

VTM Engineering, PLC

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May 8, 2023

Ms. Valerie Capels
Bristol Town Administrator
1 South Street
PO Box 249
Bristol, Vermont 05443

RE: Bristol Landfill – 2023 Annual Inspection (Draft)
Solid Waste Identification Number AD080
ANR Project Identification Number RU95-0205

Dear Ms. Capels:

VTM Engineering, PLC is pleased to provide this report summarizing VTM's annual inspection as well as recommendations for post closure care for the Bristol Landfill.

If you have any questions regarding the inspection or findings, please feel free to contact me.

Respectfully,
VTM ENGINEERING, PLC

Steven L. Palmer, P.E.
President

Attachments:
Bristol Landfill – 2023 Annual Inspection Report

**BRISTOL LANDFILL
2023 ANNUAL INSPECTION REPORT**

**Prepared for:
Town of Bristol, Vermont**

**Prepared By:
VTM Engineering**

May 5, 2023

BRISTOL LANDFILL

2023 ANNUAL INSPECTION REPORT

BACKGROUND

VTM Engineering, PLC was contracted by the Town of Bristol, Vermont to conduct an annual inspection of the former municipal landfill located at the west end of Pine Street in Bristol, Vermont. In preparing for the annual inspection, VTM reviewed the approved Landfill Post Closure Permit for the facility (Permit) dated January, 30, 2017 as well as an associated Permit Amendment dated September 7, 2021. The 2021 amendment was specific to a solar array that was constructed on top of the former landfill in 2020/2021. Finally, VTM reviewed the approved Post Closure Plan for the facility dated September 30, 2016 prepared by LE Environmental. It should also be noted that there is a separate Stormwater Discharge Permit (Permit #9252-9050) issued through the Vermont Department of Environmental Conservation for the access road area on the east side of the landfill. The stormwater permit is specifically related to solar array project and has its own (separate) annual inspection and reporting requirements.

1.0 APPLICABLE PERMITS AND PERMIT REQUIREMENTS

1.1 Landfill Post Closure Permit and Permit Amendment

A Post Closure Permit was issued by the Vermont Agency of Natural Resources in 2017. The permit includes the following annual inspection requirements: *“On or before June 15th each certification year, the Permittee shall submit an annual evaluation of the Facility. This inspection shall be performed by a registered engineer or other qualified professional. The engineer or qualified professional shall evaluate at a minimum the integrity of the final cover system and vegetative cover, the drainage systems and surface water runoff, and the gas ventilations system. The inspection shall be performed during the month of May of each certification year.”*

An Amendment to the Post Closure Permit pertaining to the solar arrays was issued in 2021. The Amendment added the following annual inspection requirement: *“Commencing upon installation of the solar array, the annual evaluation required under Condition 10 (of the original permit) shall also incorporate, any notable differential settlement and lateral foundation movement, ballast integrity, and solar system components.”*

1.2 Landfill Post Closure Plan

In addition to the permit and permit Amendment, a landfill Post Closure Plan was prepared and submitted as part of the original 2017 Permit application. The Post Closure Plan was made part of the Permit by reference. The Post Closure Plan contains the following language pertaining to annual maintenance *“A majority of the maintenance efforts will be on an "as-needed" basis. They include annual mowing of the vegetated cover for aesthetics, woody growth control, weed control to promote growth of the desired species, and regrading and re-vegetation should vegetative growth fail and/or soil erosion occurs. Drainage control features will be periodically inspected to ensure that erosion, differential settlement and sediment build-up have not occurred that may jeopardize the original design intent. These occurrences should be promptly corrected. Burrowing animals should be removed from the landfill, to avoid the creation of*

large holes in the cap. The gate and warning sign should be maintained, and the gate kept locked to prevent future dumping, to minimize vandalism and to protect the public.”

2.0 2023 SITE INSPECTION AND ASSOCIATED FINDINGS

2.1 Entry Gate

The landfill entry gate was noted to be in place. The gate was open during the inspection however Town Highway Department personnel were working in the vicinity at the time. No garbage or debris or garbage was noted in or around the area.

2.2 Final Cover System & Vegetative Cover

No areas containing significant differential settlement were noted during the inspection. Small bushes/trees were noted to be growing within the former landfill limits in a number of areas indicating that annual mowing of the vegetated cover does not appear to have been conducted recently. There was significantly more vegetive cover (grass) noted during the 2023 inspection than the year previous. Town officials indicated that significant re-seeding efforts had been undertaken following the 2022 annual inspection. Although some areas were noted to be lacking vegetative cover, the efforts undertaken in 2022 appear to have been largely successful. The areas still lacking adequate vegetative cover were primarily located in and around the new solar arrays. No areas were noted where significant erosion had occurred. It was also noted that a number of areas of the landfill cover did not appear to have been mowed in 2022.

2.2 Drainage Systems and Surface Water Runoff

In general, the stone drainage ditches surrounding the site appear to be in good physical condition. No settlement or other similar damage was noted which would impact their operation. One section of the stone lined ditch on the southeast side of the former landfill appears to have been filled. During the 2022 annual inspection, small trees were noted to be growing in a number of the stone lined ditches, primarily along the west side of the former landfill. It was noted during the 2023 inspection however that the trees in this area had been removed and the drainage ditches appeared to be in good functional condition.

One small drainage ditch along the northeast side of the facility was noted to still contain brush and small trees. The ditch still appears to be fully functional however from a stormwater transmittance perspective.

2.3 Gas Ventilation Systems

Each of the four (4) existing passive gas vents were observed during the inspection. No settlement or other visible issues were noted and the gas vents appear to be functional.

2.4 Solar Array

In 2021, a solar array was constructed on top of the former landfill. The solar array is a completely free-standing design with no buried foundations, wiring or other components that may have directly

impacted the final cover integrity during construction. The foundations for each array are designed to spread out the weight of each array and limit the potential for differential settlement. During the 2023 annual inspection, no areas with notable differential settlement, lateral foundation movement, or ballast concerns were noted. The solar arrays appear to all be in excellent condition and functioning as designed.

There were still areas lacking vegetive cover in and around the new solar arrays. Photographs of these areas are attached.

3.0 RECOMENDATIONS

The following recommendations are based upon specific items identified during the May 8, 2023, field inspection:

- A. All areas should be mowed at a minimum of once per year. Preferably mowing should be done in late May or early June to allow the vegetative cover time within the growing season to propagate. Mowing should include the perimeter ditches that are grass lined.
- B. Re-seeding and re-establishment of vegetative cover (where necessary). If any areas of erosion are noted during re-seeding activities, areas should be filled and smoothed prior to re-seeding. Monitoring of all newly seeded areas should be performed as needed. In and around the solar arrays, grass seed that is designed for shady areas should be utilized.
- B. Brush and small trees noted to be growing anywhere on or within the landfill cap area should be removed to prevent future root damage to the underlying final cover system.
- C. All brush and small tree growth within the existing stone perimeter drainage ditch on the northeast side of the site should be removed.
- D. The portion of the stone lined ditch that was filled to provide access around the southeast end of the site should be addressed. A culvert should be installed across the access road to facilitate drainage across the roadway and limit the potential for future erosion. Care should be taken to ensure that there are no adverse impacts to the existing final cover system during the work.

Photographs



Photo #1 – Landfill Overview



Photo #2 – Solar Array



Photo #3 – Area in Need of Vegetative Cover



Photo #4 – Areas in Need of Vegetative Cover



Photo #5 – Solar Array Foundation



Photo #6 – Gas Well



Photo #7 – Stone Drainage Ditch Growth Northeast Corner

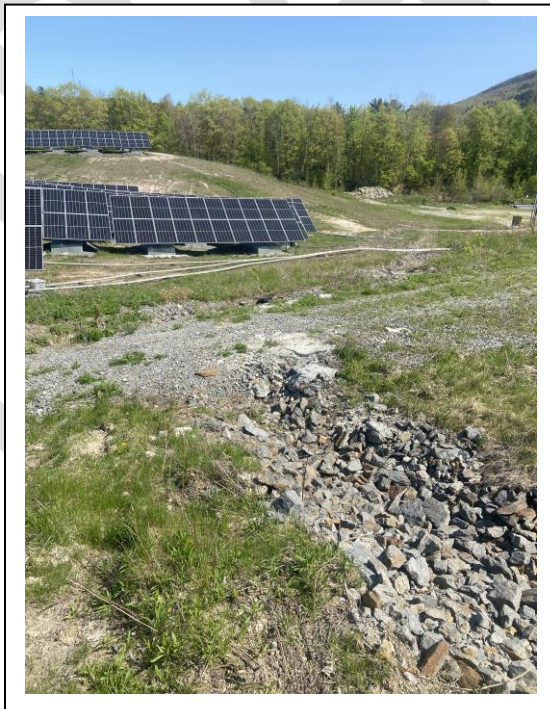


Photo #8 – Filled Stone Drainage Ditch