, and constructed wetlands.

Despite their many different names they all work similarly: they capture stormwater and allow it to infiltrate the ground to be purified naturally, and require little maintenance. Bioretention systems are usually the most involved, combining elements of natural filtration with special raised or buried storm sewer infiltration features for when there is substantial runoff. These systems are typically used to treat large amounts of water where space is limited. Rain gardens are smaller systems commonly found on private residences and parks, comprised of a kidney shaped 3 to 8 inch indentation in ground surface, and the depressed surface planted with native plants that are compatible with a wet environment. Constructed wetlands, which are typically the largest

biofiltration system, according the NJDEP, being at least 10 acres in size. Constructed wetlands are typically different from the other two mentioned systems because they are typically used to purify water that has already been captured by storm sewers and other stormwater management facilities and diverted there, they are not the point of capture.

In addition, these systems are planted, rain gardens usually planted with the owner's plants of choice and the larger ones with native trees and deep rooted species, which absorb some of the water. The goal is to eventually have a small ecosystem that also filters and purifies water through passing through layers of minerals, and waste materials being filtered by plant roots. These systems also minimize obstruction of groundwater recharge. Additional information on biofiltration systems can be found attached as **Appendix R**. It is recommended that these natural filtration systems be used in lieu of storm sewers, and raised curbs and parking lot islands be avoided and replaced with a depressed system that allows for groundwater recharge, like the one in the Mountain Park parking lot.

Bernards Township is currently examining Township maintained basins to see which basins are ideal candidates to be fitted with native plants instead of turf grass. Many non-township maintained basins are also turf grass, the homeowner associations who maintain these basins should be supplied with information on biofiltration and encouraged to stop mowing. For additional information on Municipal Stormwater Management Planning Reference a guide from the Association of New Jersey Environmental Commissions in **Appendix S**.

2. Alternative Fertilizers – Fertilizers are designed to add nutrients to the soil so grass and other plants can flourish. However, fertilizer is a chemical compound and hazardous to wildlife, and often makes its way into local streams as well as the Sewerage Authority where it adds excess phosphorus to the sewerage system. It is recommended that fertilizer use be held at a minimum, with one application a year if possible. It is also recommended that an organic or low toxicity fertilizer be used in place of a traditional kind.

3. Audubon Cooperative Sanctuary Program for Golf Courses – Coakley-Russo Golf Course, Bernards Township's municipal golf course is a sprawling 95 acre course located off Valley and Kinnan way near the VA hospital. This large stretch of land is closely mowed, regularly watered, and fertilized to keep it in prime condition for golfing. Because it is such a big stretch of land, and because of its nature frequent maintenance is essential, it is recommended that safer methods of maintaining the land be examined. The Audubon Society, distinguished for its environmental stewardship and work in bird species preservation has developed a program for golf courses that enables them to maintain their current structure, while offering assistance in ways to change operation to make the course more wildlife friendly. It also suggests alternative fertilizers and lawn care strategies that lessen the impact of a beautiful green on water quality as well as landscaping with native plants to reduce water demand. If improvement is noted in the care and operation of the golf course by Audubon Officials, a golf course can achieve the prized Audubon Certification. Annual Membership fee is \$200 and it is accompanied by *Guide to Environmental Stewardship on the Golf Course*, several guides describing best practices, and a log to describe progress which can be used to achieve certification. It is recommended that Bernards Township join and eventually apply for certification for the

Coakley-Russo Course. Recommendations made by the Audubon Society for the Golf Course can be applied to other municipal properties as well.

4. Water Audit – Since the population of both industry and residences in the community has increased rapidly during the last decade, it is important to be aware of how the community’s water supply has responded. Since several residents obtain their water from wells, and because there is occasionally runoff from areas like the Millington Quarry and other both residential and industrial sites where the water has potential to be contaminated, it is important to monitor water quality. It is recommended that Bernards Township have samples taken, and water audited, done by staff if possible, to make sure water quality is up to par. If it is determined that water quality has decreased, the situation can be improved with natural solutions, like water diverted to an areas of open space and a constructed wetland created.

5. Community Forestry Program- Trees in our cities and towns help clean the air, conserve soil and water, moderate temperature and bring nature into our daily lives. Trees are a vital component of the infrastructure in our cities and towns and provide environmental and economical benefits. Through the coordinated effort of the Shade Tree Commission, Parks Dept. and Dept. of Public Works, Bernards Township has an effective on going community forestry program and has been recognized by The National Arbor Day Foundation. Details can be found attached as **Appendix T**.

▪ **Legislation –**

1. Preserving Native Plants – The definition of Native Plants is the species of plants that were deciduous to an area before the intervention of European settlers. Native Plants are the species of plants that have lived in an area for hundreds or thousands of years, thus adapted and become well acclimated to the local climate and precipitation patterns. However, when settlers migrated to North America, they both intentionally and unintentionally brought non-native plants with them and introduced them to the ecology of the new world. Now, non-native species that have survived and proved to have a competitive nature are in areas overrunning the natural landscape. Many plants classified as “weeds” are also classified as “non-native”. However, a plant does not need to be competitive to be deemed non-native. Plants that require a lot of water, chemicals, or extensive treatment and attention are usually also classic signs of non-natives. A sample ordinance can be found attached as **Appendix U**. A list of approved native plants, also available on the website can be found attached as **Appendix V**.

▪ **Community Incentives –**

1. Increased Availability of Recycling Bins on Municipal Properties – Increasing the availability of recycling bins on public properties would increase recycling by patrons of these properties. Bernards Township residents as a whole have a good recycling record and it is believed that this attitude paired with available receptacles for recyclables would yield a positive response. More information on recycling can be found in section V. Operation.

V. Operation –

- **Internal Efficiency –**

1. Increased Naturalization of Municipal Property - Bernards Township maintains the landscape of a large amount of properties distributed throughout the township including athletic fields, areas around municipal buildings, and about 15 drainage basins. Many of these properties have been planted with turf grass, and that grass been frequently maintained during the growing season. Results found in a Swedish study, and reported here (<http://abcnews.go.com/Technology/story?id=98532>) by ABC news, found that operating a lawn mower for an hour creates an equivalent amount of air pollution as does a 100 mile car trip. Not only is frequent mowing harmful to air quality and creates harmful greenhouse gas emissions, it also hurts the Township's bottom line. It is suggested that Bernards Township cease to maintain lawn areas where feasible to both improve air quality and the Township's bottom line. It is proposed that in place of the turf grass plants that require little maintenance be placed, like native shrubs and wildflowers. These plants will need more extensive maintenance upon initial planting, but far less once established. Below is a study by Roth and Associates entitled A Comparison of Sustainable and Traditional Landscapes that proves the fiscal advantage of native landscaping.

In addition to fields and drainage basins the Township of Bernards maintains many traffic islands. Traffic islands are usually raised and grass covered, although some of the more recently installed parking lots, like Mountain Road Park, feature more eco friendly depressed rock filled islands, which allow for water inflow and ground infiltration. The raised, grass covered islands require frequent maintenance which requires money and manpower, and occasionally lawn chemicals. In order to save money, employee resources, and adopt a landscaping scheme that is more environmentally friendly it is suggested that all Township raised parking islands be covered in either low maintenance native shrubs and mulched, or replaced with rock.

Activity/Year	Sustainable Landscape (Annual Cost)	Traditional Landscape (Annual Cost)	% of Difference Sustainable/Traditional
Up Front Installations			
Traditional landscape require a wider spectrum of landscape treatments, so their up front investment is necessarily greater than that for a new native landscape.			
Design	\$25,000	\$25,000	0%
Construction	\$100,000	\$216,000	52%
Post-Planting Management	\$16,000	\$28,000	43%
Total Up-Front Costs	\$141,000	\$269,000	48%
Annual Long-term Management			
In a new native landscape, the first 4-5 years are fairly intensive inasmuch as a balance is being established between the native and non-native plants. After approximately 5 years the system begins to set into its own internal self-renewing capacities, needing only the addition of increased species richness in areas where annual monitoring dictates.			
In a traditional landscape, the frequency and intensity of mowing, sod-maintenance, weeding, and early plant replacement initially keeps costs in the same general area as the new native landscape. After about 5 years, the stresses of herbicide application, shrub and tree mortality, and other aging syndromes of a landscape that does not renew itself results in a greater maintenance costs than for sustainable landscapes.			
Year 1	\$19,000	\$33,000	42%
Year 2	\$32,000	\$33,000	3%
Year 3	\$17,000	\$33,000	49%
Year 4	\$30,000	\$33,000	9%
Year 5	\$15,000	\$33,000	55%
Year 6	\$13,000	\$30,000	43%
Year 7	\$5,000	\$30,000	83%
Year 8	\$13,000	\$30,000	43%
Year 9	\$5,000	\$30,000	83%
Year 10	\$13,000	\$30,000	43%
Ten-year Totals	\$162,000	\$315,000	52%
Year 11+	\$5,450	\$40,000	86%
Subsequent Years	\$5,450	\$30,000	82%

http://www.cdfinc.com/CDF_Resources/Sustainable_Landscape_Cost_Comparison.pdf

2. Recycling – Bernards Township and Somerset County as a whole have an excellent recycling record. Somerset County has provided curb side pickup of recyclables from residents for quite a while. The county even has hazardous waste days and other specialized recycling events a few times annually, many of which Bernards Township hosts and publicizes. For example, once annually Somerset County holds a hazardous waste day at the Department of Public Works Garage and the event is publicized by the Township through signs and mailers. Bernards Township recycles all used materials through the County including fluorescent bulbs at the mentioned hazardous waste days, because they contain small amounts of mercury. Bernards Township has recently gotten the County to agree to accept Township computer and electronic equipment for recycling as well as recycling pick up from Pleasant Valley Pool. However, recycling is a service paid by the Township to the County, and not all municipal sites are currently being

serviced. It is recommended that the Township continue asking for County assistance in recycling pick up at the currently not serviced sites.

Also, it has been indicated that recycling at the parks is often unsuccessful because of garbage mingling with the recyclables. There are recycling bins posted around Township parks, but park patrons seem to use them for trash as well. Sites of particular problem should be checked to make sure that a garbage bin is either next to or near the recycling bins, thus likely alleviating the problem.

Recycling bins should be available in lunchrooms of all municipal offices. It is suggested that lunchrooms without recycling bins acquire them.

Somerset County also does not offer recycling pick up for businesses that operate within the county. Even though these businesses pay taxes and support the recycling program, they are likely not services because the County fears large increases to the amount of material they collect. Somerset County Businesses and Restaurants are required to recycle but to do so they must hire and pay their own hauler. We should encourage businesses to pressure Somerset County to service them as well, even if they are only allowed two bins, similar to resident pick up.

In addition, it has been noted that there is no available recycling at Bernards Township Post Offices, which is a problematic considering the amount of paper likely collected at garbage material. Post Offices should be consulted about their recycling policy.

3. Procurement – Bernards Township is currently working with the Rutgers Green Cooperative Purchasing Program to begin a schedule of green purchasing. A resolution on Bernards Township’s Agreement with the Rutgers Green Purchasing Cooperative can be found attached as **Appendix W**. We are currently only purchasing one item from them but hope to expand this list soon.

Green Product	Green Features	Cost	Replaced Item	Cost
Natural Towels, JCP Paper Co.	Not Bleached	\$ 18.45 /case	Bleached Towels	\$ 34.40/ case

It is suggested that more sustainable products be added to our list, not only in an effort to support green and sustainable industries, but in order to protect employees who spend significant amounts of time working with harmful products. Many products purchased by Bernards Township from cleaning products to products used for body work at the DPW garage come with a Material Safety Data Sheets, or MSDS. These safety data sheets provide information about the product, like ideal storage area, boiling point, flash point, but their main purpose is to communicate their toxicity, safe disposal, and information on how to handle spills. The lower the score on the MSDS form, the safer the product is. There are currently employees at the Bernards Township Health Department who devote energy to maintaining a history of these data sheets for products used by Bernards Township. The goal is to use products with a low MSDS score where applicable. It is recommended that holistic and non-toxic alternatives to current products be sought. The Township may even be able to secure savings on insurance if it can prove to the Environmental Joint Insurance Fund that it is using safer products.

Specific products Bernard Township should buy the ‘green’ version of are cups as well as recycled sustainable paper. Suggested suppliers are:

Supplier	Contact
Treecycle	Treecycle.com
Ecoproducts	Ecoproducts.com
Gaiam	Gaiam.com
C & H Distributors	(414) 744-4280
Superior Group	(201) 339-5100

On 9/5/07 township staff met with Pro Link Green representatives to review their line of green products and also arraigned for an audit of the Township facilities. They will make recommendations on developing an effective Green Cleaning Program.

VI. Promoting Public Awareness -

▪ Internal Efficiency –

1. Green Charter Day – It had been discussed among Bernards Township officials that the 2008 Charter Day should have less of a commercialized feel and return to its original purpose, celebrating the charter of Bernards Township while creating a fun family atmosphere. It is suggested that the 2008 Charter Day should also be used as a vehicle to educate the public about green initiatives. One avenue of publicizing Bernards Township’s green initiatives, as well as ways the community can get involved would be to distribute fact sheets along with or independent of sustainable tote bags. Speakers from the Environmental Education Center in Lord Stirling may be invited to make a presentation, or Bernards Township might be interested in making a presentation of its own. In addition, green vendors, local farmers, and regional organic farmers should be invited to sell their produce at Charter Day. Registration fees for these vendors should either be very minimal or free. The public should be informed of the benefits of eating locally including supporting the longevity of local farms, and injecting money into local instead of foreign economies. In addition, local foods require less fossil fuel to travel from the fields to your fork.

2. Community Wildlife Habitat Project - Bernards Township has been certified as a Community Wildlife Habitat with the National Wildlife Federation. This organization raises awareness of citizen’s immediate environment and the small things they can make to enhance it for local wildlife. Conventional landscaping has reduced the natural ecological balance of our land and certification as a Community Wildlife Habitat benefits the community by:

- Attracting songbirds, butterflies, frogs and other interesting wildlife.
- Increasing curb appeal by replacing grass lawns with native wildflowers, shrubs and trees.
- Restoring habitats where commercial and residential development has degraded natural ecosystems.
- Reducing the use of chemicals, conserving energy and water and composting helps to improve air, water and soil quality.

With more education and a better understanding of natural landscapes and how food, water and shelter provide for our wildlife, we can restore balance and make a difference one backyard at a time. Visit www.bernardshabitat.org for additional information.



3. Climate Friendly Citizens Guide – A document found on the website entitled ‘Conservation Tips’ is a guide designed for citizens outlining cost effective home improvements, recycling guidelines, and best use practices for energy consuming appliances. This document was created by and for the use of Bernards Township and its residents. It was written in a tone that encourages conservation while being cost effective. This document should be disseminated to the public to educate and inform. It can be found attached as **Appendix X**.

4. Website with Climate Friendly Information – The Bernards Township Website now features a section with information on the measures Bernards Township has taken to green its operations, along with advice on how residents can do the same. This section of the website should be further disseminated to the public through the Bernards Township listserv. It is already advertised on Channel 15.

5. Energy Saving Computing Practices – Bernards Township Director of Information Technology Chris Kyriacou created a guide on the best practices for computing to save energy. Some of the tips include:

- Set the Power settings on your computer to automatically go into Sleep/Standby mode after 15 minutes or so of inactivity. If you do nothing else, do this.
- If you use a desktop, use an LCD monitor. They use lots less energy than CRT's.
- Turn your computer off when you're done for the day.
- Use a laptop computer. They use lots less energy than desktops.
- Use a power strip so you can easily turn off all your computer accessories at once. BITS makes a special power strip that goes one step further, automatically cutting power to peripherals when you turn your computer off.

The full guide can be found attached as **Appendix Y**.

6. Best Office Practices – In an office setting, some of the greenest as well as cost-saving measures involve saving paper. It is recommended that email be used as communication in place of paper documents whenever possible, and that the IT department examine the possibility of getting Bernards Township online with many forms, especially ones that are used frequently. Other suggestions include:

- Xerox Copies – always copy 1-2 sided copies
- Save documents only printed on one side and load these papers for printing unofficial documents
- Scan and e-mail rather than copy and e-mail whenever possible
- Use e-mail whenever possible to disseminate information both internally and externally
- Agenda Packages for TC and Boards – post agendas on township website and hyperlink associated documents rather than providing paper copies
- All document forms which currently exist (i.e. developer agreements, easements, deeds, license applications, etc.) should be reformatted from double spacing to single spacing
- Reduce unnecessary copies of existing NCR forms

- Whenever possible, do not produce paper copies of reports; save and disseminate reports on the computer adhering to proper records retention guides as established by the State
- IT Department should investigate digital signatures to allow for on-line approval of various forms and documents

▪ **Community Incentives –**

1. Green Festival – Green Team member Karen Witt has informed Bernards Township that there will be a First Annual Green Community Festival on November 3rd 2007 in Liberty Park, Peapack Gladstone. Contact Karen Witt for additional information on the festival to disseminate to the community.

▪ **Education –**

1. Channel 15 – Channel 15 is the Bernards Township public access channel that is used to report local happenings, announcements, as well as broadcast Town Council meetings to township residents. Bulletins and Green events can also be posted on the channel if a message is sent to ch15@bernardsboe.com.

2. Church Bulletins – Most Bernards Township churches distribute a weekly bulletin to churchgoers on Sundays, many of which are free to publish an article in. Green events as well as short facts may be published via this method in an effort to educate the community.

3. Bernards Township listserv – Bernards Township distributes email newsletters periodically to individuals that subscribe to the listserv. This tool should also be used to inform subscribers of green modification in the community, events, as well as tips and tricks

VII. Suggested Initiatives -

- Continue meeting with appointed Green Team members at least once monthly until the end of their appointed term, December 31, 2007.
- Further publicize the Green section of the Bernards Township website by making Bernards Township listserv subscribers aware of it in the next newsletter.
- Obtain additional information on and publicize the Green Community Festival set to take place on November 3rd 2007. Contact Karen Witt for additional information.
- Direct model ordinances of interest to the department they concern and have them checked for correctness and feasibility/compliance with existing code.
- Obtain a trial ream of recycled copy paper and test its compatibility with Bernards Township printers and copiers.
- Develop an effective green cleaning program.
- Investigate the purchasing of sustainable hot/cold cups and paper.
- Make sure all Park and Public recycling bins have a garbage can either next to or near their location to avoid the mingling of trash with materials to be recycled.
- Check that all municipal office lunchrooms are outfitted with a recycling bin. If none are present one should be added. A regular garbage can be converted to recycling if marked with a sign. Educate employees that they can recycle all metals, but only #1 and 2 plastics per Somerset County recycling.
- Invest in a publication like Co-op America (www.coopamerica.org) or a “Green Pages” directory to keep the Township abreast of environmental issues and vendors.
- Continue asking for County Assistance with recycling at Township properties and Parks.
- Consult Bernards Township businesses on their recycling practices, possibly through an anonymous poll. Encourage businesses to ask Somerset County for recycling pick up servicing.

- Bernards Township Post Offices should be consulted about their recycling policy. If they have none in place they should be encouraged to adopt one.
- Sign the 'Cool Cities' Pledge to reduce emissions in Bernards Township.
- Sign up to participate in the Audubon Cooperative Sanctuary Program for Golf Courses. For more information on how to sign up visit:
<http://www.auduboninternational.org/programs/acss/golf.htm>.
- Have an energy audit completed on Municipal Properties (Town Hall, Police Department, DPW, Library, Health Department), and add main details from the executive summary to box labeled Executive Summary, (p.7).
- Inquire with an energy agent about Energy Procurement and explore the possibility of purchasing energy through them for municipal facilities if they can secure a more competitive rate.
- Have plans drawn for a solar panel array to be installed on the roof of the DPW. If possible submit these plans to the Board of Public Utilities New Jersey Clean Energy Program Customer On-Site Renewable Energy (CORE) Program before August 31st 2007. After that date the value of the rebate is being reduced.
- Install motion detectors for overhead lights in at a few locations to test their effectiveness. Areas of interest to test the technology would be multi-stall bathrooms where lights are typically left on for long periods, and walk-in closets/storage areas. Motion sensors in trial areas should be installed and in service no later than Friday, September 14th.
- Check all street lights that are controlled by sensors and make sure their sensors are not blocked from light causing them to operate unnecessarily.
- Begin the purchasing and installation of T5 overhead lights.
- Survey Harrison Brook for narrow locations/locations that could accommodate a footbridge on Block 106 Lot 92.
- If adopted, inform Police Department about the changes in our anti-idling policy. Also if adopted, consider adding signs asking drivers to please turn off their engines if not in motion while on Township public school campuses.
- Review fields and drainage basins maintained by the Township and determine which areas can cease to be mowed. Furnish the areas of high visibility with

wildflower seeds and inform all concerned Parks and Grounds employees of the changes.

- Convert grass covered raised traffic islands to stone cover, shrub and mulch cover, or another form of fill that requires little maintenance. Not only are the mowers used to maintain these islands polluters, but the maintenance grass creates in these small, tight areas is an unnecessary expense.
- Encourage local Homeowners Associations to furnish their drainage basins with native plants, and cut down on lawn mowing.
- Determine fair and sufficient scaled sewer rates based on water usage for all sewer users. Alert the public of the change and of ways they can conserve to save money on their annual rates.
- Add Township maintained facilities to GIS system in order better organize these facilities. Utilities of particular interest are traffic lights, street lights, and drainage basins. Additional topographical sustainability related features, stormwater management features, and areas of concern should be mapped as well to form a sustainability layer in the Bernards Township GIS system. This process should begin no later than May 2008.
- Actively maintain, weed, and water newly planted shrubs and seeded areas until are established. Seeded areas should also be seeded seasonally until the plants are of a healthy population.
- Determine if there are any parking lots, roads, or other parcels where small areas of curbing can be eliminated and bio-filtration systems can be constructed on the other side to treat the stormwater runoff.
- Install a solar photovoltaic panel array on the roof of the DPW building.
- Explore the possibility and feasibility of digital signatures, allowing various forms and documents available for online completion.
- Hire an Environmental Coordinator to ensure that the initiatives outlined in this document as well as those proposed by PMK are carried out, and that all future affairs and decisions are made with sustainability in mind.