

March 3, 2021

Pamela Hoyt-Denison, P.E. Administrator
Waste Management Division
New Hampshire Department of Environmental Services
P.O. Box 95, 29 Hazen Drive
Concord, New Hampshire 03302-0095

**Re: North Country Environmental Services Landfill
Trudeau Road – Bethlehem, NH
Supplemental Response to February 18, 2021 Notice of Findings**

Dear Ms. Hoyt-Denison:

This letter follows up on our recent discussions regarding the New Hampshire Department of Environmental Services, Waste Management Division's February 18, 2021 notice of findings concerning North Country Environmental Services, Inc. (NCES).

We are providing an advanced copy of the capacity analysis (attached) prepared by a third-party consultant based on a survey also performed by a third-party. This capacity analysis will also be provided as an attachment to the NCES Annual Facility Report for 2020 as discussed.

We trust you will agree that this documentation supports our February 19 response to the notice of findings. Should you have any questions, please do not hesitate to contact me at (802) 236-5973 or by email at john.gay@casella.com.

Sincerely,

NORTH COUNTRY ENVIRONMENTAL SERVICES, INC.



John Gay, E.I.
Permits, Compliance & Engineering

- c. Kevin Roy, NCES (via email)
- Brian Oliver, NCES (via email)

MEMORANDUM

TO: Operating Record, NCES

FROM: Robert Grillo, P.E., CMA Engineers, Inc.

RE: NCES – 2020 Annual Facility Report
Capacity Analysis
Bethlehem, New Hampshire
CMA #665

DATE: 03/02/2021

This memorandum provides calculations determining the volume remaining at the NCES Landfill on December 31, 2020 for the Annual 2020 NCES Facility Report. Attachments included show the following:

- Plan(s) showing the surveyed footprint of the landfill, surveyed surface topography, and permitted final grades, stamped by the qualified licensed professional(s) that performed the survey and prepared the plan(s).
- Calculations for determining remaining capacity, showing the method and assumptions, submitted under cover of the qualified licensed professional who performed the work.

Topographic Surfaces - Aerial Survey & Ground Surveys:

Topographic surfaces used to calculate the volume remaining include a site aerial survey performed on June 16, 2020 by Quantum Spatial with ground control provided by Horizons Engineering, Inc., and two ground surveys performed within the active filling areas by Horizons Engineering, Inc. on October 5, 2020, and January 4, 2021. Original topographical NH licensed stamped surveys are enclosed.

CMA Engineers created a composite topographic surface using these three survey plans, shown on CMA Drawing #1. Starting with the aerial survey of the entire landfill flown on June 16, 2020, we inserted and tied in the October 5, 2020 ground survey of the area filled since the June 7 to create a single topographic surface for the October date. Next, we inserted and tied in the January 4, 2021 survey to create an “end of year” waste surface (CMA Drawing #1) for use in calculating remaining capacity.

Volume Remaining Calculations

The end of year waste surface was compared to a top of waste grading plan to calculate volume remaining. The top of waste grading plan is shown on CMA Drawing #2. The top of waste plan was based on the NHDES approved Stage V Closure Drawing, then lowered by the thickness of the landfill final cover with side slopes steepened from 3H:1V to 2.7H:1V to account for pre-settlement waste grades. Areas excluded from these volume calculations are the eastern and western slope final capped areas and the northern facing Stage V side slope which is at capacity. It is not always practical to fill side slope areas with thin layers of waste, so available capacity on the north slope was ignored in the calculation. Areas included in the calculation are within the orange dashed line on CMA Drawing #3.

As discussed with the Department on February 18, 2021, capacity currently above the final waste grades within the top deck area, shown as red ticks, is subtracted from the volume remaining value. These areas represent small uniform filling and will become drainage valleys to match the final top deck grading configuration. Final shaping of the landfill top area will occur prior to closure of the area in 2027 or 2028. Based on recorded settlement rates, the in-place waste is expected to settle 8 to 10 feet prior to closure, requiring additional filling through 2027 to achieve final permitted grades.

It has been NCES practice to survey the waste surface on a quarterly basis to closely manage disposal capacity. As the filling approaches final grades, the surveyor is called to the site on a more frequent basis to evaluate waste grades.

The volume remaining values were calculated by comparing the end of year waste topography surface to the top of waste grades using the volume analysis tools within Autodesk Civil 3D. The resulting 139,805 cubic yards capacity is shown on attached CMA Drawing #3. This value represents capacity remaining on January 4, 2021 when the ground survey was conducted. To determine capacity on December 31, 2019, waste disposed at the site between January 1 and 4, 2021 was added to the calculated capacity, as described in the attached volume remaining calculation. Scale receipt data provided by NCES for that period was converted to cubic yards using a factor of 0.80 tons per cubic yard. With this adjustment, capacity remaining at the end of 2020 is 141,628 cubic yards.

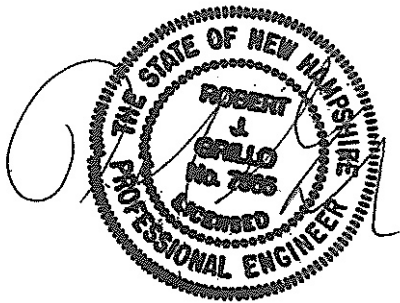
Enclosed:

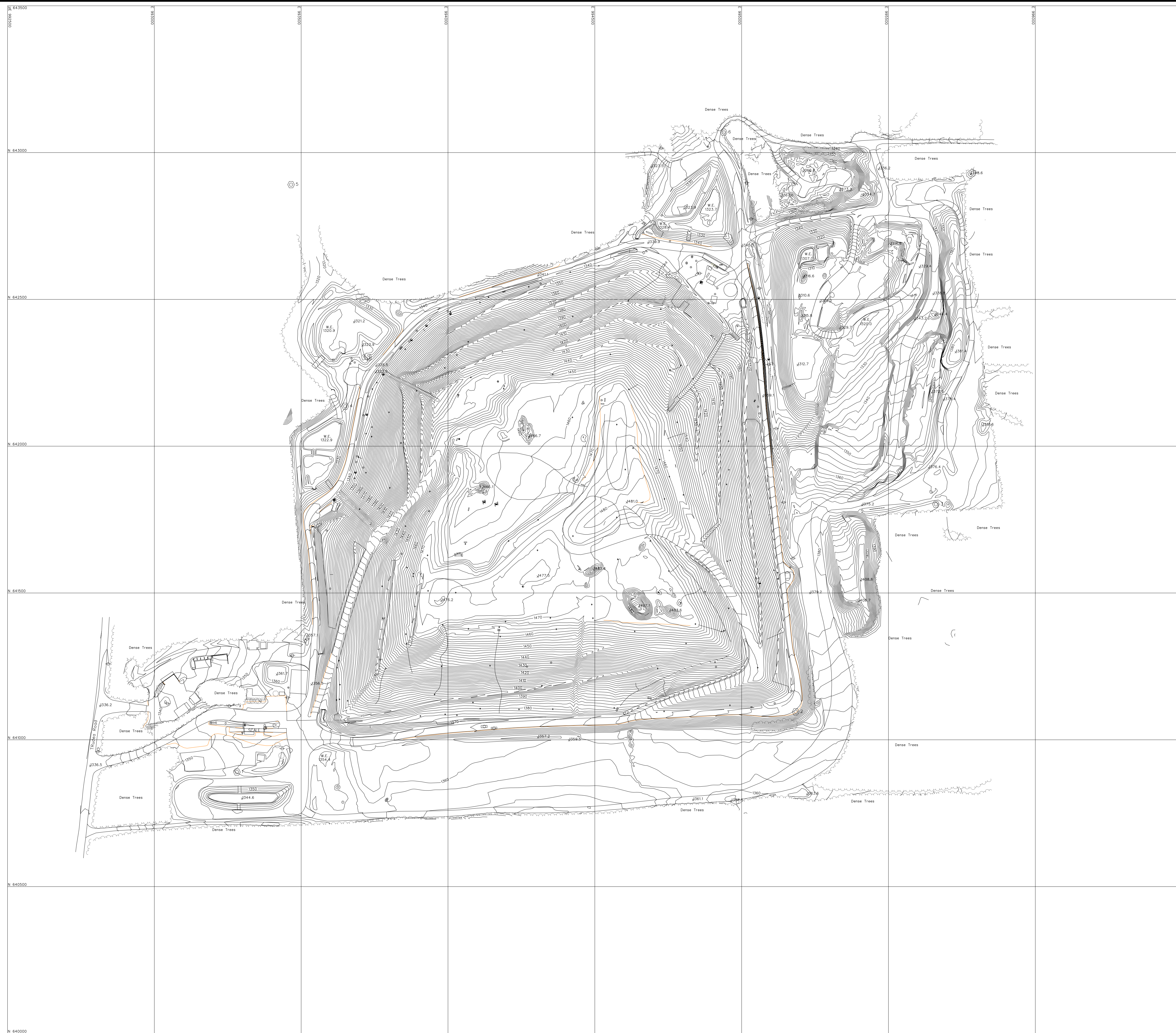
Horizons Engineering, Inc.

- Survey – June 16, 2020 Aerial Survey
- Survey – October 5, 2020 Ground Survey
- Survey – January 4, 2021 Ground Survey

CMA Engineers, Inc.

- Drawing 1 – Topography on January 4, 2021
- Drawing 2 – Top of Waste Closure Grades
- Drawing 3 – January 4, 2020 Site Survey Volume Remaining
- Volume Remaining Calculation – December 31, 2020



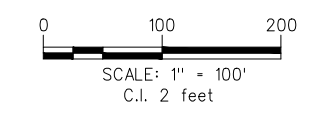


This map compiled by
QUANTUM SPATIAL
 45180 BUSINESS COURT
 DALLAS, VIRGINIA
 20166-6706

Dashed contours indicate that ground is partially obscured by vegetation or shadows. These areas may not meet standard accuracy and require field testing/confirmation. Blank areas are totally obscured by vegetation or shadows.

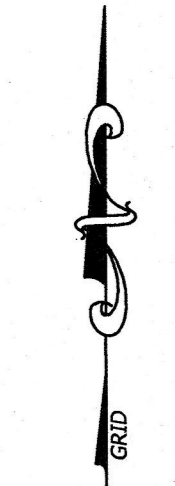
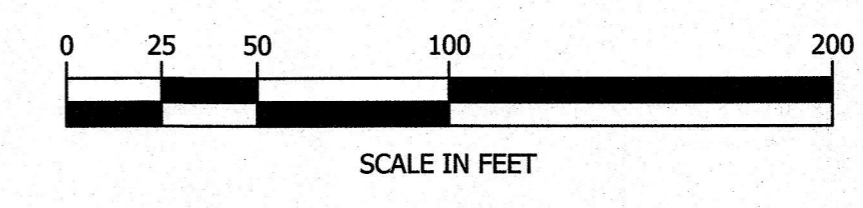
North Country Landfill

This mapping has been compiled in accordance with procedures that have been demonstrated to comply with the National Standard For Spatial Data Accuracy (NSDA), for a target horizontal mapping scale of 1 inch = 100 feet and a specified contour interval of 2 feet.



This map compiled by photogrammetric methods from aerial photography dated 06/16/2020. Grid based on Arbitrary Coordinate System. Vertical datum based on NAVD 1988.

North Country Environmental Services Bethlehem, New Hampshire 2021 Quarterly Volume Update Quantum Spatial June 16, 2020 Aerial Survey		designed by: - drawn by: - approved by: -	date: February 2021 project no: 665 file name: NorthCountryLandfill.dwg scale: 1" = 100' 0 100 200 feet
		CMA ENGINEERS CIVIL/ENVIRONMENTAL/STRUCTURAL Portsmouth, NH • Manchester, NH • Portland, ME 603/431-6196 • 603/627-0708 • 207/541-4223 c m a e n g i n e e r s . c o m	
drawing no. 1		sheet: 1 of 1	no. revision by date



horizons
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**NORTH COUNTRY
ENVIRONMENTAL SERVICES**
TRUDEAU ROAD
LANDFILL
BETHLEHEM, NEW HAMPSHIRE

OCTOBER 2020
VOLUME UPDATE

NO.	DATE	REVISION DESCRIPTION	ENG	DWG

DATE: 10/05/2020	PROJECT #: 19047
SURVD BY: NWS	DRAWN BY: NWS
CHECK'D BY: AJN	ARCHIVE #: H-

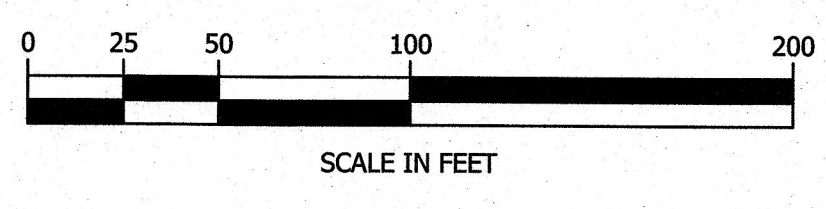
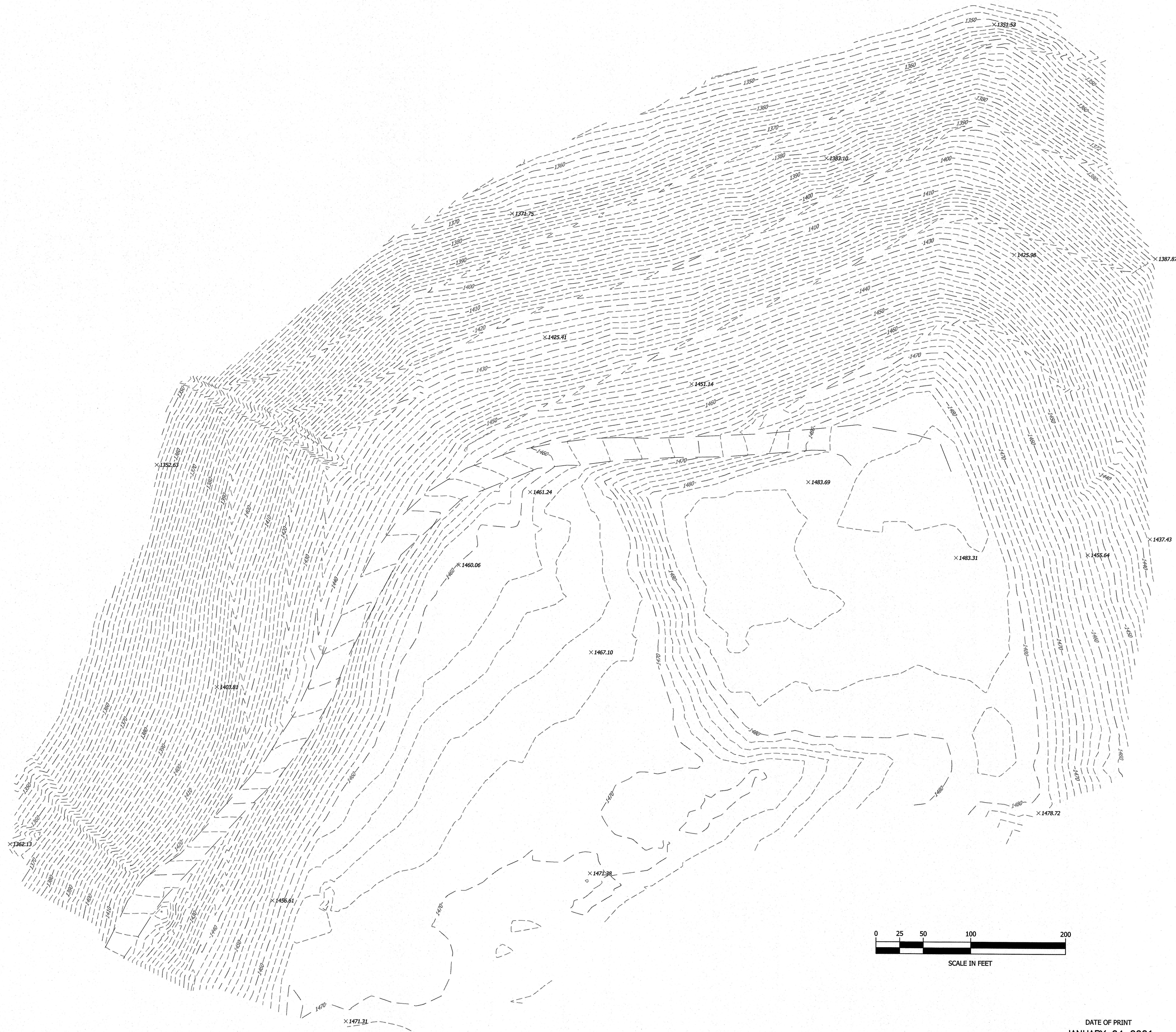
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16 8 2020

SHEET 1 OF 1

DATE OF PRINT
OCTOBER 08 2020
HORIZONS ENGINEERING

W:\19047 NCS - Bethlehem\DWG-TO-FR\2020-1005 VOLUME UPDATE.dwg, 2020-1005 Volume, 10/8/2020 7:46:32 AM, NS28



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NEWPORT VT • LITTLETON NH • NEW LONDON NH
POMFRET VT • KENNEBUNK ME • CONWAY NH

NORTH COUNTRY ENVIRONMENTAL SERVICES
TRUDEAU ROAD
LANDFILL
BETHLEHEM, NEW HAMPSHIRE

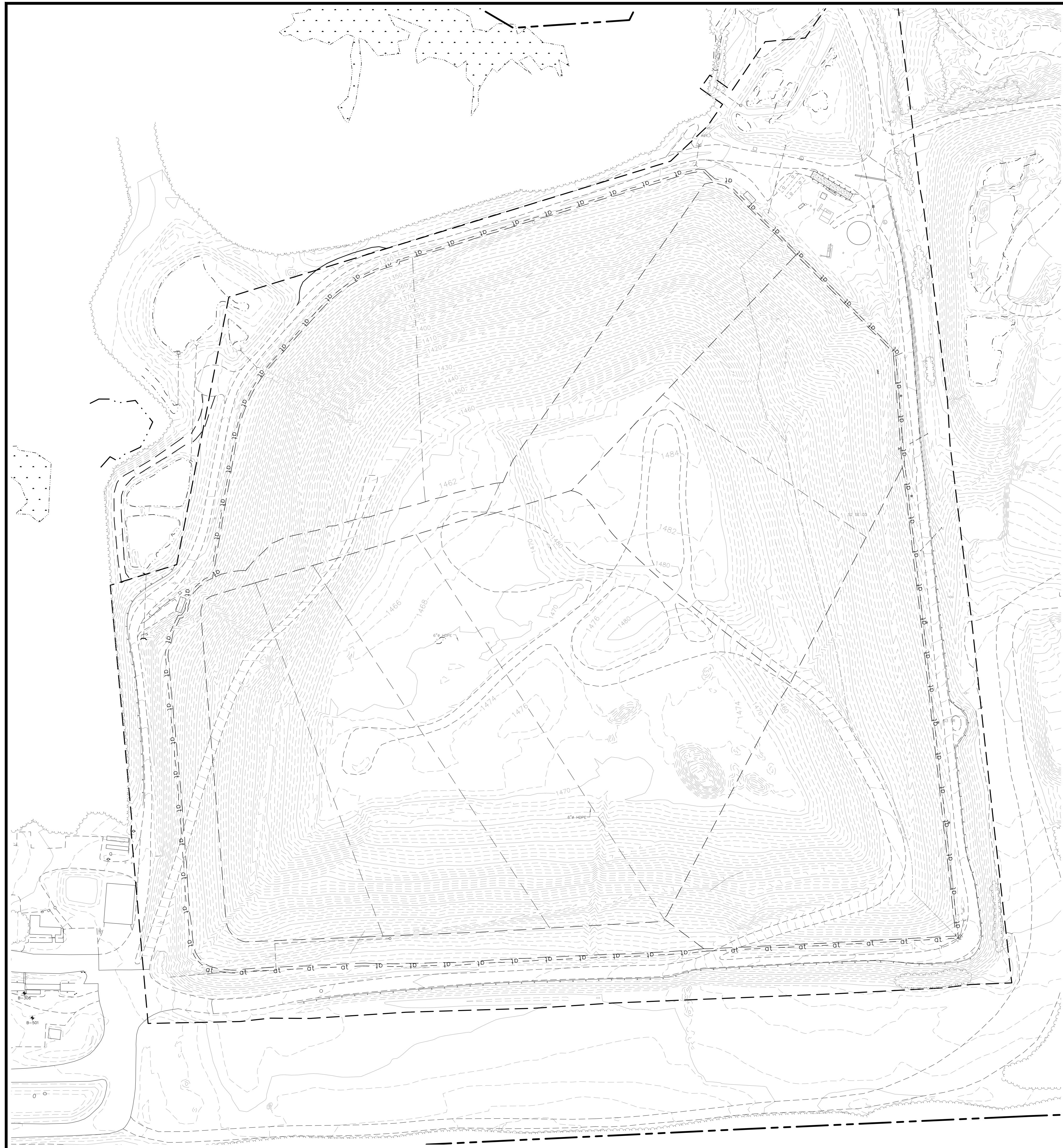
JANUARY 2021
VOLUME UPDATE

NO.	DATE	REVISION DESCRIPTION	ENG	DWG

	DATE:	PROJECT #:
	01/04/2020	19047
	SURV'D BY:	DRAWN BY:
	NWS	NWS
CHECK'D BY:	ARCHIVE #:	
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SHEET 1 OF 1		

DATE OF PRINT
JANUARY 04 2021
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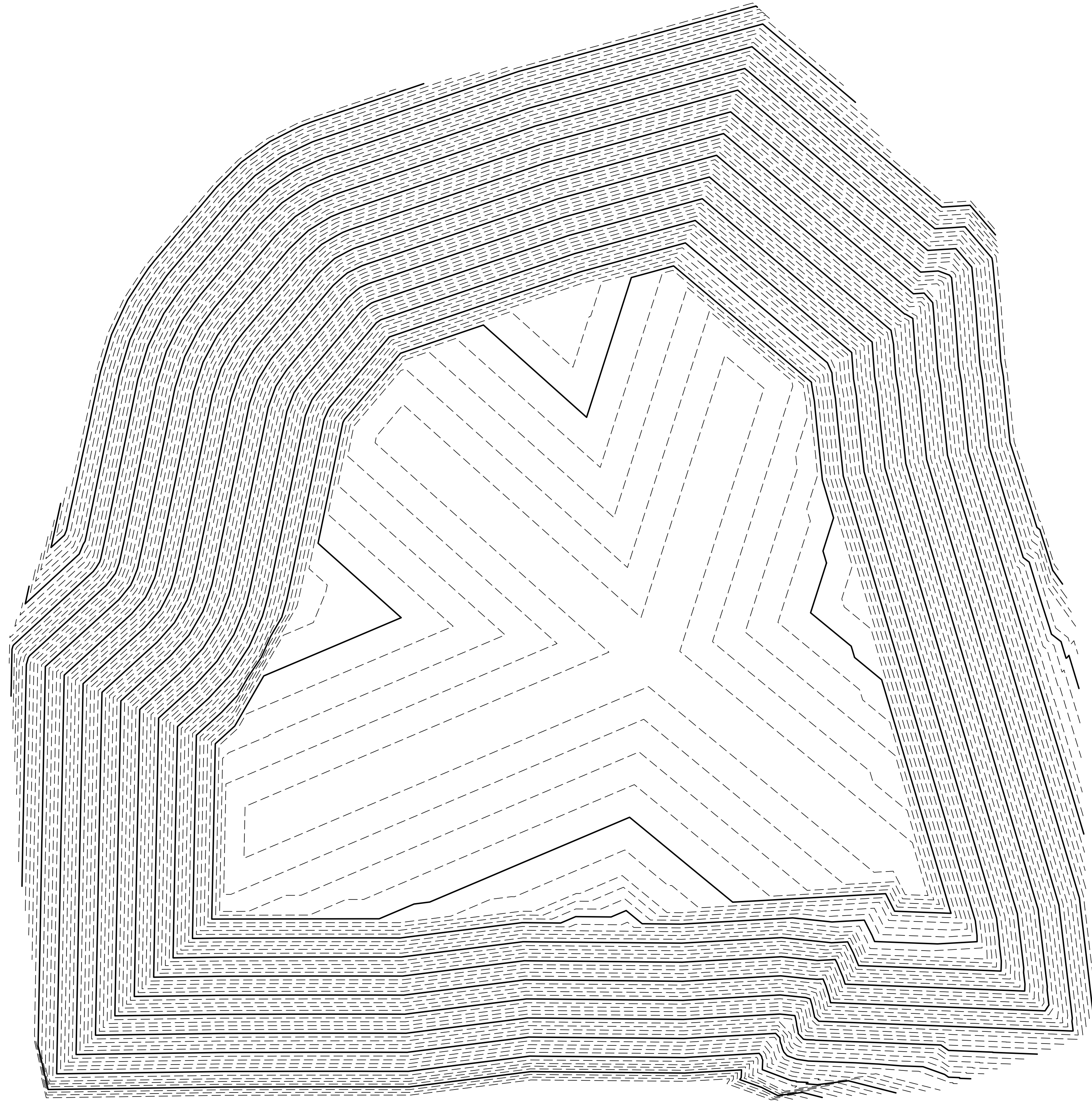
Notes:

- Existing topography surface is developed from aerial photography performed by Quantum Spatial on June 16, 2020 combined with site surveys performed by Horizons Engineering, Inc. on October 5, 2020 and January 4, 2021.

Legend:

- January 4, 2021 2' Contour
- 1440----- January 4, 2021 10' Contour
- - - - - Approximate Property Line
- - - - - Limit of Landfill District V Zone
- - at - - at - - at - - at - - at - - at - - at - - Anchor Trench

<p style="text-align: center;">CMA ENGINEERS Civil/Environmental/Structural</p> <p style="font-size: small; text-align: center;">Portsmouth, NH • Manchester, NH • Portland, ME 603/431-6196 • 603/627-0708 • 207/541-4223 c m a e n g i n e e r s . c o m</p>										
	date:	March 2021	designed by:	R/J	drawn by:	ATR	approved by:		scale:	
	project no:	665							100' 200'	
	file name:								Scale: 1" = 100'	
<p>North Country Environmental Services Bethlehem New Hampshire</p> <p>2020 AFR Volume Remaining</p> <p>Topography on January 4, 2021</p>										
drawing no.										
1										
sheet:	1	of						3	by	date

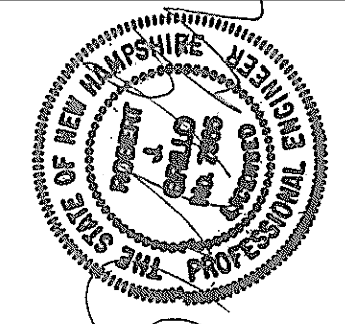


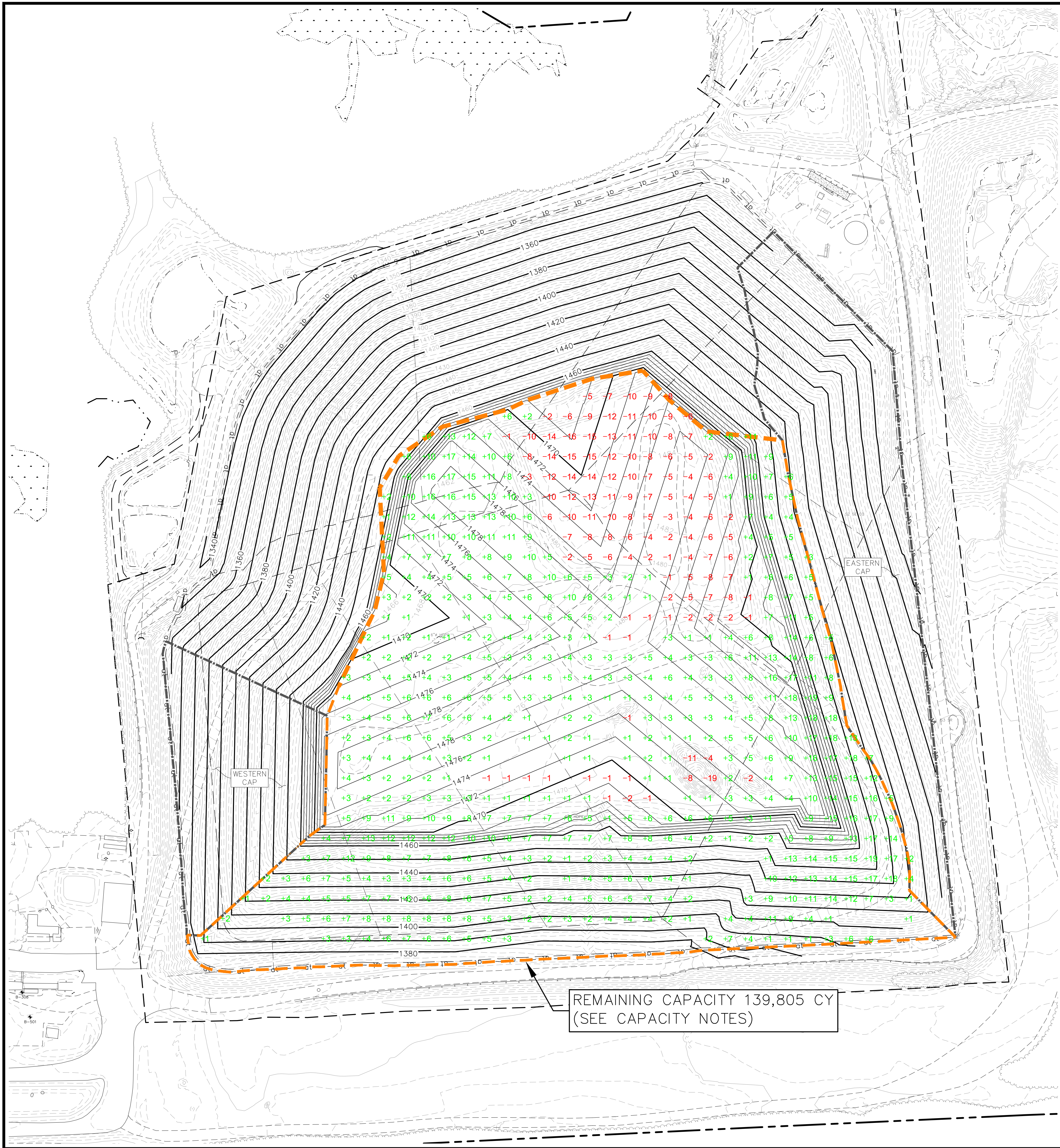
Notes:

1. Surface shown is top of waste grades from the closure plan, with side slopes steepened from 3:1 to 2.7:1 pre-settled waste grades.

Legend:

- Top of Waste Closure 2' Contour
- 1440———— Top of Waste Closure 10' Contour

	
CMA ENGINEERS CIVIL/ENVIRONMENTAL/STRUCTURAL Portsmouth, NH • Manchester, NH • Portland, ME 603/431-6196 • 603/627-9708 • 207/541-4223 c m a e n g i n e e r s . c o m	designed by: RIG drawn by: ATR approved by: _____ date: March 2021 project no: 665 file name: _____ scale: 1" = 100' 0 100 200'
North Country Environmental Services Bethlehem New Hampshire 2020 AFR Volume Remaining Top of Waste Closure Grades	
drawing no. 2	
sheet: 2 of 3	
	no. _____ revision _____ date _____ by _____



Notes:

1. Upper surface is top of waste grades from the closure plan, with side slopes steepened from 3:1 to 2.7:1 pre-settled waste grades.
2. Lower surface is developed from aerial photography performed by Quantum Spatial on June 16, 2020 combined with site surveys performed by Horizons Engineering, Inc. on October 5, 2020 and January 4, 2021.
3. The volume calculation is based on a comparison of the above surfaces. Remaining capacity was calculated using the Volume Analysis tool within Autodesk AutoCAD Civil 3D. Areas excluded from the analysis include the Stage V northern facing side slopes and the Eastern and Western final capped areas.

Capacity Notes:

Gross calculated volume remaining:
 Sum of all tick marks (+) 183,365 CY

Gross calculated overfill:
 Sum of all tick marks (-) (43,560 CY)


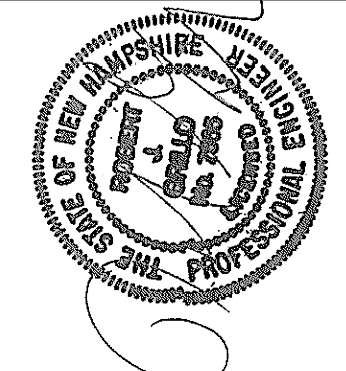
Remaining Capacity 139,805 CY

Areas within Volume Boundary without a tick mark have neither cuts nor fills and are at final top of waste elevations.

Legend:

- January 4, 2021 2' Contour
- January 4, 2021 10' Contour
- Top of Waste Closure 2' Contour
- Top of Waste Closure 10' Contour
- Approximate Property Line
- Limit of Landfill District V Zone
- - - - - Anchor Trench
- Volume Boundary
- +8 Spot Remaining Fill Thickness
- 5 Spot Overfill Thickness

REMAINING CAPACITY 139,805 CY
 (SEE CAPACITY NOTES)

	by: _____
	date: _____
	revision: _____
	no. _____
 <small>CIVIL/ENVIRONMENTAL/STRUCTURAL</small>	<small>Portsmouth, NH • Manchester, NH • Portland, ME</small> <small>603/431-6196 603/627-0708 207/541-4223</small> <small>c m a e n g i n e e r s . c o m</small>
	
<small>designed by: RUG</small> <small>drawn by: ATR</small> <small>approved by: _____</small>	<small>date: March 2021</small> <small>project no: 665</small> <small>file name: _____</small> <small>scale: 1" = 100'</small> <small>200'</small>
North Country Environmental Services Bethlehem New Hampshire	2020 AFR Volume Remaining January 4, 2021 Site Survey Volume Remaining
drawing no. 3	
sheet: 3 of 3	



35 Bow Street
Portsmouth, NH 03801

Project: NCES Landfill
Project No: 665
Date: 03/02/21
Calc. By: ATR
Chkd. By: RJG
Sheet: 1 of 1

NCES - Volume Remaining Calculation Bethlehem, New Hampshire

Volume Remaining Calculation

Surface 1 January 4, 2021 Site Survey

Surface 2 Permitted Top of Waste Closure Grades w/2.7:1 pre-settlement side slopes

Volume Remaining on January 4, 2021 **139,805 CY** (SEE CMA DRAWING 3)

NCES Scale Material Report (1/1/21 to 1/4/21)

Net Tons **1,458 TONS**

Calendar Days **4 Days**

Tons/Day **365 TONS/DAY**

Volume Remaining on December 31, 2020 - (Back Calculation)

Tonnage for 1/1-1/4 **1,458 TONS**

Compaction Rate **0.80 CY/TON**

Conversion to CY **1,823 CY**

Volume Remaining on 12/31/20 = 139,805 + 1,823 = **141,628 CY**

