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

Syncarpha Bondsville, LLC
645 Madison Ave., 14th Floor
New York, NY
10022
Attention: Clifford Chapman, Managing Member

Aug. 11, 2015

RE: Palmer-DSWM-15-227-001
Palmer – Emery St. Landfill
Post Closure Use – Solar Power
Permit Approval
BWPSW36
Transmittal #X266019

Dear Mr. Chapman:

The Massachusetts Department of Environmental Protection (the MassDEP) is issuing this permit approval to Syncarpha Bondsville, LLC (Syncarpha) for the post closure use of the Town of Palmer's capped landfill (the landfill) located off Emery Street, as a solar power farm (Solar Farm). On June 26, 2015 the MassDEP received from Syncarpha the BWPSW36 Major Post Closure Use permit application, under transmittal #X266019 (the application). The application was completed on behalf of Syncarpha by Tighe & Bond, Inc. (T&B). The application form was signed by Clifford Chapman, Managing Member of Syncarpha, and was also signed and stamped by Brian S. Huntley, Massachusetts-registered Professional Engineer (P.E.) #46273.

The application consists of the original application and an amendment submitted by T&B to MassDEP on July 29, 2015, and includes a completed transmittal form, application form, text describing the proposed use, engineering calculations, and fifteen engineering drawings. The civil engineering calculations of the application were signed and stamped by Brian S. Huntley, and structural engineering calculations for the ballasts and racking system were signed by Mohamed A. Aly, Massachusetts-registered P.E. #46847, of RBI Solar. The civil engineering drawings of the application were signed and stamped by either Brian Huntley or Francis J. Hoey III, Massachusetts-registered P.E. #40111; and the Electrical Engineering drawings of the application were signed and stamped by David J. Colombo, Massachusetts-registered P.E. #40426 (Electrical).

Summary of Proposal

The Town of Palmer (the Town) completed Final Closure (capping) of seven acres of the northern portion of the landfill in 1988, with the cap consisting of (from bottom to top) 6 inches of common soil fill, 12 inches of recompacted glacial clay till, and 6 inches of topsoil (this area is referred to as the Northern Soil Cap Area). In 1997, the Town completed capping of the remaining 12 acres of the landfill in accordance with engineering plans approved by MassDEP, with a cap consisting of (from bottom to top) 6 inches of sand gas vent layer, a 40-mil textured high-density polyethylene (HDPE) geomembrane, 12 inches of sand drainage layer, and 12 inches of topsoil (this area is referred to as the HDPE Cap Area). As required, the Town performs post-closure maintenance and monitoring at the landfill, including monitoring of groundwater, surface water, and landfill gas (LFG) during the 30-year post-closure maintenance and monitoring period.

The application proposes the construction and maintenance of a 5 megawatt (MW) photovoltaic solar farm on approximately 27 acres of the landfill property, including 19 acres on the capped landfill, and 8 acres on the western portion of the parcel, off the landfill cap. The Solar Farm work will include:

- A permanent access road will be built off the western perimeter of the landfill cap, which will extend approximately 300 feet onto the landfill cap, for vehicle access for construction and maintenance activities;
- The solar array will be placed on slopes not exceeding 10% (on the landfill) and 20% (off the landfill), with the solar panels tilted at 25 degrees from horizontal, facing south;
- Pre-cast concrete foundation footings will be placed on the vegetative support layer of the cap. Panel racks located off the cap will be installed with ground screws;
- Photovoltaic panel racks (manufactured by RBI) will be installed on the foundation footings on the landfill, and on ground screws off the cap (manufactured by TerraSmart);
- 11,424 solar panels (Canadian Solar) will be installed on the panel racks on the landfill, and 4,584 solar panels will be installed on the racks off the landfill;
- Four concrete equipment pads will be installed - one on the vegetative support layer of the HDPE Cap, and three outside the cap, off the western perimeter. The equipment pads will hold electrical equipment, including combiner boxes, inverters, switchboxes, transformers, and a switchgear box, where electrical power from the solar panels will be conveyed;
- The photovoltaic panel racks will be connected to the electrical equipment pad via above-ground electrical cables, strung on the panel racks and also on aluminum ladder-type racks between the panel racks;
- The switchgear box of the electrical equipment pad will convey electrical power off the landfill via an electrical cable buried in a conduit ductbank beneath the permanent access road, for transmission of electricity to the National Grid utility grid at new utility poles to be installed on the east side of Emery Street, at the northern access road entrance.

A permanent, 16-foot wide access road will be constructed from the existing southern property entrance on Emery Street, located 100 to 200 feet west of the landfill perimeter, to the existing northern property entrance on Emery Street. One spur road from the access road will lead to an equipment pad to be located off the western perimeter of the landfill, the second spur road will

extend 300 feet onto the Northern Soil Cap to a turnaround and equipment pad. The road and turnaround on the cap will be constructed by the placement of a woven geotextile directly over the vegetative support layer of the landfill cap, and addition of 18 inches of processed gravel over the geotextile. A 14-inch thick concrete duct bank will be installed within the processed gravel layer of the permanent road from the northern property entrance to the electrical equipment pads, with multiple 4-inch diameter PVC conduits within the duct bank; conduits will carry the electrical transmission line from the electrical equipment pads to the utility poles on Emery Street, communication lines, and at least one conduit will be a spare. Construction entry pads will be installed at both entrances of the access roads at Emery Street, consisting of a 6-inch thick, crushed stone pad, 18-feet wide by 50-feet long, to avoid dirt tracking onto Emery Street during construction.

The concrete foundations (ballasts) for the photovoltaic racks will be pre-cast off-site, and will be 8.5 feet long, 1.5 feet thick, and either 2.25 feet wide (interior array area), 3.25 feet wide, or 3.75 feet wide (exterior array area). T&B proposes to use either crushed stone or crushed, clean asphalt, brick and concrete (ABC) material, as fill beneath each footing, to provide a planar surface for the footings, at a maximum slope of 5 degrees slope from horizontal, in the North-South direction. The photovoltaic racks will be bolted to the footings. The electrical transmission wiring from the racks to the electrical equipment pad will be run on aluminum-ladder type cable trays on the landfill surface. All photovoltaic rack assemblies and above-ground wiring will be kept at least 10 feet from any landfill gas vents.

The concrete electrical equipment pad constructed on the landfill cap will be at the end of the access road, and will be 39-feet wide by 44-feet long by 1.0 to 1.5-feet thick. A minimum of 6 inches of compacted gravel and 6 inches of crushed stone will be placed beneath the pad for leveling purposes, and the concrete pad will be poured in place, from concrete trucks operating from the access road. Four inverters, two transformers, one switchgear box and ancillary equipment will be placed on the concrete pad. The electrical lines from the transformers and switchgear will run from the base of these boxes down through the concrete pad and the crushed stone/gravel below, due to electrical code requirements, however none of these electrical lines will penetrate the vegetative support layer. Specifications included in the application show that the electrical equipment, including the inverters and transformers, will be metal boxes with no opportunity for worker entry. A separate fence will not be installed around the electrical equipment pad, as a six-foot tall, chain-link fence currently exists around the entire landfill property; new locking gates will be provided at the two entrances along Emery Street.

The solar array will be grounded as required by electrical codes, including grounding to ballast blocks and the electrical equipment pad. No grounding wires or rods will extend down into the vegetative support layer of the cap. Selective tree clearing will be performed along the western portion of the property.

Only low-ground pressure equipment, 7 pounds per square inch (PSI) or less, will operate off the permanent access road on the landfill cap, and will be operated to minimize turning during operations and to minimize repeated travel over the same areas. A 10-foot wide construction access path will be constructed along the highpoint of both the plastic cap and soil cap, consisting of 6 inches of gravel or clean, crushed asphalt, brick & concrete (ABC) over a woven

geotextile; this path will be used only for low-ground pressure (less than 7 PSI) equipment. If use of equipment is determined to be detrimental to the cap vegetative support layer surface, a geotextile and a 6-inch layer of crushed stone will be placed on the vegetative support layer surface in problem areas for equipment use.

T&B and RBI performed geotechnical analyses for the solar array as follows:

- Loadings (increased ground pressure) from the foundations, racks and panels (including wind and snow loads) were calculated at the top of the sand drainage layer of the plastic cap and at the top of the low-permeable soil of the soil cap, and the calculated ground pressures were compared to a standard of 7 PSI. T&B's calculations showed that ground pressures from the solar arrays at the ballast blocks ranged from 2.0 PSI to 3.2 PSI, and the ground pressure from the electrical equipment pad on the cap would be 2.3 PSI.
- Settlement of the ballast blocks and equipment pad was calculated to be in the range of 0.036 inches to 0.060 inches.
- RBI states that the Factors–of-Safety (FOS) for sliding, overturning, and uplift of the ballasts/racks/panels from wind were acceptable, ranging from 1.46 to 1.79 (wind analysis based on a maximum wind of 95 mph) ;
- RBI states that seismic stability was calculated to be acceptable for the solar array;
- T&B states that the loading and settlement on the access roads on the cap, including potential vehicle tire loading on the access roads, would be equivalent to values calculated for the Oliver Street Landfill in Easthampton, which were previously deemed acceptable and approved by MassDEP;
- T&B concluded that all analyses, for the foundations and the roads, showed minimal loading and settlement, and no stresses or settlement which would damage the impermeable layer of the landfill cap.

T&B performed updated stormwater analyses for changes to stormwater runoff from the proposed work and concluded that there will only be small changes in stormwater runoff, and the existing stormwater control system can handle the flows. The only proposed change to stormwater management at the landfill is the proposed installation of one 12-inch culvert at the low point of the northern access road onto the landfill cap.

T&B 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 and mowed annually, at a minimum. If erosion is observed, the surface will be stabilized.

The Town has signed a long-term lease agreement with Syncarpha. If, at the end of that lease, the option to renew is not exercised, Syncarpha will be responsible for decommissioning of the Solar Farm, which would consist of removal of all structures, including foundations and

associated crushed stone, and restoration of the landfill cap to its original condition. T&B states that construction of the Solar Farm will begin in December of 2015, and will be completed by August of 2016.

MassDEP Determinations

Personnel of MassDEP have reviewed the Post-Closure Use permit application for the Palmer Emery Street 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 Town of Palmer (the Town) is the owner of the landfill, and Syncarpha Bondsville, LLC (Syncarpha) is 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 pad, 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 Town, 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 Town 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. Syncarpha and the Engineer shall be considered operators with respect to the construction of the Solar Farm and compliance with plans and specifications. Syncarpha 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 Syncarpha 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 Syncarpha 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, 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 top of the vegetative support layer of the cap, i.e. - no excavations or other penetrations shall be performed into the vegetative support layer or sand drainage layer of the cap without separate written approval from the MassDEP. All concrete footings on the cap shall be placed on top of, or above, the vegetative support layer of the cap, unless otherwise approved by the MassDEP. There shall be no penetrations (utility, conduit or other) at the base of any rack ballasts on the landfill cap. <u>There shall be no penetrations of any kind of the impermeable layer of the cap.</u>

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(5)(g), for notification and action. The additional requirements for the electrical equipment pad include the following:

   A. Each inverter/transformer box shall be ventilated and the floor of each box shall be solid, with no openings for landfill gas to enter at the floor level, except for box penetrations required by the manufacturer or electrical codes;
   B. Any utility, conduit or any other penetrations through the base of the electrical equipment concrete pad penetrations shall be fully sealed (both outside and within each conduit) against landfill gas entry, and the conduit/wiring <u>shall not extend down into the vegetative support layer of the cap;</u>
   C. The inverter/transformer boxes shall not include a heater;
   D. If MassDEP determines that nuisance noise conditions (i.e. 10 dB above background at the property line or nearest receptor) are being created by any of the electrical equipment, 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. At least one operable landfill gas monitor shall be in use at all times during construction work on the landfill cap.

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, or the landfill gas venting trench on the western landfill perimeter.. If any damage occurs to any of the above-listed landfill components, Syncarpha 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, 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. Construction work along the western landfill perimeter shall not interfere with, or damage in any way, the landfill gas (LFG) venting trench located outside the landfill cap in that area. As proposed, screw anchors shall not be used within 10 feet of the LFG trench.

13. Vehicles operating on the landfill cap shall only operate on the designated permanent 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. Low-pressure construction equipment operating off the access roads shall limit turning by tracks on the vegetative support layer as much as possible. In no case shall rutting or other disturbance extend more than 6 inches down into the vegetative support layer (i.e. to the sand drain age layer). If MassDEP determines that the use of excavation 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.

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. MassDEP also specifically reserves the right to impose, at any

time deemed necessary by MassDEP, additional requirements for construction of the access road on the cap, including the addition of a geogrid to the base of the access road.

15. Prior to the start of construction, Syncarpha shall submit to MassDEP a written protocol for the use of concrete pumpers, concrete delivery trucks or cranes on the cap, including restriction of use only to the permanent access road, 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 tracked excavators working anywhere on the cap (i.e. either no use of outriggers/stabilizers on the cap, or sufficiently large pads placed beneath outriggers/stabilizers to avoid damage to the cap).

16. If Syncarpha intends to use different solar panels, panel racks, ladder racks, or electrical equipment other than that detailed in the application, Syncarpha 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. Clean, crushed asphalt, brick and concrete (ABC rubble), crushed to 3" diameter or less, may be substituted for crushed stone beneath ballast blocks, as proposed. Coated (painted or stained) ABC rubble shall **not** be used in the Solar Farm construction. Compaction of the crushed stone or clean ABC must not damage the geomembrane of the cap, and crushed stone or ABC shall not be compacted more than 6 inches into the vegetative support layer.

18. Syncarpha 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". Syncarpha and their contractor(s) are also responsible to ensure that the proposed work complies with all other applicable local, state and federal regulations.

19. Syncarpha is responsible to ensure that the access entrances from the landfill onto Emery Street comply with applicable local and state regulations and requirements for traffic safety, and that any applicable traffic or construction permits for these entrances are gained prior to construction. Syncarpha is also responsible to ensure that the solar farm work complies with applicable Town zoning regulations.

20. Herbicides shall not be used on the landfill property during the construction or the operational life of the solar array.

21. Following completion of installation, inspections of the Solar Farm shall be performed on a quarterly basis by a qualified engineering consultant, and quarterly inspection reports shall be submitted to MassDEP. After one year of quarterly inspections, Syncarpha may petition MassDEP in writing to reduce the frequency of inspections. Environmental monitoring shall continue to be performed at the landfill by the Town as outlined in existing correspondence to the Town from MassDEP. The entire landfill shall continue to be maintained (inspected and mowed) at a minimum on 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.

22. 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 Syncarpha for the Solar Farm construction and operation. If Syncarpha 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 operator intends to operate the Solar Farm after the expiration of this permit, the operator is required to submit a request for a renewal of the permit at least 90 days prior to the expiration of the permit.

23. 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.

24. 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 (15-161-001) 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: Charlie Blanchard – Palmer Town Manager
Palmer Board of Health
Palmer Planning Dept.
Palmer Electrical Inspector
Palmer Building Inspector
Tighe & Bond – Brian Huntley, P.E.
Renewable Energy Massachusetts, LLC