



Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

Western Regional Office • 436 Dwight Street, Springfield MA 01103 • 413-784-1100

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January 6, 2012

Ben Axelman
Rivermoor-Citizens Agawam, LLC
88 Flack Falcon Avenue, Suite 342
Boston, MA 02210

Re. Agawam - SWM - Landfill
BWP SW 36: Post-Closure Use - Major
Photovoltaic Power Generation
Transmittal No. X241104
File No. 11-005-009

Dear Mr. Axelman:

On November 9, 2011, the Department of Environmental Protection, Western Regional Office ("MassDEP") received a BWP SW 36 permit application proposing to construct a photovoltaic power system at the former Grasso Landfill ("landfill") northeast of Main Street in Agawam, MA.

The application was prepared by Tighe & Bond on behalf of Rivermoor-Citizens Agawam, LLC ("Rivermoor") of Boston, MA. The engineering plans submitted with the application bear the stamp and signature of Brian S. Huntley, Massachusetts Registered Professional Engineer No. 46273 and Francis J. Hoey III, Massachusetts Registered Professional Engineer No. 40111. Additionally, two sheets depicting and describing the electrical layout of the system bear the stamp and signature of Peter A. Wozniak, Massachusetts Registered Professional Engineer No. 30817 and an engineering review of the proposed panel framing/ballast system bears the stamp and signature of Paul M. Westermann, Massachusetts Registered Professional Engineer No. 48174.

Project Description

Rivermoor has proposed to construct and operate a 1.98 MW DC solar system on the surface of the landfill, consisting of 6,072 modules, three inverters, and one transformer. Reportedly, changes in the panel layout may result in small reductions in the number of modules and total system capacity, but final specifications were not available as of the issuance of this permit.

The landfill operated from about 1954 to 1986, receiving at various times municipal solid waste, building demolition waste, earth, and road scrapings. The landfill received final cover in 1989, following MassDEP approval of a set of plans dated June 1, 1988. The final cover consists of

two feet of earth. The surface is generally covered with grass, although some areas around the margins are wooded.

The landfill consists of two distinct sections, including an upper section having an elevation of about 9.5 acres, and a lower section to the north. The solar array and associated equipment are proposed to be installed on the upper section, which generally has relatively gentle slopes of 2 to 5%. Steeper slopes exist to the north and east, but those steeper areas will not be affected by the project.

The lower section is within the 100-year floodplain (designated as land below the elevation of 60.2 feet above mean sea level) but the upper section is not.

The landfill is currently used for post-closure uses including a golf driving range, a cell phone tower, and a paintball range. The solar array will be installed on the upper part of the landfill where the driving range is currently located, so the driving range activity will cease. The cell phone tower and paintball range are located on the lower part of the landfill and will not be affected by the solar array.

Decomposition of the organic fraction of the waste has led to settlement and production of landfill gas (i.e. methane and carbon dioxide). Settlement has led to some minor irregularities on the landfill surface, causing ponding of stormwater. Monitoring has shown that landfill gas (methane) is present in the subsurface in some locations in and around the landfill. Therefore, the project must not provide an opportunity for landfill gas to collect in any structure, conduit, etc. that would create a risk of fire, explosion, or asphyxiation, nor facilitate migration of landfill gas offsite through a preferential pathway (e.g. gravel pipe bedding).

Existing depressions will be filled with soil to eliminate ponding areas and restore uniform grades to the surface. Rivermoor proposes to install the solar panels on a rack system ballasted by precast concrete blocks, which will lie on the surface rather than penetrating the final cover. Each ballast block will be placed on a compacted crushed stone pad nominally 6 inches in thickness, which will provide a solid foundation and allow for co-planar installation of adjacent ballasts. Eight photovoltaic modules will be mounted together on a rack to form one 26-foot long panel, and each rack will be bolted to two ballasts located at either end. The ballasts will have dimensions of 70 inches long, either 21 inches or 27.5 inches wide, and 8 inches thick. The panels will be connected to each other via aboveground conduit or cable trays.

The inverters and transformer will be installed on a 20-foot by 40-foot concrete pad that will be installed on a gravel leveling pad. The majority of the electrical connections to this equipment will be made through the bottom of the equipment via electrical conduits set in the concrete pad. As a result, conduits will be kept above the existing grade. This will help ensure that landfill gas will not enter into the equipment on the pad.

Manufacturer literature indicates that the three Solectria inverters will be in ventilated cabinets with blowers for cooling purposes. The cabinets will also have "feet" to raise them above the concrete pad. These features will prevent landfill gas from entering and/or building up within the cabinets. It appears that the transformer cabinet will be placed right on the surface of the pad, and it won't have provisions for ventilation. However, the large doors in relation to cabinet size will ensure that any landfill gas-impacted air inside the cabinet (in the unlikely event that it

collects there) will be diluted quickly upon opening the doors. The cabinet is relatively shallow (36 inches), so it appears that the controls within the cabinet can be operated without entering the cabinet. The application does not indicate that other electrical equipment will be installed on the pad, such as switchgear or a metering cabinet. If Rivermoor intends to install additional equipment, it should forward the specifications to MassDEP prior to construction so that MassDEP can review it in relation to potential landfill gas impacts.

Calculations are provided showing the potential ground pressure on the cover from the weight of the ballasts, racks, panels, as well as snow and wind loads. They indicate that the maximum ground pressure will be about 708 pounds per square foot or 4.9 pounds per square inch (psi). It is Tighe & Bond's opinion that this level of ground pressure is unlikely to cause any significant elastic or consolidation settlement of the landfill. Decomposition settlement will continue to occur whether or not the solar array is constructed, and this type of settlement is likely to cause misalignment of the solar panels over time. However, the rack system will be adjustable to allow periodic realignment, and in any case, electrical connections will be flexible to allow for panel settlement.

Rivermoor proposes to build a permanent 16-foot wide gravel access road over the landfill surface adjacent to the westerly property boundary. The road will be built directly on the landfill cover and will consist of, from bottom to top, a nonwoven geotextile laid directly on the surface, 12 inches of processed gravel borrow, and 6 inches of dense graded crushed stone. Road material will be compacted to a minimum of 92% of the maximum dry density as determined by a Modified Proctor analysis. Part of the road and a few solar panels will be built within the 100-foot buffer zone of a jurisdictional stream (i.e. protected under the Wetlands Protection Act). As a result, Rivermoor will need to receive approval from the Agawam Conservation Commission for work in that area.

Rivermoor proposes to use only low ground pressure (LGP) equipment with less than 7 psi ground pressure off of the access road during system installation. Such equipment will be operated to minimize turning and repeated travel over the same areas will be reduced by accessing the work area from different points on the access road. However, if damage to the cover soil occurs, temporary roads or pads will be constructed by placing a layer of nonwoven geotextile on the surface overlain by a 6-inch layer crushed stone. Once system installation is complete, the vegetated areas will be repaired and seeded as soon as possible.

The entire photovoltaic system will be surrounded by a minimum 6-foot high chain link fence. The fence height will be increased to 9 feet and privacy slats will be provided in the area closest to Main Street. Double swing gates will be provided at the northern and southern ends of the solar array. The fence will be anchored by posts set into concrete footings. Since the landfill final cover consists only of a minimum of two feet of earth, there is no barrier layer that would be penetrated by the footings. Therefore, installation of footings into the final cover is acceptable at this site. If the footings are installed in auger holes or excavated holes, any solid waste removed from the subsurface must be properly disposed of at an offsite disposal facility.

A note on the Proposed Site Plan (Sheet 3) indicates that that solar array access road/gate at the northern end of the project will connect to the existing access road servicing the cell phone tower. However, it should be noted that the cell phone tower access road does not extend to the location indicated. Based on additional correspondence with Tighe & Bond, MassDEP understands that the gate will be constructed at the north end of the access road, but no

additional roadway will be constructed to link the gate to the existing cell tower access road. The northern gate is being provided only for Fire Department access in the event of an emergency and Rivermoor does not plan to use it under normal circumstances.

The plans depict that several new utility poles will be installed to run overhead electric lines from the transformer/inverter pad to Main Street. As noted above, it is acceptable at this site to penetrate the final cover for the installation of the utility poles, but any solid waste removed from the subsurface must be properly disposed of.

Based on correspondence with Tighe & Bond, MassDEP understands that Western Massachusetts Electric Company ("WMECO") has not completed review of the placement of poles and overhead electric lines within its existing electrical easement. It is possible that WMECO will require underground electrical conduit to be installed within the easement rather than overhead lines, so the plans contain a detail drawing showing the conduit cross-section. The drawing depicts that wires will run through a pair of PVC conduit pipes set in a concrete encasement. The conduits will be set 36" below the finished grade, and warning tape will be buried 12 inches above the conduit. Since the potential location of subsurface conduit and certain design considerations are still undefined, this permit requires Rivermoor to submit revised drawings for MassDEP comment prior to construction if it intends to alter the electrical layout to include subsurface conduit.

Rivermoor will be responsible for operating and maintaining the solar system. Work will be performed by a combination of Rivermoor personnel, subcontractors, or authorized vendor representatives. It is expected that such personnel will visit the site periodically for scheduled inspections and maintenance of electrical system components and additionally as needed to respond to the system's automated alert system. Rivermoor or its contractors will be responsible for mowing the areas between rows of panels a minimum of twice per year. No herbicides or chemicals will be used to control vegetation. The condition of gates and access roads will also be checked periodically and repaired as necessary. There are no proposed changes to maintenance or monitoring of parts of the landfill outside of the solar system limits.

The landfill has a network of landfill gas monitoring locations, such as gas monitoring wells, catch basins, and vents that are monitored periodically. There is also a landfill gas venting trench along the property line between the landfill and land owned by Peter and Linda Parotta. Some of the monitoring points will be within the perimeter fence of the solar project and may be in the vicinity of solar panels and/or other project features (not all of the monitoring points are depicted on the application plans). The fence will run in the vicinity of the gas venting trench. This permit requires that Rivermoor protect monitoring points and the venting trench during and after construction and provide access for monitoring as necessary.

The project should not result in any significant changes to stormwater volumes or patterns. The landfill does not currently have any stormwater handling structures except for a concrete-lined down chute which conveys flow from the upper part of the landfill to the lower part. The down chute will not be affected by the project. Stormwater generally flows across the surface of the upper landfill from south to north, terminating at the down chute. The grades on the upper landfill will not be modified except to fill in small areas that currently pond water. The size and orientation of the ballast blocks and transformer/inverter pad should not significantly increase the impermeable area or impede the general flow pattern. The stormwater flowing off the lower edges of the panels could result in minor localized erosion along the edges of the panels, but

that issue can be corrected if it arises. During construction, Rivermoor proposes to use hay bales with silt fencing and/or Filtrex Siltsoxx filled with compost for sedimentation control in various locations around the site.

DEPARTMENT DETERMINATIONS

This application substantially complies with the application requirements at 310 CMR 19.039, *Applicant's Request to Modify a Permit*, and was reviewed in accordance with 310 CMR 19.037, *Review Procedure for Permit Modifications*. This permit approval is issued pursuant to Massachusetts General Laws Chapter 111, Section 150A and 310 CMR 19.000, subject to the conditions set forth below and the standard conditions at 310 CMR 19.043(5) and any amendments thereto. In the event this permit conflicts with all or parts of prior plan approvals or permits issued pursuant to c. 111, s. 150A or solid waste regulations in effect prior to July 1, 1990 the terms and conditions of this permit shall supersede the conflicting provisions of the prior permits or approvals. This permit does not convey property rights of any sort or any exclusive privilege.

1. Rivermoor shall modify the landfill only in accordance with the plans and specifications referenced above, except as modified by this permit or otherwise approved by the MassDEP in writing.
2. Construction Oversight:
 - A. A third-party, qualified engineering consultant (the "on-site engineer") shall be on-site regularly (minimum daily) when construction work is taking place on the cap. A continuous presence on-site shall be required during any operations in which excavation or use of an auger drill into the landfill cover or underlying waste occurs or construction equipment (e.g. bulldozer, loader, etc.) or heavy vehicles are operating on the landfill cover. Notwithstanding this requirement, the on-site engineer need not be on-site daily if the only work occurring is of a nature that does not involve any construction equipment or heavy vehicles, excavation or penetration into the subsurface, or potential damage to vegetative cover or landfill appurtenances (e.g. monitoring wells, vents, venting trench, etc.). An example of an activity not needing daily oversight by the on-site engineer is installation of above-ground electrical conduits in which materials are brought to the work area using a light truck. The on-site engineer shall inspect the site at least once per week during periods when daily oversight is unnecessary. The on-site engineer may contact MassDEP for guidance if the need for daily engineering oversight is unclear in a given circumstance.
 - B. The on-site engineer shall have sufficient staff onsite to provide quality assurance/quality control (QA/QC) oversight for all construction work at the site, and shall submit monthly construction progress reports to MassDEP summarizing the work performed during the month. Within 60 days following the completion of construction, the third-party engineering consultant shall submit a completion report, signed and stamped by a Massachusetts-registered P.E., certifying that the work was completed in accordance with the approved plans and specifications and the conditions of this permit.

- C. MassDEP reserves the right to require greater or more frequent oversight by the on-site engineer than specified herein if it believes such increased oversight is necessary to protect the landfill cover or appurtenances, public health, safety, or the environment.
- 3. Rivermoor and its contractor(s) are responsible to ensure that all necessary precautions are taken to protect the health and safety of workers and the general public during construction, operation, and maintenance of the solar system. A site-specific Health & Safety Plan for the solar system shall be submitted to the MassDEP prior to the beginning of any construction work, which shall include protocols for monitoring of landfill gas as needed, and protocols for modifying work practices if landfill gas is detected at levels deemed excessive.
- 4. Rivermoor and its contractor(s) are responsible to ensure that the inverter and transformer cabinets on the landfill cap area will not accumulate landfill gas during the construction and operation of the solar system. Any landfill gas levels exceeding 10% of the Lower Explosive Limit (% LEL) within any electrical equipment box shall trigger the requirements of 310 CMR 19.132(4)(g), for notification and action. The additional requirements for the enclosures include the following:
 - A. Electrical component cabinets installed on the concrete pad shall not have openings that could allow landfill gas to enter except as necessary for electrical connections made via conduits. All penetrations for conduits shall be fully sealed, both inside and outside the conduit.
 - B. Rivermoor shall ensure that the design of any transformers, inverters, and any other electrical cabinets/equipment shall not allow the entry of landfill gas, and in the event that gas does enter, the equipment shall be designed to prevent the ignition of the gas.
 - C. As part of the site-specific H&S Plan, a written protocol shall be prepared and submitted for the maintenance of the inverters/transformers, and for regular calibration and maintenance of landfill gas monitors used by workers on the site.
 - D. If Rivermoor intends to install any other equipment on the inverter/transformer pad or any other location on the surface of the landfill (i.e. equipment not specifically identified in the application or subsequent correspondence), it shall submit documentation and specifications for such equipment as soon as possible prior to construction so that MassDEP can review it in relation to potential landfill gas impacts.
- 5. In order to comply with the Wetlands Protection Act and 310 CMR 10.00, Rivermoor shall receive approval from the Agawam Conservation Commission ("ACC") prior to proceeding with the project in areas that are subject to those rules.
- 6. Vehicles operating on the landfill cap shall only operate on the designated access roads, except for low-pressure construction equipment (with ground pressures of 7 PSI or less) which may operate off the access roads, in accordance with the remaining conditions of this permit. All operators of vehicles entering the cap area shall be clearly instructed by the on-site engineer and/or the contractor of the requirements of this permit prior to arrival, to avoid damage to the landfill cap. Low-pressure construction equipment operating off the access roads shall minimize turning movements and repeated travel over the same areas as much as possible. Temporary roads/pads may be constructed as proposed in the application to prevent damage to the vegetative surface. Any temporary roads and/or damaged areas of the cap shall be repaired and reseeded as soon as possible following construction to minimize the potential for erosion.

7. Prior to the commencement of construction activities, all landfill gas vents, landfill gas monitoring wells, and any other existing structures or appurtenances of the landfill shall be flagged for visibility, and protective barriers shall be placed around such structures as needed to prevent damage by vehicles accessing the cap area. Existing monitoring points shall remain accessible during and after construction, and access shall be granted during reasonable times for personnel needing to monitor them.
8. Should WMECO require that Rivermoor construct buried conduit rather than overhead electric lines within the WMECO easement, Rivermoor shall provide MassDEP with drawings and specifications depicting and describing the locations and construction details associated with the conduit as soon as possible. MassDEP reserves the right to require a permit modification to implement this design change.
9. Rivermoor is responsible to ensure that the proposed work complies with all applicable local, state and federal electrical codes and permits, including the National Electrical Code (NEC), 2011 Edition, Article 690 - "Solar Photovoltaic (PV) Systems".
10. Following completion of the solar system, inspections and maintenance of the solar system and landfill cap shall be conducted, at a minimum, as proposed in the application, except as may be modified by this permit. The minimum frequency of inspections and maintenance shall be as follows:
 - A. The landfill surface within the solar system limits shall be mowed at least twice per year.
 - B. The condition of the fence and access gates shall be inspected at least once a month.
 - C. The condition of access roads shall be inspected at least twice a year.
 - D. Notwithstanding the inspection and maintenance intervals stated in this Condition, Rivermoor and/or its contractors shall be responsible for observing and responding to problems whenever they occur if observed when personnel are on site for other purposes or problems are brought to Rivermoor's attention by another party.
11. Rivermoor shall ensure that any erosion, unusual or excessive settlement, stressed vegetation, damage to landfill gas monitoring wells, vents, and other appurtenances, and any other problems with the landfill cap are reported to MassDEP within 24 hours of discovery. Such problems shall be evaluated and appropriately repaired within 7 days of discovery or in accordance with an alternative schedule approved by MassDEP.
12. If any condition associated with the solar system represents a risk, or actual harm, to public health, safety, or the environment, Rivermoor shall immediately take such actions necessary to prevent or ameliorate such risk or harm. Rivermoor shall notify MassDEP as soon as possible after discovering such a condition or event.
13. Rivermoor shall submit a quarterly inspection report to MassDEP within 30 days following the end of each calendar quarter, which shall contain the following information:
 - A. The dates and findings of inspections during the quarter.

- B. Any problems with the landfill cap, including but not limited to, unusual or excessive settlement, stressed vegetation, and erosion.
 - C. Any problems with access controls such as damaged gates and/or fences, as well as any evidence that unauthorized access to the solar system area has occurred.
 - D. Any damage to landfill gas monitoring wells or other monitoring points, landfill gas vents, or other landfill appurtenances.
 - E. A description of actions taken to correct any problems.
13. Any historic solid waste removed from the landfill (e.g. waste removed from auger holes for the installation of poles or fence footings) shall be promptly removed from the site and disposed of at a facility permitted to accept it.
14. Compliance with any submission deadlines pursuant to this approval shall be determined by the date of receipt or the postmarked date, whichever is earlier.

RIGHT OF APPEAL

Right to Appeal- Pursuant to 310 CMR 19.037(5), except as provided for under 310 CMR 19.037 (4)(b), any person aggrieved by the issuance of this permit may file an appeal for judicial review of said decision in accordance with the provisions of M.G.L., c. 111, s. 150A and C. 30A not later than thirty [30] days following notice of this decision.

Notice of Appeal- Any aggrieved person intending to appeal the decision to the superior court shall provide notice to MassDEP of intention to commence such action. Said notice of intention shall include MassDEP File Number (12-005-009) and shall identify with particularity the issues and reason(s) why it is believed the approval decision was not proper. Such notice shall be provided to the Office of General Counsel of MassDEP and the Regional Director for the regional office which made the decision. The appropriate addresses to which to send such notices are:

General Counsel
Department of Environmental Protection
One Winter Street -Third floor
Boston, Massachusetts 02108

Regional Director
Department of Environmental Protection
Western Regional Office
436 Dwight Street
Springfield, Massachusetts 01103

No allegation shall be made in any judicial appeal of this decision unless the matter complained of was raised at the appropriate point in the administrative review procedures established in those regulations, provided that matter may be raised upon a showing that it is material and that

it was not reasonably possible with due diligence to have been raised during such procedures or that matter sought to be raised is of critical importance to the public health or environmental impact of the permitted activity.

This approval pertains only to the Solid Waste Management aspects of the proposal and does not negate the responsibilities of the owners or operators to comply with any other local, state or federal laws, statutes and regulations or enforcement actions, including orders issued by another agency now or in the future. Nor does this approval limit the liability of owners or otherwise legally responsible parties from any other applicable laws, statutes or regulations now or in the future.

MassDEP reserves the right to require additional modifications, additions or deletions of construction design components, investigatory or remedial work, including the installation of remedial measures, if monitoring results or other information indicate such a need.

If you have any questions concerning this matter, please contact Jim Scheffler of this office at 413-755-2127.

Sincerely,

This final document copy is being provided to you electronically by the
Department of Environmental Protection. A signed copy of this document
is on file at the DEP office listed on the letterhead.

Daniel Hall
Solid Waste Chief
Bureau of Waste Prevention
Western Region

DH/jps

cc: Agawam Board of Health
Agawam Conservation Commission
Dana Hammett and Steve Zicolella, Mushy's Golf Center, LLC
Brian Huntley, Tighe & Bond
Peter Czapienski, DEP WERO (Electronic)
Paul Emond, DEP Boston