

# Guidance for Installation of Solar Renewable Energy Systems On Landfills in New Jersey (Updated January 8, 2013)

## A. Introduction

Closed landfills may be suitable locations for renewable energy systems such as solar panels or membranes. The installation of solar renewable energy projects on landfills within New Jersey would increase the amount of renewable energy produced in New Jersey while offsetting some or all of the costs of landfill closure and providing long-term revenues for landfill owners such as municipalities and counties. Accordingly, the implementation of solar projects on landfills is a priority for the Department. See <http://www.state.nj.us/dep/docs/depgoals.pdf>.

This guidance provides information about the process for obtaining approval to install solar energy projects on closed sanitary landfills under New Jersey's Solid Waste Regulations, N.J.A.C. 7:26 et seq., and other Department of Environmental Protection (DEP or Department) programs. This guidance describes the approvals that are necessary from the DEP's Solid & Hazardous Waste Management Program; the Site Remediation Program's Office of Brownfield Reuse and provides a list of the other permits or approvals from other programs in the Department and other agencies that may be required. It also describes some of the special issues that must be addressed when placing solar energy systems on sanitary landfills.

This Guidance reflects the Department's current thinking with regard to the best approach to obtaining approvals for these types of projects. We are continuing to evaluate issues arising in connection with solar projects, and may identify other approaches in the near future.

The process for obtaining approvals for landfill solar projects will generally follow this path, depending on site-specific situations:

1. Permit Readiness Checklist: The Permit Readiness Checklist and initial GeoWeb site suitability review are provided by the Department's Office of Permit Coordination and Environmental Review. The applicant completes the Readiness Checklist. See section B below.
2. Pre-application meeting: A pre-application meeting provides an opportunity early in the planning process for the applicant to meet with Department representatives, discuss the project and proposed schedule, and determine what will be required in order to obtain the appropriate permit approvals for the project. See section B below. For projects within the New Jersey Pinelands Area, inclusion of Pinelands staff at the premeeting is advisable.

3. Site Investigation: The applicant performs a site investigation to determine the types and extent of closure requirements needed for the landfill. See C below.
4. Landfill Disruption Approval: The applicant must obtain a Minor Disruption Approval pursuant to N.J.A.C. 7:26-2A.8(j), when performing a site investigation with soil boring/well drilling/decommissioning, all in accordance with N.J.A.C. 7:9D and carried out through the services of a New Jersey Licensed Well Driller of the proper class, or when the site investigation includes test pits. See section C below.
5. Site Remediation Program (SRP) Process: In certain cases, the project may be required to be managed under the SRP through N.J.A.C. 7:26C & E. An applicant may also elect to be managed under SRP. A Licensed Site Remediation Professional (LSRP) would manage the project, or for certain types of sites, the Department. In these cases, the steps in this path will still be carried out in concert with the phases of remediation under the SRP regulations. See Section H below.
6. Landfill Closure Plan: A Closure and Post Closure Plan prepared in accordance with N.J.A.C. 7:26-2A.9(e), must be submitted to the Department for review and approval, along with a Closure and Post-Closure Financial Plan. (N.J.A.C. 7:26-2A.9(f))
7. Closure Plan Modification: If a Closure Plan has already been approved, then the applicant will be required to address any changes or modifications to any previously installed systems under the original Closure Plan Approval. (N.J.A.C. 7:26-2A)
8. Construction: After successfully completing items 1 through 7 above, the applicant should have obtained all required approvals which were identified by the Office of Permit Coordination and the Solid & Hazardous Waste Program to move forward with the proposed project. The applicant can now start construction of the proposed solar project.
9. Post-closure Submissions: After completion of the project, the applicant must submit as-built and post closure maintenance plans, signed and sealed by a New Jersey licensed Professional Engineer to the Bureau of Landfill and Hazardous Waste Permitting.

All permit/approval applications should be submitted directly to each program in the Department, or to agencies outside the Department as appropriate, after discussion and coordination through meetings with the Office of Permit Coordination and Environmental Review.

To find information concerning the size (acreage) and location of landfills in New Jersey, visit the Department's Solid and Hazardous Waste Program's Landfill Database website at: <http://www.nj.gov/dep/dshw/lrm/landfill.htm> .

Feel free to contact the Department's Office of Permit Coordination and Environmental Review at (609)292-3600, or the Bureau of Landfill and Hazardous Waste Permitting at 609-984-6985 at any time for assistance.

## **B. Permit Coordination**

A solar landfill project may require a number of Department permits or approvals. For the applicant's convenience, the Department's Office of Permit Coordination and Environmental Review (OPCER) offers a one stop coordination process to assist the applicant. This office was established to improve service to permit applicants by way of better communication, coordination, and identification of problematic issues early in the permitting process. The OPCER office will work with the applicant to help identify any site impediments or fatal flaws via a GeoWeb review as well as DEP permits and approvals necessary to complete the project. The OPCER office will establish a permitting team of representatives of all applicable Department programs and set up pre-application meetings with all DEP programs that will have involvement in permitting or approving the project. This process assists the applicant in determining if a development plan is advanced enough to be ready to submit permit applications, to establish contact with a full Departmental permitting team, and to maintain consistent contact throughout the permitting process. To initiate the permit coordination process, an applicant is requested to electronically submit a Permit Readiness Checklist, which outlines permits required by the Department with program contacts and associated websites, to the OPCER office prior to a pre-application meeting to ensure that all appropriate programs are present. The permit readiness checklist is located at the website: <http://www.nj.gov/dep/pcer.htm>. If you have any questions concerning permitting requirements, please contact the OPCER office at (609) 292-3600.

## **C. Landfill Investigation**

To obtain approval from the Solid & Hazardous Waste Management Program, the installation of the solar system needs to be integrated into a Closure and Post-Closure Plan for the landfill. If no approved Closure and Post-Closure Plan exists for the landfill, the owner of the site or other applicant must perform a site investigation. The purpose of the site investigation is to determine the types and extent of closure requirements needed for the landfill. The site investigation should use available records with the physical investigation to determine the current condition and potential impact of the landfill. The investigation should address, but not be limited to, the following: types of waste disposed, vertical and horizontal extent of waste, existing cover, current gas generation, leachate and groundwater quality and flow direction, any environmental

controls already in place and an evaluation of the environmental setting, including surrounding land use, possible receptors and environmentally sensitive areas.

If a physical investigation of the site (e.g., soil boring/well drilling/decommissioning all in accordance with N.J.A.C. 7:9D, or test pits) is necessary, then the applicant shall obtain a Minor Disruption Approval pursuant to N.J.A.C. 7:26-2A.8(j) from the Solid & Hazardous Waste Management Program. The application to obtain a Minor Disruption Approval should be prepared, and submitted pursuant to the requirements of Section 9 of the Department's Technical Manual for Sanitary Landfill Permits and Approvals, and Department approval must be obtained prior to the investigation.

If an approved Closure and Post-Closure Plan already exists for the landfill, then the approved closure plan will need to be modified.

#### **D. Landfill Closure**

A sanitary landfill must be properly closed in accordance with Department regulations in order for a solar renewable energy system project to be installed. This section discusses what regulations apply in order to obtain a Landfill Closure/ Post Closure Plan Approval. If an approval has already been issued, the closure plan will need to be modified. The required Closure Plan Modification will include any additional requirements that need to be addressed in order to obtain an additional approval from the Department.

**Post-1982 Landfills** - A sanitary landfill that ceased accepting waste after January 1, 1982 will need to follow the design standards and construction requirements for a final cover system as per N.J.A.C. 7:26-2A-7(i). Listed below are brief descriptions of what is required for proper closure of a post 1982 landfill.

1. The final cover system will be designed to minimize long term infiltration or percolation of liquid into the landfill throughout closure and post closure periods. (N.J.A.C. 2A.7(i) 1).
2. If the site is a Class II or Class III landfill (see definitions at N.J.A.C. 7:26-1.4), the cover can consist of 2 feet of final cover as long as number 1 above and N.J.A.C. 2A.6(i) are met. (N.J.A.C. 2A.7(i) 2).
3. The final cover system must completely isolate the landfilled waste from the surrounding community. This is achieved by making sure the permeability of the final cover system is less than or equal to the bottom liner system or natural subsoils present. Final cover depth must be 18 inches overlain by a minimum six inches erosion layer. If a synthetic membrane is at the bottom of the liner system, then final cover should also be a synthetic membrane. (N.J.A.C. 7:26-2A.7(i) 3).

4. The determination of long-term stability of final slopes needs to be addressed according to information gathered pursuant to N.J.A.C. 7:26-2A.5(a)6. (N.J.A.C. 2A.7 (i) 4).
5. Final grades of the cover system must have a surface drainage system, and be capable of conducting run-off across the final grades without development of erosion rills or gullies. (N.J.A.C. 7:26-2A.7(i).6).
6. The final cover system must accommodate initial settlement to ensure the integrity of the impermeable liner is maintained throughout closure and post closure. If the leachate collection system is operating properly, then a temporary cover may be constructed. Unless the landfill is designed to allow leachate recirculation, the temporary cover must minimize infiltration and consist of 12 inches of compacted soils, and must not remain for more than six months unless otherwise stipulated by the department. (N.J.A.C. 2A.7(i)7).
7. Grading and stabilization of the final lifts of solid waste will result in a relatively planar surface, and will supply a firm base for the placement and construction of the impermeable cap. (N.J.A.C. 2A.7(i)8).
8. Final lifts of solid waste should be physically or chemically stabilized. The density should be increased as much as is practicable, by reducing the layers of the layers as compacted, increasing the load of compaction equipment, and increasing the number of passes done by the compaction equipment. Blending of materials (concrete, brick etc.) into the upper 12 to 24 inches of the final lift may be beneficial. (N.J.A.C. 7:26-2A.7(i)9).
9. Construction of the final cap must follow requirements such as being as impermeable as the most impermeable component of the containment system, minimum thickness of the clay cap needs to be 12 inches, synthetic geomembrane needs to be 30 mils, or HDPE should be 60 mils. The cap must also be protected from below and above by a minimum thickness of six inches of bedding, and should be located below the level of frost penetration. (N.J.A.C. 7:26-2A.7(i) 10).
10. Drainage Layer - Material used in the drainage layer must be designed and constructed so that discharge is able to flow freely in a lateral direction to minimize the hydrostatic head on the impermeable cap, flows through the drainage layer, and allows infiltrated liquid the ability to escape. Drainage layers must conform to the following: if located on a clay cap, it must be 6 inches thick, and if located on a geomembrane impermeable cap, it must be at least 12 inches thick. A properly designed synthetic layer must result in no seepage forces in the overlying soil. (N.J.A.C. 7:26-2A.7(i)11).
11. Vegetative Layer - Must be thick enough to contain the effective root depth or irrigation depth for vegetation planted. All fertilizer, mulch or seeding must be in

accordance with the Standards for Soil Erosion and Sediment Plan Control N.J.A.C. 2:90. (N.J.A.C 7:26-2A.7(i)12).

**Pre-1982 Landfills** - Pre-1982 landfills are sites which ceased acceptance of waste prior to January 1, 1982. Usually pre-1982 landfills must be closed in a manner similar to post-1982 landfill except that a financial plan is not required. At a minimum, pre-1982 sites must be covered with at least two feet of clean soil if there is no bottom liner present. However, when a bottom liner is present, then the landfill cap must have the same permeability characteristics as the present bottom liner, per N.J.A.C. 2A.7(i)3.

In most cases, sanitary landfills should be closed in accordance with the requirements of N.J.A.C. 7:26-2A.9 before installing renewable energy production systems. This includes the preparation and Department approval of a Closure and Post Closure Plan according to N.J.A.C. 7:26-2A.9(e). Specific guidance on each provision of a Closure and Post-Closure Plan is included in the Department's Technical Manual for Sanitary Landfill Permits and Approvals. This technical manual is available at <http://www.nj.gov/dep/dshw/resource/techman.htm> . The plan must include a narrative describing the design of each closure element and a justification/explanation of how the design complies with the regulation. The plan must also include New Jersey licensed P.E. signed and sealed engineering drawings of the design of closure elements.

Listed below are brief descriptions of the elements required in a Closure and Post-Closure Plan:

1. Solid Waste Facility Permit Application Form is available at <http://www.nj.gov/dep/dshw/resource/forms.htm> for filing an application for a Landfill Closure and Post-Closure Plan.
2. Soil Erosion and Sediment Control Plan (certified) - A SESC plan approved by the regional soil conservation district or a copy of the SESC plan application must be included in the closure plan.
3. Final Capping/Cover, Final Cover Vegetation, and Final Cover Maintenance - The requirements for final cover systems can be found at N.J.A.C. 7:26-2A.7(i). A QA/QC plan for the installation, inspection and testing of the final cover should also be included. For final cover vegetation, the type of vegetation should be selected in accordance with the Standards for Soil Erosion and Sediment Control in New Jersey. A description of maintenance of the final cover during post-closure must include, but not be limited to, mowing, application of fertilizer/line, reseeding, repair of eroded areas and settlement repair.
4. Maintenance of Side Slopes - addressed in a similar manner to item 3 above.
5. Stormwater Run-on/Run-off Controls – According to Solid Waste Regulations, the surface drainage should be designed to protect the sanitary landfill from run-on/run-off at a minimum peak discharge of a 24 hour, 25-year storm. The design requirements for surface drainage must be in accordance with N.J.A.C. 7:26-

2A.7(g). It should be noted that other Programs in the Department may have more stringent requirements on stormwater management (see below for more information on stormwater requirements). Details of maintenance and repair activities (i.e. periodic cleaning of sedimentation basins and repair of drainage structures such as downchutes) must also be provided.

6. Groundwater Monitoring Wells and Maintenance - A groundwater monitoring system must be designed and constructed in accordance with the New Jersey Pollutant Discharge Elimination System (NJPDES) regulation N.J.A.C. 7:14A-6. Wells will have to be periodically inspected and the applicant should also provide an estimate of when the wells may need to be replaced or redeveloped. Monitoring must be performed according to NJPDES regulations N.J.A.C.7:14A or according to the closure plan approval.
7. Landfill Gas Venting and Evacuation System, Maintenance and Testing - A landfill venting system must be developed to prevent gas build up and migration laterally from the site to adjacent receptors such as residences or other structures. Gas venting systems must be designed and constructed in accordance with N.J.A.C. 7:26-2A.7(f). Active gas venting systems are recommended over passive systems that allow gas to migrate off site under varying atmospheric conditions according to the Agency for toxic Substances and Disease Registry (ATSDR) internet website guidance at <http://www.atsdr.cdc.gov/HAC/landfill/html/ch5.html> . The closure application must include information on materials and manpower required to operate, maintain and repair the system, such as blower replacement settlement, repair of collection headers and condensate testing and disposal must be included. Testing for gas migration must be in accordance with N.J.A.C. 7:26-2A.8(h)9 when atmospheric pressure is falling.
8. Leachate Collection and Control System, and Operation and Maintenance of the Leachate Collection System - The leachate collection system must be designed and constructed in accordance with N.J.A.C. 7:26-2A.7(d). Details of all aspects of the O&M of the leachate collection system must be provided.
9. Facility Access Control and Maintenance of Access Control - Facility access control must be designed and constructed in accordance with N.J.A.C. 7:26-2A.8(b)25. Environmental controls such as an on-site leachate pretreatment facility, a lagoon, a leachate storage tank or gas flares must be individually fenced if a perimeter fence does not exist. A program for maintenance of the access controls must be provided.
10. Conformance of the Site To the Surrounding Area – Provision of a program to make the closed landfill aesthetically compatible with the surrounding area is required. The program must include landscaping, scale house removal, construction entrance removal, etc. In addition, the program shall provide for the maintenance of the items.

11. Inspections – The plan must provide for periodic inspections of the facility. Details of items required to be inspected, inspection form(s), and an inspection schedule should be included.
12. Closure and Post-Closure Financial Plan - In accordance with N.J.A.C. 7:26-2A.9(f), landfills that accepted waste for disposal after January 1, 1982, must have a Financial Plan that sets forth the costs and expenses for implementation of the Closure and Post-Closure Plan. The Financial Plan must also establish the means for meeting the costs and expenses for full implementation of the Closure and Post-Closure Plan. Post-closure is assumed to last for 30 years after completion of closure, although the Department can shorten or lengthen this time period.
13. Plan Certification - A New Jersey licensed professional engineer must prepare, sign and seal the closure plan per N.J.A.C. 7:26-2A.9(d).

Construction of the final cap must follow the requirements set forth at N.J.A.C. 7:26-2A.9 (e.g., as impermeable as the most impermeable component of the containment system, minimum thickness of the clay cap needs to be 12 inches, synthetic geomembrane needs to be 30 mills, or HDPE should be 60 mills). The cap must also be protected from below and above by a minimum thickness of six inches of bedding, and should be located below the level of frost penetration. (N.J.A.C. 7:26-2A.7(i)10).

The Department will consider the use of new technology for solar energy production such as, but not limited to, geomembrane landfill capping systems incorporating the photovoltaic cells in the geomembrane that are approved by a licensed New Jersey Professional Engineer (P.E.). The P.E. shall sign and seal the Closure/ Post Closure Plan application as meeting the Department's landfill closure regulatory requirements and that also provides for Post-closure Care remedies in the event of failure of the geomembrane or any aspect of the functionality of the membrane as related to satisfying the landfill closure requirements.

If the landfill applicant/owner has already obtained a Closure and Post Closure Plan approved by the Department, the proposed solar project will alter the Plan. Therefore, an application for modification of the Closure and Post-Closure Plan must be submitted per N.J.A.C. 7:26-2A. The application will have to address any changes to the above items and discuss plans for constructing any modifications to systems that have already been installed including:

1. Written description of the proposed change(s) containing relevant factors and rationale supporting the request;
2. Engineering drawings (if necessary) signed and sealed by a New Jersey licensed Professional Engineer; and a
3. Schedule for implementation of proposed change(s).

## **E. Specific Issues Regarding Solar Systems**

Many issues may influence the integrity of the landfill and its properties when installing solar systems on a landfill site. Therefore, it is important to understand what properties of the landfill need to be addressed and understood before commencing with a solar system project located on a landfill.

1. Settlement – Landfills naturally settle over time due to physical, chemical, and biological changes taking place in the waste mass. Differential settlement can cause damage to the landfill cap and ponding which can increase infiltration of water into the landfill. This would increase leachate generation and potentially cause leachate seeps and/or negatively impact groundwater quality. The weight of the solar installations and construction equipment could have an impact on landfill settlement. Also, settlement can damage the solar installations or adversely impact their efficiency. Therefore, the design of the capping/cover system, selection of the type of solar systems and its support system, and construction practices must consider measures to minimize settlement.
2. Side Slope Stability – Like settlement, side slope stability must be considered when selecting the type of solar installation, the design of the cover system and solar foundations that will be used in such locations. Snow and ice loading should also be considered when designing solar installations on side slopes.
3. Stormwater/Run-off – Installation of solar systems on a landfill will change the way stormwater behaves and will likely increase the potential for erosion and increase the amount of runoff that will have to be managed to prevent flooding. Therefore, the design of the solar installations must consider measures to minimize erosion, and stormwater management structures must be designed for the expected higher flow.
4. Thin Landfill Cover - For landfills with existing caps/cover systems, installation may impact the landfill cap and exposing waste during construction. This can occur during clearing and grading, construction of solar system support systems and utility installation. Construction must be done so the integrity of the cap is not damaged during construction or the capping/cover system is repaired to its original design. Construction activities must also be conducted in compliance with the requirements for landfill disruptions found at N.J.A.C. 7:26-2A.8(j).
5. Routine Cap Maintenance - Simply due to their presence on the landfill, solar system installations will affect the way post-closure maintenance of closure systems are normally performed. The Closure and Post-Closure Plan must address how the system design and maintenance programs allow for such things as vegetation management, erosion inspections and cover maintenance, inspection and maintenance of the gas and leachate collection systems, gas migration and surface monitoring, etc.

## F. Other Permits/Approvals/Requirements

Other Divisions within the Department or agencies outside of the Department may require particular permits or approvals or solar projects on landfills. Some of the more common permits that may be required by the applicant of the site are listed below. Please note that this is not a complete list of the Department's permits and approvals that may be necessary for specific projects with unique circumstances. Contact information is provided to get further information on the specific requirements of these permits or approvals.

1. Land Use Permits, such as Flood Hazard Area, Freshwater Wetlands, Coastal Wetlands, CAFRA, Waterfront Development, Highlands Preservation Area, and Tidelands permits/approvals. For questions regarding permit requirements, please contact the Division of Land Use Regulation by visiting its internet website at <http://www.nj.gov/dep/landuse/> or by telephone at (609) 777-0454.
2. Air Permits, required for landfill gas venting systems, such as an Air Pollution Control Permit and Certificate. Pursuant to N.J.A.C. 7:27-8.2(c)17, equipment used for the purpose of venting a closed or operating dump, sanitary landfill, hazardous waste landfill, or other solid waste facility, directly or indirectly into the outdoor atmosphere. For questions regarding these permit requirements, please contact the Bureau of Air Permits by visiting its internet website at <http://www.nj.gov/dep/aqpp/> or by phone at (609)-292-0834.
3. Well Drilling Permits - necessary for drilling, constructing, redeveloping, replacing and decommissioning wells (including but not limited to gas vent extraction wells), some soil borings, cathodic protection wells, dewatering wellpoints, etc. placed within or outside of the landfilled area must be obtained through the services of a New Jersey Licensed Well Driller of the proper class. For questions regarding these permit requirements, please contact the Division of Water Supply and Geoscience by visiting its internet website at <http://www.nj.gov/dep/watersupply/> or by phone at 609-984-6831.
4. New Jersey Pollutant Discharge Elimination System Permits (NJPDES) –  
Groundwater discharges: For questions regarding these permit requirements, please contact the Solid and Hazardous Waste Program by visiting its internet website at <http://www.nj.gov/dep/dshw/> or by phone at 609-984-6985.  
Surface water discharges: If, as a result of this project, a new or increased discharge to surface water will occur, the Bureau of Surface Water Permitting should be contacted at (609) 292-4860.
5. New Jersey Highlands Council - for designation of a Department-designated brownfield area as a Highlands redevelopment area. For questions regarding the redevelopment area designation in either the Preservation Area or the Planning Area, please contact the Highlands Council Executive Director at New Jersey Highlands Council, 100 North Road (Route 513), Chester, N.J. 07930-2322,

telephone: (908) 879-6737, fax: (908) 879-4205, and <http://www.highlands.state.nj.us/>. Specific guidance is available at: [http://www.highlands.state.nj.us/njhighlands/implementation/redevelopment\\_procedures\\_103008\\_final.pdf](http://www.highlands.state.nj.us/njhighlands/implementation/redevelopment_procedures_103008_final.pdf). For information on the Highlands Water Protection and Planning Act rules, visit the internet website at <http://www.nj.gov/dep/highlands/>."

6. New Jersey Pinelands Commission - approval for sites located in the New Jersey Pinelands Area will require approval of the Pinelands Commission and conformance with the Commission's regulations, including new provisions at N.J.A.C. 7:50-5.36. For questions regarding permit requirements, please contact the NJPC by visiting its internet website at [www.NJ.gov/pinelands](http://www.NJ.gov/pinelands) or by phone at (609) 894-7300.
7. Green Acres – For questions concerning any permit requirements, please contact the Green Acres Program by visiting its internet website at <http://www.nj.gov/dep/greenacres/staff.htm> or by phone at (609) 984-0500.
8. Fish & Game – For questions regarding any permit requirements, please contact the Fish & Game, by visiting its internet website at <http://www.nj.gov/dep/fgw/contact.htm>
9. Stormwater Requirements for Placement of Solar Projects on Landfills

There are two different requirements that are described below, the Construction Activity Stormwater General Permit (5G3) and the design and performance standard for runoff quantity.

- a. Construction Activity Stormwater General Permit (5G3) - Construction activities that propose to disturb an acre or more of land must apply for a Construction Activity Stormwater General Permit (known as "5G3"). This permit can be accessed through the Bureau of Nonpoint Pollution Control's Stormwater Construction E-Permitting System available at the website: <http://www.nj.gov/dep/online>. Guidance on filling out the permit is available at <http://www.state.nj.us/dep/dwq/5g3.htm> or by phone at 609-633-7021. The Bureau website can be found at [http://www.state.nj.us/dep/dwq/bnpc\\_home.htm](http://www.state.nj.us/dep/dwq/bnpc_home.htm)
- b. Stormwater Runoff Quantity and Control Requirements - The Department's requirements for the minimum design and performance standards necessary to control stormwater runoff quantity impacts of solar project placement on landfills can be found at N.J.A.C. 7:8 *et seq.* The Bureau of Non-Point Pollution Control is available at the websites listed in Item a. above.

## **G. Solid & Hazardous Waste Management Program Contact Information**

Additional information concerning the requirements discussed above regarding disruption approvals, closure/post closure plan approvals and closure plan modifications, is available in the Bureau of Landfill and Hazardous Waste Permitting's Technical Manual for Sanitary Landfill Permits and Approvals. This manual is available at: <http://www.nj.gov/dep/dshw/resource/techman.htm> .

If you have any questions regarding the information in this guidance for the installation of solar energy producing systems on landfills you may discuss your questions with a representative from the Landfill Permitting section of the Bureau of Landfill and Hazardous Waste Permitting at (609) 984-6985.

Mailings of Closure and Post-Closure Plans, Applications for Sanitary Landfill Disruption Approvals, and other correspondence related to closing sanitary landfills should be addressed to:

Mail Code 401-02C  
Chief, Bureau of Landfill & Hazardous Waste Permitting  
Solid & Hazardous Waste Management Program  
New Jersey Department of Environmental Protection  
401 East State Street P.O. Box 420  
Trenton, New Jersey 08625

## **H. Site Remediation Program, Office of Brownfields Reuse Contact Information**

(Where to direct further questions and concerns regarding the remediation/closure of a nonoperating landfill under N.J.A.C. 7:26C & E.)

If you have any questions regarding the information in this guidance for the remediation of a landfill and installation of solar energy producing systems on the landfill, you may discuss your questions with a representative from the Office of Brownfield Reuse section of the Brownfield Remediation & Reuse Element at (609) 984-2001.

Mailings of Remediation documents and applications for Sanitary Landfill remediations under the Site Remediation Program should be addressed to:

Mail Code 401-06A  
Section Chief, Office of Brownfield Reuse  
Site Remediation Program  
New Jersey Department of Environmental Protection  
401 East State Street P.O. Box 420  
Trenton, New Jersey 08625

## **I. Financial Incentives for Solar Renewable Energy Project Funding**

A number of financial incentives are available for the installation of solar energy production systems both from governments and industry as the cost of closure of landfills can be significant. These incentives are generally designed to make the installation of renewable energy projects cost effective over several years.

Regional energy utilities may provide grants or loans for installation of renewable energy projects that would help to offset the cost of the project.

The New Jersey Board of Public Utilities (NJBPU) may offer credits for installation of renewable energy projects. The NJBPU also supports the Solar Renewable Energy Credit (SREC) system that allows solar power producers to sell SREC credits based on the amount of energy produced on a market to help offset the cost of the solar renewable energy system over the long term. The NJBPU website is available at: <http://www.njcleanenergy.com/main/rebates-and-promotions/rebates-and-promotions>

Federal grants or tax credits may be available depending on the federal incentives in place at the time of the project. Nonprofit institutions such as municipalities may structure renewable energy solar projects through third parties in order to take advantage of any tax credits that may be available.

The Department fully supports and encourages the application of Processed Dredged Material (PDM) for use in the closure/remediation design to stabilize, level and cap the landfill, which will help fund the project to offset some or all of the costs of landfill closure/remediation. Information concerning sources of PDM in New Jersey is available from the:

Mail Code 401-06C  
Office of Dredging and Sediment Technology  
401 East State Street P.O. Box 420  
Trenton, New Jersey 08625  
(609) 292-1250

<http://www.state.nj.us/dep/localgov/bfielduse.dredgetech.html>

Additional financial incentives may exist at the time of the project. Please contact the Bureau of Landfill and Hazardous Waste Permitting at (609) 984-6985 which may be aware of recent changes in financial incentives from experience with current solar projects.

Information regarding financial incentives for solar energy projects in New Jersey is also available at the following websites:

**SAGE: NJDEP Office of Sustainable and Green Energy**  
website: <http://www.nj.gov/dep/sage/>

**OBR: NJDEP Office of Brownfield Reuse  
Hazardous Discharge Site Remediation Fund  
Website: <http://www.nj.gov/dep/srp/brownfields/>**

**NJ BPU: Clean Energy Program  
website: <http://www.njcleanenergy.com/>**

**DSIRE: Database of State Incentives for Renewables & Efficiency,  
website: <http://www.dsireusa.org/incentives/incentive.cfm?>**

**PSE&G: Solar Loan Program,  
website: <http://www.pseg.com/home/save/solar/overview.jsp>**

Additional financial incentives may exist at the time of the project. Please contact SAGE at (609) 292-8601.

## **J. Resources for Additional Information**

“Solar Power Installations on Closed Landfills: Technical and Regulatory Considerations,” September 2009. Prepared by: Gabriel Sampson, National Network of Environmental Management Studies Fellow, Bren School of Environmental Science and Management, University of California, Santa Barbara for the U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Office of Superfund Remediation and Technology Innovation, Washington, D.C. [www.epa.gov www.clu-in.org](http://www.epa.gov/www.clu-in.org) .  
<http://www.clu-in.org/download/studentpapers/Solar-Power-Installations-on-Closed-Landfills-Sampson.pdf>

New Jersey Department of Agriculture State Soil Conservation Committee (SSCC) -  
<http://www.state.nj.us/agriculture/divisions/anr/nrc/soil.html>

USDA Natural Resources Conservation Service (NRCS) -  
<http://directives.sc.egov.usda.gov/>

USFWS New Jersey Field Office - <http://www.fws.gov/northeast/njfieldoffice/>

New Jersey Department of Environmental Protection Air Quality Permitting Program -  
<http://www.nj.gov/dep/aqpp/>

New Jersey Department of Environmental Protection Brownfields -  
<http://www.nj.gov/dep/srp/brownfields/>

New Jersey Department of Environmental Protection Endangered and Threatened Species - <http://www.nj.gov/dep/fgw/tandespp.htm>

New Jersey Department of Environmental Protection Land Use Program - <http://www.nj.gov/dep/landuse/>

New Jersey Department of Environmental Protection Solid and Hazardous Waste Program - <http://www.nj.gov/dep/dshw/>

New Jersey Department of Environmental Protection Stormwater and Nonpoint Source Pollution - <http://www.nj.gov/dep/stormwater/>

New Jersey Department of Environmental Protection Division of Water Supply and Geoscience – <http://www.nj.gov/dep/watersupply>

New Jersey Department of Environmental Protection Division of Water Quality - <http://www.nj.gov/dep/dwq/>

Division of Water Quality's NJPDES Discharge to Surface Water Program – <http://www.nj.gov/dep/dwq/swp.htm>

New Jersey Highlands Council - <http://www.highlands.state.nj.us/>  
Guidance for the Highlands Water Protection and Planning Act – <http://www.nj.gov/dep/highlands/>

New Jersey Pinelands Commission - <http://www.nj.gov/pinelands/>