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

City of Pittsfield
Department of Public Utilities
City Hall, 70 Allen St.
Pittsfield, MA 01201
Attention: Bruce Collingwood, Commissioner

Nov. 6, 2015

RE: Pittsfield-DSWM-15-236-001
Pittsfield Municipal Landfill
Post Closure Use – Solar Power
Permit Approval
BWPSW36
Transmittal #X267611

Dear Mr. Collingwood:

The Massachusetts Department of Environmental Protection (the MassDEP) is issuing this permit approval to the City of Pittsfield (the City) for the post closure use of the City's capped landfill located off Downing Street parkway (the landfill), as a solar power farm (Solar Farm). On September 25, 2015 the MassDEP received from the City the BWPSW36 Major Post Closure Use permit application, under transmittal #X267611 (the application). On November 2, 2015, MassDEP received an addendum containing additional technical information for the application. The application and addendum were completed on behalf of the City by AMEC Massachusetts, Inc. (AMEC) and the application was signed and stamped by Robert J. Bukowski, Massachusetts-registered Professional Engineer (P.E.) #41492. The application form was also signed by Bruce Collingwood, Commissioner of Public Utilities. The application consists of the completed transmittal form, application form, text describing the proposed use, engineering calculations, and six engineering drawings.

Summary of Proposal

The City is the owner of the landfill and the permittee for the Post-Closure use permit. Ameresco, Inc., dba Downing Parkway Solar LLC, will construct and operate the Solar Farm. The application proposes the construction and maintenance of a 2.91 megawatt (MW) photovoltaic solar farm on approximately 12 acres of the capped landfill, including the Western and Eastern Operating Areas, as follows:

- One permanent and six temporary access roads will be built on the landfill cap for vehicle access for construction and maintenance activities;
- Approximately 956 pre-cast concrete foundation footings (ballasts) will be placed within the vegetative support layer on the topslope area of the cap;
- Approximately 478 photovoltaic (PV) panel racks will be installed on the ballasts;

- Approximately 9,538 solar panels (PV modules) will be installed on the panel racks;
- Approximately 85 string inverters will be installed on concrete pads on the vegetative support layer of the cap, where electrical power from the solar panels will be conveyed;
- Four transformer pads will be installed on the vegetative support layer of the cap, where electrical power from the string inverters will be conveyed, and stepped up to the line voltage of the utility grid;
- Power output from the solar panels will be conveyed to the transformer pads via above-ground electrical cables on cable trays mounted on the panel racks, and in above-ground conduit mounted on small, pre-cast concrete ballasts on the vegetative support layer;
- Electrical power will be conveyed off the landfill from the transformer pads via above-ground conduit mounted on small, pre-cast concrete ballasts on the vegetative support layer, and an overhead power line on four new utility poles to be installed off the south perimeter of the landfill.

Erosion and sediment barriers will be placed around the entire work zone of the Solar Farm prior to construction. The Solar Farm work zone is outside the 200-foot Riverfront Buffer and 100-foot wetlands buffer zone.

A permanent access road will be constructed, which will begin at the end of Downing Street, by the City Dog Pound. The permanent access road will run along the southern perimeter of the Eastern Operating Area, up the eastern sideslope of the Western Area, and then northward along the ridge of the Western Area cap. Six temporary access roads will be built off of the permanent road, in an East-West direction, and would be removed after array construction. The access roads (permanent and temporary) will be constructed by placement of a 19-foot wide geogrid (Syntec Biaxial SBX15 or equivalent) on the vegetative support layer (VSL), and addition of a minimum thickness of 12 inches of processed gravel (dense graded stone), to produce a 15-foot wide road with maximum 10% grade. Three, 6-inch culverts are proposed to be installed at the base of the permanent access road in the Eastern Area, to carry stormwater flows across the road. The access roads will be used for delivery of materials, including photovoltaic panels, panel racks, precast footings, and electrical equipment. Only low-ground pressure equipment, 7 pounds per square inch (PSI) or less will be used on the landfill cap off the access roads. Field personnel from AMEC will be on-site during all construction activities on the cap, to monitor for potential damage to the cap. Concrete jersey barriers will be placed along the edge of the permanent access road adjacent to the 6 landfill gas trench vents, to protect the vents from vehicular damage.

The concrete foundations (ballasts) for the photovoltaic racks will be pre-cast off-site. At each ballast location, an excavation will be completed no more than 6 inches into the VSL, and 6 inches of dense-graded, crushed stone will be placed under the ballast. Ballasts on the exterior of the array will be 4 feet wide, 1.5 feet thick, and 8 feet long; ballasts on the interior of the array will be 3 feet wide, 1.5 feet thick, and 6 feet long. The panel racks will be bolted to the footings, and the photovoltaic panels will be mounted to the racks. DC electrical transmission wiring from the racks will run in cable trays on the racks to 85 string inverters, where DC power will be converted to AC power. Each string inverter will be mounted on a concrete ballast 3 feet long, 3 feet wide, and 1 foot thick, placed on 6 inches of dense graded crushed stone at the top of the VSL. All photovoltaic rack assemblies and above-ground wiring will be kept at least 10 feet from any landfill gas vents.

AC power from the string inverters will be conveyed to four transformer pads on the landfill. Each transformer pad will be a 1-foot thick concrete pad, 12.4 feet wide by 20 feet long, poured in place over a 6 inch thick layer of dense –graded, crushed stone, which will be placed over a non-woven geotextile fabric laid on the top of the VSL. Each transformer pad will include a three-phase transformer, panel, stepdown transfer, meter, and data acquisition system. Specifications included in the application show

that the electrical equipment, including the inverters and transformers, will be in metal boxes (cabinets) with no opportunity for worker entry into the cabinets.

Medium voltage power from the three transformer pads on the Western Landfill Area will be conveyed to the easternmost transformer pad on the Eastern Operating Area via conductors in above-ground conduit, in accordance with electrical code requirements. The above ground conduit will run on the panel racks, and also on pre-cast ballast blocks measuring 2 feet wide, 2 feet long, and 1 foot thick. At four road-crossing locations on the permanent access road, the medium voltage power lines will run in pre-cast, concrete road crossing trays, 37.5 inches wide by 22.5 inches deep, with a minimum of 3 inches of dense-graded stone beneath the tray, and the dense-graded stone fill of the access road thickened to be flush with the top of the tray. An overhead power line on four new utility poles will be installed off the south perimeter of the landfill (south of the access road), to carry medium voltage power off the landfill to the utility interconnection there.

AMEC performed geotechnical analyses for the loading on the ballasts and concrete pads, settlement and stability of the ballasts/pads, and sliding stability of the ballasts. The maximum surface slope on which ballasts will be placed will be 11.7 % grade, ballasts will be shimmed at their base with dense-graded crushed stone so that the maximum slope of the ballasts will be 5 %. Uplift, overturning and sliding calculations were based on a modeled wind velocity of 90 miles per hour. AMEC concluded that:

- The maximum loading (bearing pressure) of the ballasts on the crushed stone beneath them was 2.5 pounds per square inch (PSI);
- The maximum bearing pressure of the transformer pads on the crushed stone beneath them was 1.45 PSI;
- The maximum settlement of the ballasts was 1.42 inches;
- The maximum settlement of the transformer pads was 1.6 inches;
- The maximum settlement estimate would produce a strain on the geomembrane liner of the landfill cap of 0.7%, well below the 12% allowable strain at yield for a 40-mil textured HDPe geomembrane;
- The Factor-of-Safety (FOS) for the worst-case ballast sliding scenario (north wind, uplift force on panels, 5% surface slope to the south) was 1.95, above the minimum recommended FOS of 1.5.
- The FOS range for ballast overturning was 1.8 to 1.9 , above the minimum recommended FOS of 1.5.
- The lowest modeled FOS for sliding stability of cap layer materials was 1.9, for the crushed stone/ballast block interface, above the minimum recommended FOS of 1.5.
- For the proposed access road design of a Biaxial Type 2 Geogrid and 12 inches of dense-grade crushed stone, a maximum rutting of 1.5 inches in the road material was modeled, based on an axle load of 40,000 pounds, a tire pressure of 80 PSI, and 500 axle passes.
- All analyses showed minimal loading and settlement, and no stresses or settlement which would damage the impermeable layer of the landfill cap.

AMEC performed updated stormwater analyses for changes to stormwater runoff from the proposed work; AMEC concluded that there will only be small changes in stormwater runoff, and the existing stormwater control system can handle the flows. AMEC states that the proposed construction and operation of the Solar Farm will not alter the conclusions of the previous Qualitative Risk Assessment for the landfill (completed as part of the Comprehensive Site Assessment); i.e. that there are no significant risks to human health and the environment posed by the landfill, or by the presence of the Solar Farm on the landfill.

There are no proposed changes to the existing, long-term monitoring program for the landfill. The landfill will continue to be inspected semi-annually and mowed annually, by the City. If erosion is observed, the surface will be stabilized. Site work on the cap will be avoided during periods of heavy precipitation or when cover soils are saturated and soft, to avoid damage to the cap.

The landfill perimeter is partially surrounded by existing 6-foot chain-link fence on the northern and eastern perimeters, and part of the southern perimeter; the western perimeter of the landfill property is bounded by the Housatonic River and associated wetlands. Decomissioning of the solar farm, if required in the future, would consist of removal of all structures, including foundations, and restoration of the landfill cap to its original condition. The City and Downing Parkway Solar LLC entered into a Power Purchase Agreement (PPA) and lease on July 27, 2015, which extends for a period of 20 years. AMEC states that construction of the solar farm will be completed by March of 2016.

MassDEP Determinations

Personnel of MassDEP have reviewed the Post-Closure Use permit application for the Pittsfield Municipal Landfill in accordance with MGL c. 111 s. 150A, MGL c. 30A, 310 CMR 19.000, and MassDEP's publication Landfill Technical Guidance Manual (the LAC), revised in May, 1997. MassDEP has determined that the application is approved in accordance with MGL c. 111, s. 150A and MGL c. 30A, subject to the conditions outlined below.

1. The City of Pittsfield (the City) is the owner of the landfill and the permittee for the Solar Farm construction and operation.

2. A third-party, independent Massachusetts-registered professional engineer knowledgeable in landfill design and construction (the "Engineer") shall supervise the overall construction of the Solar Farm. The Engineer and/or a qualified QA/QC officer shall be present at the site at all times during road building, fence installation, ballast delivery and placement, installation of the electrical equipment pads, and rack/panel construction, when construction equipment is operating on the landfill. The QA/QC officer shall work under the direct supervision of the Engineer.

3. The Engineer's duties shall include, but not be limited to: oversee installation and construction of the components of the Solar Farm as outlined above; oversee quality assurance/quality control (QA/QC) testing and verify all data generated through the testing program; document all construction and QA/QC activities; and submit monthly construction progress reports to the MassDEP and the City, which shall summarize the work performed during the month.

4. The Engineer's monthly construction report shall include at a minimum the following:

   (A) Any deviation from compliance with requirements approved or set forth in this Permit;
   (B) Any actions taken to correct such deviations, as required by MassDEP or recommended by the Engineer;

(C) Schedules to correct identified problems;
(D) Review of quality assurance/quality control (QA/QC) testing data generated, and documentation for construction and QA/QC activities;
(E) The inspection report shall be signed and dated by the Engineer certifying that to the best of his/her knowledge all information is accurate and complete; and
(F) The Engineer shall submit one copy of the monthly report to the MassDEP and one copy to the City no later than seven (7) days following the end of the previous month.

5. Upon completion of the Solar Farm installation, the Engineer shall submit to MassDEP a completion report, signed and sealed by a Massachusetts-registered P.E., certifying that the work was completed in accordance with the application and the conditions of this permit.

6. Downing Parkway Solar LLC and the Engineer shall be considered operators with respect to the construction of the Solar Farm and compliance with plans and specifications. Downing Parkway Solar LLC shall also be considered an operator during the operational life and decommissioning of the Solar Farm. As such, the Department may take enforcement action against Downing Parkway Solar LLC or the Engineer, consistent with its authority under applicable Massachusetts law and regulation, for any failure to construct the Solar Farm in accordance with approved plans and specifications of which Downing Parkway Solar LLC or the Engineer were, or should have been, aware.

7. The owner, operators and their 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 both construction and maintenance of the solar farm. A copy of the site-specific Health & Safety Plan for the construction and maintenance of the Solar Farm 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 (a minimum of one landfill gas monitor shall be present and in use during all construction activities on the cap), and protocols for modifying work practices if landfill gas is detected at levels deemed unsuitable.

8. All disturbance of the landfill cap shall be limited to the proposed installations on the vegetative support layer of the cap, i.e. - no excavations or other penetrations shall be performed greater than 6 inches in depth into the vegetative support layer, and there shall be no excavations, disturbances or penetrations of any kind into the sand drainage layer of the cap. All concrete footings on the cap shall be placed no more than 6 inches into the vegetative support layer of the cap. There shall be no penetrations (utility, conduit or other) at the base of any rack ballasts. There shall be no penetrations of any kind of the impermeable layer of the cap. The Engineer shall oversee the installation of the four utility poles proposed to be installed off the southern perimeter of the Eastern Operating Landfill soil cap; if solid wastes are observed in the auger holes, the extent and nature of the wastes shall be documented, and a 3-foot bentonite seal shall be placed around the base of the pole.

9. The owner, operators and their contractor(s) are responsible to ensure that the inverter and transformer boxes on the landfill cap area will not accumulate landfill gas within the boxes during the construction and operation of the solar farm. 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 transformer pads include the following:

   A. The floor of each inverter/transformer box shall be solid, with no openings for landfill gas to enter at the floor level, except for utility penetrations;
   B. All utility penetrations of the boxes shall be fully sealed (both outside and within each conduit) against landfill gas entry, and the conduit/wiring from these boxes shall not extend down greater than 6 inches into the vegetative support layer of the cap;
   C. The inverter/transformer boxes shall not include a heater;
   D. The transformer pads shall meet all electrical code requirements, including any code requirements for fencing of the transformer pads. If MassDEP determines that nuisance noise conditions are being created off the landfill property by the electrical equipment of the Solar Farm, MassDEP reserves the right to require noise studies and/or the installation of noise mitigation measures; and
   E. 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.

10. All necessary precautions shall be taken to ensure that the proposed construction and maintenance work associated with the Solar Farm shall not in any way damage the impermeable layer of the landfill cap, landfill stormwater control structures, landfill monitoring wells, landfill gas venting wells, the passive landfill gas venting trench located in the center of the Western Operating Area, or the perimeter active landfill gas collection and treatment system. If any damage occurs to any of the above-listed landfill components, the City or Downing Parkway Solar LLC shall notify MassDEP immediately (within 24 hours maximum), a written plan for repair of the components shall be submitted to MassDEP within 48 hours, and any repair work shall be completed on the schedule determined by MassDEP.

11. Prior to the commencement of construction activities, all landfill gas vents, landfill gas monitoring wells, landfill gas piping, groundwater monitoring wells, and other existing, above-ground structures of the landfill cap and appurtenances 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, including the landfill gas monitoring wells located north of the landfill.

12. 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 components.

13. Low-pressure construction equipment operating off the access roads shall limit turning by tracks on the vegetative support layer and repeated passes over the same areas as much as possible. In no case shall rutting or other disturbance extend more than 6 inches down into the vegetative support layer, or to the sand drainage layer. If MassDEP determines that the use of equipment is creating the potential for damage to the sand drainage layer or the impermeable layer, the usage of such equipment shall cease immediately upon notification by MassDEP, and alternative work practices for operation of equipment of the cap (i.e. placement of geotextile and crushed stone, as proposed) in the affected area(s) shall be instituted. Construction of the Solar Farm shall not create areas of ponded stormwater on the landfill cap, and any such ponded areas shall be remediated as part of the Solar Farm construction or operation.

14. MassDEP specifically reserves the right to restrict or prohibit heavy vehicular loads from the access road on the landfill cap, either as a weight restriction or a usage restriction, should inspections or other information reveal the potential for damage to the cap beneath the road from heavy vehicle loads. The maximum rut depth allowed on the access roads is 3 inches. If ruts greater than 3 inches are created or observed on the access roads, an additional 6 inch thickness of gravel shall be placed on the affected access roads. A minimum of two, additional 6-inch diameter stormwater culvert pipes shall be installed across the access road, at the base of Western Area sideslope, and where the access road curves to the north on the Western Area.

15. Prior to the start of construction, the City or Downing Parkway Solar LLC shall submit to MassDEP a written protocol for the use of concrete pumpers or concrete delivery trucks on the cap. The protocol shall include restriction to only the access roads, and a restriction on the use of outriggers or stabilizers unless specifically approved by MassDEP. The protocol shall also include procedures for the use of outriggers or stabilizers by other, tracked equipment working anywhere on the cap (i.e. either no use of outriggers/stabilizers for concrete pumpers or excavators on the cap, or sufficiently large pads placed beneath outriggers/stabilizers to avoid damage to the cap).

16. If Downing Parkway Solar LLC intends to use different solar panels, panel racks, ladder racks, or electrical equipment other than that detailed in the application, Downing Parkway Solar LLC shall notify MassDEP and provide documentation that the alternative equipment does not increase calculated ground pressures or decrease calculated Factors of Safety for solar array stability.

17. The City, Downing Parkway Solar LLC and their contractor(s) are 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". MassDEP notes that the western perimeter of the landfill is not fenced, and fencing does not extend along the entire southern perimeter. At a

minimum, the remainder of the southern perimeter shall be fenced with a 6-foot tall , chain link fence. The fence may use driven posts only off the landfill cap, the fence shall use ballasted posts anywhere on the landfill cap. MassDEP also notes that the transformer pads are not enclosed by a full fence. The City, Downing Parkway Solar LLC and their contractor(s) are also responsible to ensure that the proposed work complies with all other applicable local, state and federal regulations.

18. Following completion of installation, inspections of the Solar Farm shall be performed on a quarterly basis by a qualified, third-party inspector, and quarterly inspection reports shall be submitted to MassDEP. After one year of quarterly inspections, the City may petition MassDEP in writing to reduce the frequency of inspections. Environmental monitoring shall continue to be performed at the landfill by the owner or operator as outlined in existing correspondence to the City from MassDEP. The entire landfill shall continue to be maintained (inspected and mowed) on a minimum of an annual basis. Any erosion problems, settlement problems, or other issues observed on the landfill cap (inside or outside of the fenced Solar Farm) shall be reported to MassDEP and repaired immediately.

19. This post-closure use permit shall be valid for a period of 30 years from the date of this permit, provided that MassDEP may amend the term of the permit in accordance with an approved modification pursuant to either 310 CMR 19.039 or 19.040. This permit is issued to the City for the Solar Farm construction and operation. If the City intends to transfer this permit to any other entity for operation of the Solar Farm, the requirements at 310 CMR 19.044, Transfer of Permits, shall be satisfactorily completed. If the permittee or operator discontinues operation of the Solar Farm, the permittee or operator is responsible to perform decommissioning activities as outlined in the permit application, including removal of the solar array equipment, ballasts, and associated crushed stone. If the City intends to operate the Solar Farm after the expiration of this permit, the City is required to submit a request for a renewal of the permit at least 90 days prior to the expiration of the permit.

20. MassDEP and its agents and employees shall have the right to enter upon the landfill at all reasonable times, to inspect the landfill and any equipment, structure or land located thereon, take samples, recover materials or discharges, have access to and photocopy records, to perform tests and to otherwise monitor compliance with this Permit and all environmental laws and regulations. This right of entry and inspection shall be in addition to MassDEP's access authorities and rights under applicable federal and states laws and regulations, as well as any permits or other agreements between the Permittee and MassDEP.

21. MasDEP reserves the right to require additional or increased monitoring or maintenance activities in the event that the post-closure use is or may be having a detrimental effect on the landfill cap or appurtenances. MassDEP reserves all rights to suspend, modify or rescind this permit, should the conditions of this permit not be met, should the Solar Farm create nuisance conditions or threats to public health, safety or the environment, or

should MassDEP otherwise determine that continued post-closure use is negatively impacting the landfill cap or appurtenances.

Pursuant to 310 CMR 19.033(5), any person aggrieved by the issuance or denial of this permit decision, except as provided for under 310 CMR 19.033(4)(b), 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 the receipt of the final permit. The standing of a person to file an appeal and the procedures for filing such appeal shall be governed by the provisions of M.G.L. c. 30 A. Unless the person requesting an appeal requests and is granted a stay of the terms and conditions of the permit by a court of competent jurisdiction, the permit decision shall remain effective or become effective at the conclusion of the 30 day period.

Any aggrieved person intending to appeal the decision to the superior court shall provide notice to MassDEP of said intention to commence such action. Said Notice of Intention shall include the MassDEP File Number (15-236-001) 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, 02108

Regional Director
Department of Environmental Protection
436 Dwight Street - Fifth Floor
Springfield, MA 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 and regulations now or in the future.

If you have any questions about this matter, please contact Larry Hanson of this office at 413-755-2287.

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
Section Chief, Solid Waste Management

cc: Pittsfield Health Dept.
Pittsfield – Electrical Inspector
Pittsfield – Building Inspector
AMEC – Robert Bukowski, P.E
Pittsfield – Mayor's Office